THE NATIONAL BIOLOGICAL DIVERSITY STRATEGY AND ACTION PLAN

2007

The National Biological Diversity Strategy and Action Plan

Prepared by

Republic of Turkey
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Department of Nature Conservation
National Focal Point of Convention on Biological Diversity

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Living resources, which are important in terms of food and agriculture and which are steadily decreasing, are counted today among the important advantages a country may possess. The arable lands and water resources of the world are rapidly becoming polluted and disappearing. Scientists think that mankind will in the near future be faced with a serious shortage of water and food. In the light of these developments, the biological diversity of a country is becoming a major strength, especially in terms of genetic resources.

As a country that has vital resources for people's food security. Turkey is one of the fortunate countries of the world from the viewpoint of biological diversity. This considerable wealth both offers our country economic opportunities and imposes upon it the responsibility to establish a conservation-utilization balance. Our country will be able to use these opportunities and to establish a conservation-utilization balance and carry its biological diversity over to future generations through plans and programmes that also ensure harmony between sectors. As required by Article 6 of the UN Convention on Biological Diversity, to which we are a party, our country must prepare national strategies, plans and programmes to achieve the conservation and sustainable use of biological diversity.

The National Biological Diversity Strategy and Action Plan (NBSAP) has been prepared with the aims of meeting our obligations under the UN Convention on Biological Diversity, implementing actions in conformity with the regulations of the European Union in the sector of nature conservation, and achieving the goals of conservation and sustainable use through a comprehensive and integrated approach to the biological diversity of our country.

The NBSAP includes goals and actions that will directly or indirectly affect all sectors that play a role in the conservation, management and utilization of biological diversity. It also defines the priorities and commitments of our country at the international level with regard to the conservation and sustainable use of biological diversity. For these reasons, the contribution and participation to be provided by the relevant institutions and organizations at the stage of implementation as they did during the preparation of the NBSAP will be one of the most important elements of the heritage that we will leave to future generations.

Prof. Dr. Veysel EROĞLU

Minister of the Environment and Forestry

CONTENT

PREFACE

The decrease of biological diversity is considered as one of the most serious global environmental threats faced by mankind today. In this age, where man is having an adverse impact on the environment, it is observed that the loss of species has further accelerated in comparison with past ages. This rapid decrease in biological diversity is threatening the ecological, economic, moral and cultural benefits we currently derive from the living resources of the earth. At the World Summit on Sustainable Development held in 1992 in Rio de Janeiro, it was agreed that the decrease of biological diversity is a major problem and can only be prevented through international efforts. The Summit ended with the signing of important global conventions including the Convention on Biological Diversity, to which Turkey is party. Turkey signed this Convention in 1992 and ratified it through Law 4177 of 29 August 1996. The Convention entered into force in our country on 14 May 1997.

Due to the differences in biological resources and in the conditions of each country, it is a basic principle that each country should determine and implement its own priorities to achieve the goals specified in the Convention. For this reason, the implementation of the Convention and of the work programmes adopted under the Convention is left to national actions. Article 6 of the Convention envisages the preparation of national biological diversity strategies and action plans for this purpose.

Turkey's National Biological Diversity Strategy and Action Plan (NBSAP) was prepared in 2001 under the coordinating role of the Ministry of Environment, with the intention that it should serve as a guide in implementing the Convention on Biological Diversity in harmony with other obligations and in addressing the problems caused by the loss of biological diversity. However, changing national and international conditions and trends made it necessary to revise the NBSAP of 2001. Consequently, the NBSAP was updated in 2007 through a participatory approach under the "Biological diversity Convention Implementation Project" conducted with UNEP/GEF grant support. More than 100 representatives, listed in the annex, from relevant governmental agencies, universities, professional associations and non-governmental organizations as stakeholders in the conservation, management and use of biological diversity contributed to and participated in the process. In addition, consultancy support was received in thematic areas and in implementing methods of participation by the team composed of Prof. Dr. Ekrem Kün, Prof. Dr. Zeki Kaya, Prof. Dr. Bülent Cihangir, Prof. Dr. Hayri Duman, Prof. Dr. Metin Ger and Nurhan Koral.

I would like to express my appreciation and special thank at first to Project Coordinator Deputy General Director Mr. Mustafa AKINCIOĞLU, Deputy Project Coordinator Head of Department Ali Mennan MENNANOĞULLARI, Biologist Hüsniye KILINÇARSLAN, Biologist Ergül TERZİOĞLU and Engineer Ersin ÖZEK and staff of our General Directorate who contributed to the preparation of the NBSAP with their self-sacrificing works.

Cooperation at the national level is required for our country to use its potential in terms of biological resources and to maintain its process of development without destroying those resources. I consider it a pleasant duty to thank all the participants who contributed to the preparation of the NBSAP and I hope that this valuable cooperation and participation will also be achieved in its implementation.

Prof. Dr. Mustafa Kemal YALINKILIÇ

Ministry of the Environment and Forestry

General Director of Nature Conservation and National Parks

1. EXECUTIVE SUMMARY

1.1. INTRODUCTION

Biological diversity means the diversification of living organisms in all sources including the terrestrial, marine and other aquatic ecosystems and the ecological structures that are part of these ecosystems; it refers to the differences exhibited by the living environments (habitats or, more broadly, ecosystems) of species in terms of various biotic and abiotic factors, to the differences between living things in ecosystems and between living and non-living things, which vary according to place and time, and to all of genes, species, ecosystems and functions.

Biological diversity is considered in three hierarchical categories: genetic diversity, species diversity and ecosystem diversity.

Genetic Diversity means the diversity within a given species. Such diversity is measured by the genetic difference within a certain species, population, variety, sub-species or race.

Species Diversity means the diversity of the species in a particular region or area or in the entire world. The number of species in a region (that is, the "species richness" of that region) is the most commonly used measure in this regard.

Ecosystem Diversity concerns the whole created by the community of organisms that interact with each other as an ecological unit and by their physical environment. The ecosystem also includes factors, such as fire, climate and the food cycle, which are separate from the community level and which are non-living themselves but affect the formation, structure and interaction of the community of living things. The conservation of biological diversity at the ecosystem level covers the conservation of the food chain and of the energy flow. At this level, it is necessary to protect not only species or groups of species but also characteristics and processes.

Biological diversity is the basis of living resources which have an essential place in meeting the basic needs of human beings, including food in particular. Biological diversity provides services such as decomposition, the chemical structure of the atmosphere and the world climate which are of vital importance for human beings and which can only be secured through the continuity of healthy and complex ecosystems. Half the drugs used in medicine originate from wild living things. All types of agricultural product, that is, plant and animal species under culture, are rooted in their wild relatives. Also today, wild species are made use of to obtain new types of agricultural product or to improve existing ones for the needs of human beings. For wild species to maintain their existence, to evolve, to diversify and to acquire new genetic characteristics, ecosystems have gained complex and differing structures and functions through the interaction of living and non-living things with each other and within themselves, also depending on environmental conditions. The integrity and diversity of ecosystems perform important functions in the continuity of natural balances such as climate, rainfall and species sociology.

Living resources, which are important in terms of food and agriculture and which are steadily decreasing, are counted today among the important advantages a country may possess. The arable lands and water resources of the world are rapidly becoming polluted and disappearing. Scientists think that mankind will in the near future be faced with a serious shortage of water and food. In the light of these developments, the biological diversity of a country is becoming a major strength, especially in terms of genetic resources. Wild living resources are used to develop varieties resistant to environmental pressures and with high production potential.

It is observed that the human factor is directly or indirectly responsible for almost all causes that reduce or adversely affect biological diversity throughout the world. Regardless of the origin of the causes that reduce biological diversity, it is again the responsibility of us human beings to protect, manage and sustainably use it.

The Convention on Biological Diversity was drafted at the end of a four-year exercise launched by the United Nations Environment Programme (UNEP) in 1987 upon the need that emerged with the acceleration of processes bringing biological diversity under increased pressure such as industrialization and urbanization across the world. At the World Summit on Sustainable Development held in 1992 in Rio de Janeiro, it was agreed that the decrease of biological diversity is a major problem which can only be prevented through coordinated international efforts. The Summit ended with the signing of important global conventions including the Convention on Biological Diversity, to which Turkey is party. Turkey signed this Convention in 1992 and ratified it in 1996 and it entered into force in our country on 14 May 1997.

The three main goals of the Convention on Biological Diversity (CBD) are:

- The conservation of biological diversity;
- The sustainable use of biological resources; and
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Convention as a global instrument guides the countries party to it with the aim of evaluating the adequacy of the efforts for the conservation of biological diversity and the sustainable use of biological resources and determining how the gaps concerning the matter can be filled and how opportunities can be created. Turkey is required to comply with the terms of the Convention, including the development of a National Biological Diversity Strategy and Action Plan.

In this framework, the National Biological Diversity Strategy and Action Plan (NBSAP) was prepared in 2001 under the coordinating role of the Environment Ministry, with the intention that it should serve as a guide in implementing the Convention on Biological Diversity in harmony with other obligations and in solving the problems caused by the loss of biological diversity. However, the need emerged to update the NBSAP in the light of the changing national and international conditions and trends and the progress recorded under the Convention since 2001. More than 100 representatives and experts from relevant governmental agencies, non-governmental organizations and universities as stakeholders in the conservation, management and use of biological diversity participated in and contributed to the process of updating the NBSAP. With these representatives and experts, national workshops were held on a participatory basis and activities conducted in thematic groups on agricultural, steppe, mountain, forest, coastal and marine, and inland water biological diversity. Following the activities conducted under the leadership of a team of specialists who provided scientific and technical consultancy to the process, the data concerning our country's biological diversity and the information concerning the institutional and legal infrastructure were updated, the goals for the conservation and sustainable use of biological diversity were ranked by priority, and the strategic goals and roadmap were determined. In addition, the obstacles and gaps standing in the way of achieving the priority goals, the inconsistencies in practices, and the requirements to be met for achieving the goals were identified.

The NBSAP is intended to identify and assess Turkey's biological diversity in brief, to determine an agreed strategy for conservation and to present decision-makers with proposals for action required for achieving the goals of biological diversity conservation in Turkey. The NBSAP should be regarded as a dynamic tool which may be renewed and updated as the goals are reached and the conditions change.

1.2. ASSESSMENT

Turkey is one of the fortunate countries in the world as a country possessing vital resources for people's food security and has the responsibility to protect and use this important wealth rationally for the welfare of the future generations. Because it has three biogeographical regions called Euro-Siberian, Mediterranean and Irano-Turanian and their transition zones and because its climatic and geographical features change within short intervals of space due to its position as a bridge between two continents, Turkey has acquired the character of a small continent from the point of biological diversity. Turkey has forest, mountain, steppe, wetland, coastal and marine ecosystems and different forms and combinations of these systems.

This extraordinary ecosystem and habitat diversity has produced a considerable species diversity. It is noted that fauna biological diversity is quite high in our country compared with the biological diversity of other countries in the temperate zone. Despite lack of data, the invertebrates constitute the largest number among the identified living species. The total number of invertebrate species in Turkey is about 19,000, of which about 4,000 species/sub-species are endemic. The total number of vertebrate species identified to date is near 1,500. Of the vertebrates, over 100 species are endemic, including 70 species of fish. Anatolia is the home of the fallow deer and the pheasant. The fact that our country is located on two major bird migration routes in the world makes it an important place as a feeding and breeding area for birds.

To appropriate Turkey's wealth in flora species, a comparison with the continent of Europe will be sufficient: While there are 12,500 gymnospermous and angiospermous plant species in the entire continent of Europe, it is known that there are such species close to this number (about 11,000) in Anatolia alone, with some one third of them endemic to Turkey. Eastern Anatolia and Southern Anatolia among the geographical regions, and the Irano-Turanian and Mediterranean regions among the phytogeograhical regions, are rich in endemic plant species.

Turkey's genetic diversity becomes important with plant genetic resources in particular because Turkey is located at the intersection of the Mediterranean and Near Eastern gene centres. These two regions have a key role in the emergence of cereals and horticultural crops. In our country, there are 5 micro-gene centres in which more than 100 species display a wide variation and which are the origin or centre of a large number of important crop plants and other economically important plant species such as medical plants. These centres offer very important genetic resources for the future sustainability of many plant species cultivated across the world. In terms of animal genetic resources, it is agreed that many domestic animal races were originally bred in Anatolia as a result of its location and spread from here to other regions of the world.

In conclusion, while talking about the wealth of biological diversity, it must be addressed at the level of ecosystems, species, genes and biological functions and evaluated also from the point of its significance for agriculture, forestry and industry.

The in-situ and ex-situ conservation approaches are followed to protect biological diversity. With their respective peculiar applications, both approaches are widely accepted on the international scale.

In-situ conservation is an approach which holds that species depend on the natural environment for their survival and must therefore be protected in their own ecosystems. In Turkey, in-situ conservation efforts were started in the 1950s, long before the concept of 'in-situ conservation' gained wide acceptance. In our country, in-situ protected areas have been designated under various statuses including National Park, Nature Park, Nature Conservation Area, Natural Site, Wildlife Development Area, Special Environment Conservation Area and internationally significant wetland. The in-situ protected areas established for different purposes to date have reached

about 4.6 million hectares in total, corresponding to some 6 % of the country's surface area. However, the existing protected areas do not adequately represent the components of biological diversity that our country has, including the steppe and marine ecosystems in particular.

The conservation of biological diversity outside its natural habitat is considered a method of conservation that complements in-situ conservation. In our country, such activities were started in the 1930s with a view to protecting agricultural biological diversity and in the 1970s with a view to protecting forest biological diversity. The gene banks at the Field Crops Central Research Institute and the Aegean Agricultural Research Institute, both of which are affiliated to the Ministry of Agriculture and Rural Affairs, have assumed the leading role in the ex-situ conservation of the wild relatives of crop plants and of other herbaceous plant species. The ex-situ conservation activities for forest trees are performed by organizations affiliated to the Ministry of the Environment and Forestry, including the Forest Trees and Seeds Improvement Research Directorate in particular.

Another point which is as much important as in-situ and ex-situ conservation with regard to biological diversity conservation is to incorporate the principles of "sustainable use" into sectoral applications. Sustainable use means establishing a conservation-utilization balance in view of the self-maintenance capacity of natural resources. In this way, biological diversity can be used optimally and, at the same time, its continuity is guaranteed. The NBSAP is expected to perform an important function in incorporating the principles of sustainable use into sectoral applications.

1.3. THE STRATEGY IN BRIEF

This Strategy is a response to the obligation to prepare a national strategy for the purpose of guiding the implementation of the Convention on Biological Diversity. The aim of this Strategy is to identify and assess Turkey's biological diversity in brief, to determine a generally agreed strategy for conservation and to propose the actions required for achieving the goals of biological diversity conservation in Turkey. The Strategy is intended "to create a society that lives as part of nature, that values biological diversity that does not consume more than what nature is capable of replacing, and that leaves to future generations a nature rich in biological diversity".

The Strategy is a living tool which may be renewed and updated as the goals are reached and the conditions change. The Strategy has been prepared for the benefit of society, with the contributions of the individuals and organizations to assume a role in its implementation.

An approach that promotes participation was used in the process of forming the Strategy. In two workshops held so as to enable the representation of all individuals and organizations concerned with biological diversity, the necessary infrastructure was created for the second and third national reports that Turkey was required by the Convention on Biological Diversity to submit to the Secretariat of the Convention, on the one hand, and the goals required for the Strategy were prioritized and proposals for action developed, on the other hand.

The following materials were taken as a basis in the Strategy work.

- Information, proposals and opinions obtained from the second and third national reports prepared under the Convention on Biological Diversity
- Development plans and annual programmes prepared by the State Planning Organization
- Legal arrangements explained in section 4.1.2. of the Strategy
- The Work Programmes and the Guidelines under the Convention on Biological Diversity
- Previously made plans with direct or indirect relevance (the NBSAP-2001, the National Environmental Strategy and Action Plan, the National Plan for In-Situ Conservation of Plant Genetic Diversity, the Action Plan for the Protection and Rehabilitation of the Black Sea, the Mediterranean Action Plan, the National Action Plan to Combat Desertification, etc.)
- Project outputs prepared by various organizations (the Project for In-Situ Conservation of Plant Genetic Diversity, the Biological Diversity and Natural Resource Management Project, the Project for the Conservation and Management of the Habitats of Endangered Plant Species, management plans prepared for national parks and wetlands, projects conducted in Special Environmental Protection (SEP) Zones by the SEP Agency, projects conducted by the Agricultural Research and Forestry Research Institutes, projects conducted by universities, etc.)
- Outputs of the workshop held for the updating of the NBSAP

The Strategy defines the current legal responsibilities concerning biological diversity, underlines the importance of international cooperation intended for policy-making and the importance of the necessary research conditions to develop ecosystem management, and includes a definition and assessment of Turkey's biological diversity and the strategies and priority action plans towards the goals.

Strategic Objectives and Goals

When examining the goals that are considered to have priority by at least three thematic areas, it is found that the following issues have strategic importance in achieving the objectives of the Convention on Biological Diversity:

- Identifying the indicator species that are important for biological diversity, making inventories of species, populations and ecosystems, and effectively implementing the monitoring and classification system
- Identification, recording, protection and management of the elements of genetic diversity that are important for biological diversity, agriculture, food and economic values
- Establishing a central information management system to enable the sharing of research results for application by decision-makers, users and other stakeholders and a more rapid analysis and distribution of biological and biophysical data
- Developing special protection measures with priority given to fragile, threatened and endangered species and ecosystems, to critical habitats, to classification groups on which very little work has been done, to classification groups that have economic value, to areas with a high level of diversity, and to regions where damage caused by rural and urban development and human activity has occurred most widely
- Determining and monitoring the impacts of climate change on biological diversity and taking measures to protect the most affected ecosystems and species from these impacts
- Identification and conservation of special, fragile mountain ecosystems and other biological diversity hot points and of the species that accompany them

- Ensuring the links and coordination between the implementation processes of the National Biological Diversity Strategy and other relevant national initiatives such as agricultural strategies or national development plans
- Promoting the sustainable use of biological resources and eliminating or minimizing the negative effects of resource use on biological diversity

Coordination is the primary shortcoming that needs to be eliminated on the road to achieving the strategic goals envisaged for effective conservation and sustainable use of biological diversity. For this reason, issues relating to coordination and financial resources are addressed as the tenth objective of the Strategy. In the area of human resources, lack of skilled personnel is noticeable. With regard to infrastructure, although the categories of goals have different requirements, it is noted that infrastructural requirements have a key role in achieving the goals of identifying, protecting and recording genetic resources. With regard to legislation, gaps have been identified in some areas, and a lack of implementation and enforcement in others.

Starting from the current state of biological diversity in Turkey, the trends, the priorities and the gaps analysis, 10 objectives have been defined under the three goals of the Convention on Biological Diversity. Three of these objectives are considered by all the thematic working groups to have priority and therefore address all the thematic areas. The common strategic goals for the thematic areas have been brought together under these three objectives, and the actions regarded as critical for achieving these goals have been defined. Under the other 6 objectives are listed those goals which both are considered by each thematic area to have priority for itself and must be addressed in the scope of that thematic area for achieving the common goals. Under these goals defined for the particular thematic areas, actions that support again both the goals of the thematic area and the common goals have been determined, including actions towards capacity-building in view of the needs identified in the gaps analysis. The tenth objective defined is for solving the problem of cooperation and coordination in particular. The capacity requirements identified in the gaps analysis and to play a key role in the implementation of the NBSAP are also reflected in the actions under this objective. The objectives and goals of the Strategy are presented below:

GOAL 1: To identify, protect and monitor biological diversity components which have importance for Turkey

Objective 1.1 In order to determine and monitor any changes in ecosystems, species and genetic diversity, to develop and implement biological diversity inventory and monitoring methods and programmes, by considering rapid assessment methods and biological diversity indicators, as well

Objective 1.2 To include the less-represented ecosystems, species and genetic diversity centers into protected areas of both terrestrial and aquatic ecosystems, and to achieve an effective protected area management

Objective 1.3 To prevent or minimize as far as possible any pressures on and threats to biological diversity

GOAL 2: To use biological diversity components in a sustainable manner by applying the methods and at a level fitting to their renewal capacity by taking the future generations' needs into account

Objective 2.1 To establish harmony among legal, administrative and institutional regulations and applications having relevance to the conservation of biological diversity and sustainable use of its components

Objective 2.2 To develop and put into practice the ecosystem-based planning and management systems for the purposes of the biological diversity conservation and the sustainable use of biological resources

Objective 2.3 To raise public awareness and sensitivity concerning the conservation and sustainable use of biological diversity

GOAL 3: To identify, protect and benefit the components of genetic diversity, including the traditional knowledge, which have importance for Turkey

Objective 3.1 To identify, record, protect and manage the components of genetic diversity which have importance in terms of biological diversity, agriculture, food and economic value

Objective 3.2 To control access to genetic resources and guarantee the sharing of the benefits arising out of the utilization of these resources with Turkey

GOAL 4: To identify, protect and monitor the components of biological diversity which have importance for agricultural biological diversity; to protect genetic resources which have actual and potential values for food and agriculture, and to ensure the sustainable use of such resources; and to ensure the fair and equitable sharing of the benefits arising out of the utilization of genetic resources

Objective 4.1 To identify, protect and monitor the biological diversity elements which have importance for agricultural biological diversity

Objective 4.2 To develop management applications and technologies as well as policies which support the positive impacts of agriculture on biological diversity, on one hand, and minimize its adverse impacts, on the other hand, and to increase yield from agricultural ecosystems and its capability to sustain as a source of livelihood

Objective 4.3. To prevent or minimize as far as possible any pressures on and threats to agricultural biological diversity which come from the genetically modified organisms (GMO's) and the alien species

Objective 4.4. To ensure conservation and sustainable use of genetic resources which have actual and potential values for food and agriculture; and to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources

GOAL 5: To protect steppe biological diversity, to ensure the sustainable use of its components, as well as to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources; and to combat against the loss of steppe biological diversity and the socio-economic results of that

Objective 5.1. To fill the information gaps concerning steppe biological diversity

Objective 5.2. To identify ecological, physical and social processes such as grazing, drought, desertification, aridity, salinity, flood, fires, tourism, agricultural transformation or abandonment which have adverse impacts on the biological diversity of steppe ecosystems and mainly on the ecosystem structure and function, and to take measures regarding the above

Objective 5.3. To establish mechanisms and frameworks in order to support the fair and equitable sharing of the benefits from the utilization of the genetic resources of steppe areas

GOAL 6: To establish an effective monitoring, management and coordination system for the conservation of forest biological diversity and the sustainable use of its components

Objective 6.1. To develop and put into practice the monitoring programmes for better evaluation of the status and tendency of forest biological diversity

Objective 6.2. To establish appropriate mechanisms for more effective conservation and sustainable use of forest biological diversity

GOAL 7: To establish an effective monitoring, management and coordination system for the conservation and sustainable use of mountain biological diversity, together with its different ecosystems, pursuing a holistic approach

Objective 7.1. To effectively implement biological and ecological inventories, monitoring programmes and classification systems

Objective 7.2. To establish appropriate mechanisms for the conservation and sustainable use of sensitive mountain ecosystems

GOAL 8: To develop and implement effective methods for the conservation of inland waters biological diversity, the maintenance of ecological functions of inland waters ecosystems, and the sustainable use of these ecosystems

Objective 8.1. To strength technical and institutional capacity for the conservation and sustainable use of inland waters biological diversity

Objective 8.2. To take actions for the conservation and sustainability of inland waters biological diversity and reduce threats to it

GOAL 9: To develop and implement effective methods for the conservation of coastal and marine biological diversity, the maintenance of ecological functions provided by coastal and marine ecosystems, and the sustainable use of these ecosystems

Objective 9.1. To strengthen necessary administrative, legal, institutional and technical capacity for the identification, monitoring, conservation and sustainable use of coastal and marine biological diversity

Objective 9.2. To fill the information gaps concerning coastal and marine biological diversity, to identify and put under conservation the areas and species which have importance for biological diversity and are under threat, and to develop and implement monitoring programmes

Objective 9.3. To combat against the threats to coastal and marine biological diversity

GOAL 10: To establish a mechanism for the implementation of the Biological Diversity Strategy and Action Plan and the follow-up of implementation and reporting

Objective 10.1 To establish coordination among the relevant institutions as regards the conservation and sustainable use of biological diversity

Objective 10.2. To achieve the integrity and sustainability of financial structure for the identification, conservation and sustainable use of biological diversity

2. INTRODUCTION

2.1. THE CONVENTION ON BIOLOGICAL DIVERSITY AND THE NBSAP

The National Biological Diversity Strategy and Action Plan (NBSAP) is a response to the obligation to prepare a national strategy that will guide the implementation of the Convention on Biological Diversity.

The Convention on Biological Diversity was drafted at the end of a four-year exercise launched by the United Nations Environment Programme (UNEP) in 1987 upon the need that emerged with the acceleration of processes bringing biological diversity under increased pressure such as industrialization and urbanization across the world. At the World Summit on Sustainable Development held in 1992 in Rio de Janeiro, it was agreed that the decrease of biological diversity is a major problem and can only be prevented through international efforts. The Summit ended with the signing of important global conventions including the Convention on Biological Diversity, to which Turkey is party. Turkey signed this Convention in 1992 and ratified it through Law 4177 of 29 August 1996. The Convention entered into force in our country on 14 May 1997.

The three main goals of the Convention on Biological Diversity (CBD) are:

- The conservation of biological diversity;
- The sustainable use of biological resources; and
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Convention requires each country to identify those of its biological resources for which special protection measures are needed and those which have a greater potential for sustainable use and to identify and monitor the categories and processes of actions that may have a negative effect on conservation and sustainable use.

The Convention on Biological Diversity acknowledges the sovereignty of countries over the biological resources within their boundaries. Access to such resources shall take place based on mutual agreement and subject to the authority of the relevant country. Such mutual agreements also constitute a basis and an opportunity for access to technology and for sharing the benefits obtained from the use of genetic materials. The fact that the Convention on Biological Diversity is the first convention to address genetic resources with binding obligations in an international agreement makes this Convention particularly important for our country with rich genetic resources.

The Conference of the Parties is the decision-making body of the Convention. Decisions concerning the implementation of the Convention are adopted in the Conference of the Parties, which is held once every two years. To control the possible negative effects of genetically modified organisms (GMOs) on biological diversity, the Cartagena Biosafety Protocol was prepared as a supplement to the Convention and entered into force in 2003 across the world.

Various work programmes and guidelines have been adopted under the Convention to date. Work programmes address different ecosystems. Guidelines have been developed on subjects related to the management of ecosystems and concerning each thematic area such as sustainable use, incentives, access to genetic resources and benefit-sharing. The work programmes and the guidelines are intended to ensure coordination at the international level in implementing the Convention. Goals and priorities need to be set at the national level under the implementation of work programmes.

Work Programmes Adopted under the Convention	*Guidelines Adopted under the Convention*
• *Coastal and marine biological diversity* • *Agricultural biological diversity* • *Forest biological diversity* • *Dry and sub-humid lands biological diversity* • *Inland waters biological diversity* • *Mountain biological diversity* • *Protected areas* • *Island biological diversity*	• *Sustainable use* • *Ecosystem approach* • *Incentive measures* • *Environmental impact assessment* • *Indicators* • *Alien species* • *Access and benefit-sharing* • *Public education* • *Traditional knowledge*

The objectives of the coastal and marine biological diversity work programme are to implement integrated marine and coastal area management, to protect marine and coastal living resources and to ensure their sustainable use; to establish and maintain effectively managed and ecologically based marine and coastal protected areas; to eliminate or minimize the negative effects of fish farming on marine and coastal biological diversity and to develop the positive effects of fish farming through the use of local species; to prevent the entry of invasive alien species into the marine and coastal environment and to eliminate as far as possible those invasive alien species which have already introduced.

The objectives of the agricultural biological diversity work programme are to combat the negative effects and promote the positive effects of agricultural practices on biological diversity in agricultural ecosystems and in other ecosystems with which they are in interaction; to encourage the conservation and sustainable use of genetic resources that have actual or potential value for food and agriculture; and to promote fair and equitable sharing of the benefits obtained from genetic resources.

The objectives of the forest biological diversity work programme are to apply the ecosystem approach to the management of all forest types; to reduce the threats against forest biological diversity and mitigate the impacts of processes that threaten it; to protect, improve and restore forest biological diversity; to promote the sustainable use of forest biological diversity; to regulate access to forest genetic resources and benefit-sharing; to develop a favourable institutional environment; to identify decisions that result in loss of forest biological diversity and the socioeconomic failures and defects that cause it; to build public education, participation and awareness; to develop the general classification and awareness; to develop the general classification of forests at different scales; to develop information and methods for the assessment of the situation and its trends; to develop understanding of the role of forest biological diversity and ecosystem operation; and to develop infrastructure for data and information for correct assessment and monitoring of global forest biological diversity.

The objectives of the work programme on the dry and sub-humid lands biological diversity are to compile and disseminate available information concerning the state of biological diversity, threat factors and best practices in those areas; to support the measures to be taken to ensure the sustainable use of arid area biological diversity; to develop a resource management system within the principles of the ecosystem approach; to find alternative, sustainable livelihoods, to promote sustainable harvesting and grazing, and to create new markets for products.

The objective of the inland water biological diversity work programme are to integrate conservation and sustainable use of biological diversity into the current programmes, the legislation and the sectors concerning the management of water resources and river basins; to establish and maintain a comprehensive, adequate and representative system of inland water protected areas; to enhance the protection status of inland water biological diversity and to

combat alien species; to support technology and innovative approaches; to provide incentives for the conservation and sustainable use of inland water biological diversity; to implement the communication, education and public awareness work programme and support participation; to develop understanding of inland water ecosystems and of the threats against them; to make the cultural, environmental and socioeconomic impact assessment of projects and actions that may have negative impacts on inland water ecosystems; and to introduce and maintain suitable arrangements for monitoring.

The objectives of the mountain biological diversity work programme are to identify and combat threats against mountain biological diversity, to protect, recover and restore mountain biological diversity; to promote sustainable use; to promote benefit-sharing and to maintain genetic diversity; to strengthen the legal, policy, institutional and economic framework; to develop the activities of identification, monitoring and assessment; and to provide support for technology transfer and development.

Due to the differences in biological resources and in the conditions of each country, it is a basic principle that each country should determine and implement its own priorities to achieve the goals specified in the Convention. For this reason, the implementation of the Convention and of the work programmes adopted under the Convention is left to national actions. Article 6 of the Convention envisages the preparation of national biological diversity strategies and action plans for this purpose.

Turkey's National Biological Diversity Strategy and Action Plan (NBSAP) was prepared in 2001 under the coordinating role of the Ministry of Environment, with the intention that it should serve as a guide in implementing the Convention on Biological Diversity in harmony with other obligations and in addressing the problems caused by the loss of biological diversity. However, changing national and international conditions and trends made it necessary to revise the NBSAP of 2001. Consequently, the NBSAP was updated in 2007 through a participatory approach under the Project titled "Consultation for National Reporting, Participation in the National CHM and Further Development of the NBSAP conducted with UNEP/GEF grant support.

The updated NBSAP is intended to identify and assess Turkey's biological diversity in brief, to determine an agreed strategy for conservation and to present decision-makers with proposals for action required for achieving the goals of biological diversity conservation in Turkey. The NBSAP should be regarded as a dynamic tool which may be renewed and updated as the goals are reached and the conditions change.



Photo: Ümit N. ÜLKÜTAŞIR

2.2. THE METHOD USED IN UPDATING THE NBSAP

As in other similar strategy efforts, foremost among the basic principles of the Turkish Biological Diversity Strategy are to determine the strategies with the participation of stakeholders and to achieve certain goals within certain timeframes.

The following materials were taken as a basis in the Strategy work.

- Information, proposals and opinions obtained from the second and third national reports prepared under the Convention on Biological Diversity
- Development plans and annual programmes prepared by the State Planning Organization
- Legal arrangements explained in section 4.1.2. of the Strategy
- The Work Programmes and the Guidelines under the Convention on Biological Diversity
- Previously made plans with direct or indirect relevance (the NBSAP-2001, the National Environmental Strategy and Action Plan, the National Plan for In-Situ Conservation of Plant Genetic Diversity, the Action Plan for the Protection and Rehabilitation of the Black Sea, the Mediterranean Action Plan, the National Action Plan to Combat Desertification, etc.)
- Project outputs prepared by various organizations (the Project for In-Situ Conservation of Plant Genetic Diversity, the Biological Diversity and Natural Resource Management Project, the Project for the Conservation and Management of the Habitats of Endangered Plant Species, management plans prepared for national parks and wetlands, projects conducted in Special Environmental Protection (SEP) Zones by the SEP Agency, projects conducted by the Agricultural Research and Forestry Research Institutes, projects conducted by universities, etc.)
- Outputs of the workshop held for the updating of the NBSAP

To implement participatory methods in the process of updating the NBSAP and to provide academic contributions in the thematic areas, academic and technical support was received from a specialized consultancy firm in the context of the following activities.

- Determining the national priorities in each of the thematic areas and between them
- Preparing a baseline report in each thematic area, including the legal and institutional structure, capacity, overlaps, obstacles and gaps
- Assessing the existing capacity related to each thematic area and identifying the capacity needs to achieve the priorities and goals
- Analysing the outputs of the meetings and other activities implemented during the project and the gaps and needs concerning the adaptation of the work programmes and guidelines of the Convention in each thematic area to the national conditions and priorities, and defining the objectives, common strategic goals and priority actions related to achieving the objectives of the Convention.

3. TURKEY'S BIOLOGICAL DIVERSITY AND ITS SIGNIFICANCE

3.1. TURKEY'S GEOGRAPHICAL FEATURES

Turkey is a country situated on the continents of Asia and Europe, bounded on the north by the Black Sea, on the west by the Aegean Sea and on the south by the Mediterranean. Its neighbours are Bulgaria and Greece to the west, Georgia, Armenia, Azerbaijan and Iran to the east, Iraq and Syria to the south. With a total surface area of 780,576 km^2, of which 10,000 km^2 is formed by rivers and lakes, Turkey is located between latitudes 36^0-42^0 North and longitudes 26^0- 45^0 East.

Turkey is surrounded on the north by the Northern Anatolia Mountains which run parallel to the Black Sea coast, on the northwest by the Yıldız Mountains, on the south by the Taurus Mountains parallel to the Mediterranean coast, and on the west by the Western Anatolia Mountains

perpendicular to the Aegean Sea coast. Turkey's topography is highly varied. In the country, where the average altitude is 1,130 m (over 2,000 m in Eastern Anatolia), 55 % of the land surfaces are located at altitudes of 1,000 m and more. Sparse mountains separated from each other by broad and high plains in the central parts of the country increase in density towards the east and reach more conspicuous heights. Turkey's highest mountain is Büyük Ağrı (5,137 m) followed by Ulu Doruk in Hakkari (4,135 m), Kaçkar in Rize (3,932 m) and Erciyes in Kayseri (3,917 m).

Turkey may also be considered rich in lakes and rivers with 33 rivers, 200 natural lakes, 159 dam reservoirs and 750 artificial lakes, which constitute its inland waters. Lake Van, the largest and deepest lake, has an altitude of 1,646 m and a surface area of 3,712 km^2. The second largest lake is Tuz Gölü, a salt lake in Central Anatolia, which is not deep and which lies at 925 m above sea level and has a surface area of 1,500 km^2. In Turkey, there are principally four regions in which lakes are concentrated: the Lakes Region (Eğirdir, Burdur, Beyşehir and Acıgöl), South Marmara (Lakes Sapanca, İznik, Ulubat and Kuş), Lake Van and its vicinity, and Tuz Gölü and its vicinity. The rivers in Turkey's territory discharge into 6 different seas, with the rivers Çoruh, Filyos, Kızılırmak, Yeşilırmak and Sakarya into the Black Sea, the rivers Asi, Dalaman, Ceyhan, Seyhan and Tarsus into the Mediterranean, the rivers Ergene, Küçük and Büyük Menderes, Gediz and Meriç (Maritza, Evros) into the Aegean Sea, the rivers Biga, Gönen and Susurluk/Simav into the Sea of Marmara, the river Aras (Araks) into the Caspian Sea, and the Dicle (Tigris) and Fırat (Euphrates) into the Persian Gulf. Kızılırmak is 1,355 km long, Ceyhan 509 km, Büyük Menderes 307 km, Susurluk 321 km, Fırat 1,263 km up to the Syrian border, and the Aras 548 km up to the Armenian border.

Turkey's highly varied topography is one of the main causes of its climatic diversity. In the Mediterranean climate which prevails in the southern and western parts of the country, summers are hot and dry, winters are mild and rainy. In the Black Sea climate dominant in the northern part, there is rainfall in every season; summers are not very hot just as winters are not very cold. In the central parts of the country, the continental steppe climate prevails.

Although the annual average rainfall in Turkey is about 640 mm, rainfall varies according to years, regions and seasons. The distribution of total annual rainfall between the different regions varies from 200 mm to 3,000 mm. Generally in the country, ¾ of total annual rainfall occurs in the winter months. The annual average rainfall is 817 mm in the Black Sea region, 751 mm in the Mediterranean region, 672 mm in the Aegean region, 641 mm in the Marmara region, 611 mm in Eastern Anatolia, 610 mm in Southeastern Anatolia and 339 mm in Central Anatolia.

For reasons due to Anatolia's topography, the differences between the temperatures of the various regions in summer are not very wide, but there are wide differences between the regions in winter temperatures. In terms of average and extreme temperatures, wide differences are also observed between regions and between provinces in the same region. Frequently, there are years when the lowest winter temperature is below -20 C degrees in Central Anatolia and -30 C degrees in Eastern Anatolia. The region where the highest summer temperatures in the country are recorded (about 35-40 C) is Southeastern Anatolia, where winters are generally mild.

Of Turkey's surface area, 52.8 % is agricultural land with 34.1 % cultivated and 18.7 % grassland and meadows, and 27.2 % is forest land. 14 % of our country's soil is threatened by erosion at a slight degree, 20 % at a medium degree, and 63 % at a high and very high degree.

3.2. TURKEY'S SOCIOECONOMIC FEATURES

Turkey's population is about 70 million according to the population census of 2000. The annual growth rate of population was 24.9 per mille in 1980-1985 and 21.7 per mille in 1985-1990, falling to 18.3 per mille in 1990-2000. Turkey is still a country with a young population; 31.5 % of its population is under 15 and 6 % above 65. According to the census of 2000, the rate of literacy is 87.32 %. National income per capita reached $5,000 in 2005. The arithmetical population density is 88 persons per km^2. However, since the population is not evenly distributed

across the country, density is greater in areas suitable for agriculture, in industrialized regions and in some coastal provinces with easy access, and lower in the internal parts of the country and in mountainous areas. The levels of education and income display features similar to the distribution of population.

According to the 2004 data, the agricultural sector accounts for 11.2 % of GDP, industry for 24.9 % and commerce for 20.6 %. Despite its low share in GDP, the agricultural sector employs 40 % of the actively working population, and it is the sector with the lowest income per capita. The sector that has displayed the fastest growth in recent years and that has the highest average income per capita is the service sector.

Due to the biological diversity value that rural areas possess, their socioeconomic characteristics and needs have a special importance in determining the principles of conservation and sustainable use. In Turkey, about 65 % of the population lives in cities and 35 % in the rural sector. However, it is estimated that another 5 % of the rural population has joined the urban population since 2000. This change in the structure of population is due both to rapid urbanization and to migration from the village to the city.

Although the agricultural sector, which has been the main component of the economy for many years in the past, has witnessed a steady fall in its share in GDP over the periods, it is still an important source of economic activity compared with other sectors, providing 61.4 % of employment in rural areas. In this context, the agricultural sector remains the basic driving force in rural development efforts as well as being an important element of overall national development. In addition, agriculture is not only an economic activity as such but also a social process of regional, cultural and ecological importance. Since agricultural production in Turkey is carried out in small enterprises using rather low agricultural inputs, it also provides a suitable environment for the conservation of wild species through the farmer in the rural sector.

In Turkey, rural settlements are very numerous and scattered, making it difficult for the rural population to have access to basic infrastructural and other services and complicating public investments. To overcome these obstacles, the National Rural Development Strategy, forming the rural development policy framework and envisaging the preparation of a National Rural Development Plan, was adopted in 2006.

Biogeographical Zones of Turkey

3.3. GENERAL INFORMATION CONCERNING TURKEY'S BIOLOGICAL DIVERSITY

Turkey displays the character of a small continent in terms of biological diversity. Among the reasons for this situation, one may count the fact that the country has three different types of bioclimate and three Biogeographical Zones, namely Euro-Siberian, Mediterranean and Irano-Turanian, its topographic, geological, geomorphologic and soil diversity, the existence of different types of aquatic bodies such as the sea, lakes, rivers, and fresh water, salt water and mineral water lakes, the altitude differences that range between 0 and 5,000 metres, the fact that the country has deep canyons and very different types of ecosystem and that it was less affected by the glacial period in comparison with European countries, the existence of the Anatolian Diagonal which links Northern Anatolia to Southern Anatolia and the resulting ecological and floristic differences, and the fact that the country is at the point where three continents intersect. In brief, Turkey has agricultural, forest, mountain, steppe, wetland, coastal and marine ecosystems and different forms and combinations of these ecosystems.

Of the biogeographical zones, the Euro-Siberian Biogeographical Zone extends throughout Northern Anatolia and in those parts of the Thracian Region which face the Black Sea. This is the climatic region with the highest rainfall and is largely covered with forests. The Mediterranean Biogeographical Zone covers all areas on the Mediterranean cost and the western parts of Thrace and includes very different types of ecosystem. The Irano-Turanian zone is the largest of the Biogeographical Zones, starting in Central Anatolia and extending as far as Mongolia. The continental climate and steppe flora are predominant in this zone.

3.3.1. Ecosystem Diversity

Agricultural Ecosystems

Turkey's main ecological regions from the agricultural point of view are the Mediterranean Coastal Region, the Aegean Coastal Region, the Black Sea Coastal Region, the Thrace and Marmara Regions, the Central Anatolia Region, the Southeastern Anatolia Region, the Eastern Anatolia Region and the Transition Regions (Northwestern Transition, Western Transition, Northeastern Transition, Eastern Transition, Southeastern Transition). This zoning system, based on main climatic features such as rainfall and temperature, covers agricultural product diversity and the regional and phenological characteristics of agriculture. The Coastal Regions may be defined as agricultural production regions generally located in the Mediterranean climatic zone. The Central, Eastern and Southeastern Anatolia Regions are dominated by the hard continental climate, and their agricultural product characteristics carry the influences of these ecological regions. The transition regions are agricultural regions differing more or less from each other in terms of both climatic factors and overall agricultural characters, each covering several provinces in the transitions from the middle of Central Anatolia to other regions.

Cultivated areas, most of which are located in steppe zones, constitute about 35 % of Turkey's total surface area. Of the total agricultural area, 70 % is formed by cropland, 5 % by orchards, 2.7 % by vegetable gardens, 2 % by vineyards and 2 % by olive groves. The remaining 18 % of the agricultural area is left fallow according to the cultivation pattern implemented in those regions. Grasslands and meadows constitute about 19 % of Turkey's total surface area. They may be divided into two groups: "Coastal Meadows" and "Steppe Meadows". The coastal meadows include the grazing areas in the Black Sea, Marmara, Aegean, Mediterranean and Thracian regions. About 25-30 % of the country's meadows area coastal meadows, where annual rainfall varies between 600 and 2,800 mm and the herbaceous plant cover shows forms of transition to the steppe character as rainfall decreases. As a result of higher rainfall and better soil conditions, a more fertile pasture vegetation has formed in the coastal meadows. The grazing areas in arid and semi-arid zones, where total annual rainfall varies between 200 and 700 mm, are called steppe meadows, which are divided into two as "mountain steppe meadows" and "plain steppe meadows" in terms of altitude and topography. Since altitude and rainfall are relatively higher in mountain steppes, more valuable fodder plants can be grown there.

Steppe Ecosystems

In Turkey, steppes and grasslands, defined as areas covered with herbaceous plants, are currently about 21 million hectares. The steppe ecosystems in Turkey are prevalent especially in Central Anatolia, in the high mountain floors of the Aegean and Mediterranean Regions and in a major part of Eastern Anatolia. The most characteristic feature of the steppe ecosystem is the predominance of annual or perennial herbaceous plants. The floristic composition of the steppe vegetation is very rich and includes many endemic plants.

The steppe formation in Turkey is generally divided into two as "Plain Steppe" and "Mountain Steppe" depending on the topographical structure of the area in which it lies. The plain steppe occurs in flat or slightly sloped areas at altitudes of 800 to 1,200 metres and provides a habitat for species such as halophilic plants, members of the chenopodiaceae, juncaceae and cyperaceae, harmal, speedwell, thyme and garden sage.

The mountain steppe is prevalent at altitudes of 1,300 to 2,500 metres. It hosts the species of astragal, thorny sainfoin, globe thistle, asphodel and thyme. In the Eastern Anatolia mountain steppe, ferula species become more predominant unlike in other regions. Alpine and sub-Alpine meadows cover large areas in the higher parts of the Eastern Black Sea mountains and in the northern and northeastern parts of Eastern Anatolia.

Forest Ecosystems

In Turkey, forest ecosystems cover a total area of 21,188,747 hectares. Forests consisting of broad-leaved trees are more widespread in Turkey. Coniferous trees occur at all altitudes from sea level to the highest limit where forests exist. In the Aegean and Mediterranean regions, there are humid and semi-humid coniferous and dry forests (oak, black pine and red pine) as well as shrubs and maquis.

The forest types according to the biogeographical regions are as follows:

Euro-Siberian Biogeographical Region:

- Broad-leaved and coniferous forests (Beech, Chestnut, Hornbeam; 500-1200m),
- Humid and semi-humid coniferous forests (black pine, Scotch pine, spruce, fir; 1000-1500m),
- Dry oak and pine forests (Oak:<1500m; black pine: >600m; red pine: 400-500m)
- Shrub (maquis and pseudo-maquis) formation (Red pine: <500m)

Mediterranean Biogeographical Region:

- Shrub (maquis and garigue) formation (Oaks, Sandal, gum, myrtle, etc. 350 m Marmara, 600 m Aegean; 800 m Mediterranean),
- Low-Altitude Mediterranean Belt forests (Red pine: <1000m; Black pine: 800-1500m),
- Aegean High Mountain Forests (Chestnut: <1000m; Beech, Linden, Hazelnut: >1500m; Scotch pine: >1600m; Oak and Black pine: >700m, Red pine: <600m),
- Mediterranean High Mountain Forests (Oak: 500-1200m; Black pine: 1200-2000m; Fir: 1200-1800m; Cedar: 1000-2000m; Juniper: 100-1800m; Beech-Hornbeam: 1100-1900m)

Irano-Turanian Biogeographical Region:

- Central Anatolia Steppe Forests (Mossy and white oak, Black pine, Juniper: 800-1500m),
- Central Anatolia Dry Black Pine, Oak and Juniper Forests (Oaks: <1200m; Black pine: 1000m-1500m; Scotch pine >1500m),
- Eastern Anatolia Dry Oak Forests (oak species <850m).

These rich forest ecosystems of Turkey provide habitats for a great number of endemic plant species, important bird species and other wildlife species. These ecosystems also include the wild relatives of many cultivated plants which are important for agricultural biological diversity.

Mountain Ecosystems

In Turkey, there are mountain systems formed by folding, faulting and volcanism. The types of the mountain ecosystems vary according to biogeographical regions, to patterns of formation and to altitudes.

The mountains formed by faulting exist in the Aegean Region. These mountains extend perpendicular to the coast and are rich in water resources. The Kaz Mountains, the Yunt Mountains, Boz Mountains and the Aydın and Menteşe Mountains are important mountains of this region. The Kaz Mountains are the habitat of the Kaz Mountain Fir (Abies nordmanniana ssp. equi-trojani).

Among the mountain chains of Turkey formed as a result of the Alpine-Himalayan folding, the most important ones are the Yıldız, Köroğlu, Küre, Canik and Eastern Black Sea Mountains to the north, the Western and Central Taurus Mountains to the south, the Nur and Southeastern Taurus Mountains to the southeast, and the Hınzır, Tahtalı, Munzur, Palandöken, Allahüekber and Aras Mountains in Central and Eastern Anatolia. These mountain systems, including the Taurus Mountains in particular, are important ecosystems from the point of biological diversity with their high rates of endemism. The higher parts of the Eastern Black Sea mountains and the northern and northeastern parts of Eastern Anatolia are dominated by sub-alpine and alpine meadows, and the high mountain floors of other regions by steppe and meadow ecosystems. Forest ecosystems that differ according to regions begin as altitude decreases. In addition, lakes in high mountain sections, isolated from each other and having different characteristics, form special habitats.

Of the volcanic mountains, which add special value to biological diversity with their volcanic lake formations in particular, the most important ones are Ağrı, Tendürek, Nemrut, Süphan, Karacadağ, Erciyes, Hasan and Kula. With their mineral-rich soil, they also have a special importance for agricultural biological diversity.

Inland Waters Ecosystems

With its rivers and lakes covering an area of about 10,000 km^2, Turkey has very important inland water resources to maintain biological diversity. In studies conducted so far, 135 wetlands of international significance have been identified and 12 of them designated as Ramsar sites. In Turkey, there are 7 drainage basins including 26 river basins, and the ground waters are estimated at 94 billion m^3. The average annual rainfall is about 640 mm, roughly one third of which reaches water reserves and thus contributes to the maintenance of wetlands.

The largest natural lake is Lake Van in Eastern Anatolia, with a surface area of 374,000 hectares and with high salinity. In the Central Anatolian Plateau, there are some shallow salt lakes, the largest of which is Lake Tuz (128,000 hectares). Lake Tuz almost completely dries up in summer and gets covered with a salt layer 30 cm thick. Only salt-resistant vegetation grows around the lake. Lakes, marshes, deltas, reedbeds and mud plains are very important for wildlife, including birds in particular. More than half the bird species in Turkey are migratory. Wetlands constitute important resting and wintering grounds for water birds.

In Turkey, there are nine rivers more than 500 km in length: Kızılırmak, Fırat, Sakarya, Murat, Aras, Seyhan, Dicle, Yeşilırmak and Ceyhan. The annual discharge of the rivers in Turkey is about 41 billion m^3 into the Black Sea and 36 billion m^3 into the Mediterranean. Dicle and the Fırat flow across to Iraq and Syria, respectively. Deltas are of great importance for biological diversity, especially for water birds. The Meriç, Gediz, Büyük Menderes and Küçük Menderes Deltas, formed by rivers that discharge into the Aegean Sea, and the Göksu, Seyhan and Ceyhan Deltas, formed by rivers that discharge into the Mediterranean, provide suitable habitats for a large number and variety of water birds, particularly as lakes in Anatolia freeze in winter. The delta formed by the

Kızılırmak, which discharges into the Black Sea, has great importance especially for migratory birds that pass directly over the Black Sea.

Turkey's highly complex geography and the fact that rivers are separated by mountainous areas from each other, thus preventing to a large extent the diffusion of species, have resulted in high endemism and genetic diversity. For this reason, a great majority of the invertebrates living in river ecosystems are endemic. The waters in the Köyceğiz-Dalyan area with their salinity ranging from zero to extreme provide a good example of the relationship between habitat and species diversity. Lindenia tetraphylla is a new species in Turkey and it is recorded that this species is about to become extinct in Yugoslavia. Artodiaptomus burduricus, which lives in Lake Burdur and which has adapted itself to different conditions, is an endemic invertebrate species and important for genetic diversity. Aphanius burduricus, which lives again in Lake Burdur, is also an endemic fish species that has adapted itself to the lake conditions. Likewise, Alburnus tarichi, an endemic fish species living in Lake Van, has also achieved its adaptation to the extreme conditions of this lake.

In Turkey's wetlands, plants such as the cattail (Typha sp.), the reed (Phragmites sp.), the rush (Schoenoplectus sp.), and the reed mace (Juncus sp.) form large communities. In addition, there are also plants that cover the water surface such as the water lily (Nymphae sp.) and underwater plants that grow in shallow lakes such as the duck grass (Phodophyllum sp.), the duck lentil (Wolffia sp.), the water lentil (Lemna sp.) and Ceratophyllum sp., Myriophyllum sp. and Potamogeton sp.

236 fish taxons belonging to 26 families have been identified in inland waters ecosystems as a result of the studies conducted so far. The most common species present in our waters are the brown trout, the pike, the carp, the tench, the striped mullet, the roach, the zander and the inland waters bass. Located on bird migration routes, Turkey is a key country for many bird species. It is known that there are about 460 bird species in our country. The stork, the flamingo, the spoonbill, the black-winged stilt, the avocet, the crane, the Ardeae and ducks are bird species commonly observed in Turkey's wetlands.

Coastal and Marine Ecosystems

The different characteristics of the seas that surround Turkey, namely the Black Sea, the Marmara, the Aegean and the Eastern Mediterranean, have resulted in the diversification of the biological resources they contain. The Mediterranean, which has the highest salinity and temperature among the Turkish seas, is the area with the richest biological diversity. After the opening of the Suez Canal, many species belonging to the Indian-Pacific area migrated through the Red Sea to the Mediterranean and settled in this area. 26 species were identified to have settled in the area through migration. There are 388 fish species in the Turkish waters of the Mediterranean, 389 in the Aegean, 249 in the Sea of Marmara and 151 in the Black Sea.

The Black Sea is the largest enclosed sea of the world and the most isolated from oceans. In the Black Sea, there are 151 fish species, 1,619 fungus, alga and high water plant species and 1,983 invertebrate species. Fish species such as the sturgeon which are important both for biological diversity and for economic value and 4 sea mammal species live in the Black Sea. There are 6 different sea meadow species (Zostera marina, Z. Noltii, Potamogeton pectinatus, Ruppia maritima, R. Spiralis and Zannichellia major) which are the spawning grounds of 34 fish species even if the areas covered by them are getting smaller.

The Turkish Straits System, consisting of Strait of Istanbul and Strait of Çanakkale and the Sea of Marmara, has the position of an inland sea system providing water transport between the Aegean Basin of the Eastern Mediterranean and the Black Sea and performs the function of a biological corridor for the bonito, the large bonito, the bluefish and similar fish species. It has been observed that the surface of the Sea of Marmara is under the influence of the Black Sea waters coming through the Turkish Straits . The deeper regions of the Sea of Marmara contain Aegean-Mediterranean waters and host more than 400 species of benthic organisms. The Sea of Marmara is the spawning ground of many pelagic fish species. Gerardia savaglia, a coral species, still maintains its life at the depth of 30 m.

With a surface area of about 180,000 km^2, the Aegean Sea has a very complicated bottom topography and coastal geometry. In addition, there are hundreds of islands, big and small, on this sea. It may be said that the basin generally consists of 3 deep depressions. The northern depression is about 1,500 m deep and connected to the 1,100 metre-deep middle Aegean depression by a hill 200-500 m deep. In the southernmost part, there is the deepest region of the Aegean Sea with depths exceeding 2,000 m. Sponges, which are generally black in their natural environment, are one of the commercial products harvested from the deep waters of the Aegean, and a decrease has been observed in their populations in recent years. As in the Black Sea, the coasts of the Eastern Mediterranean are connected to the deep basin by a topographic slope belt of 10-20 km. The major depressions of the Northern Mediterranean are the basins of Rhodes (4,000 m), Antalya (2,500 m), Çukurova (1,000 m) and Latakia (1,500 m). The Çukurova Basin is shallower than the Antalya Basin, and they are separated from each other by a wall-shaped topography.

Coastal ecosystems are highly special ecosystems as they are important sudden transition zones (ecotones) where marine and terrestrial ecosystems intersect. Coastal ecosystems form 4.1 % of the terrestrial resources that make up the country's surface area. The fact that the patterns in which mountains come down to the sea, and the coastal topography, differ from each other in the coastal areas of our country have resulted in various coastal ecosystems such as dunes, caves, deltas, lagoons, marshes and calcerous terraces. Among all these coasts, particularly the coastal areas in the Eastern Mediterranean region are rich ecosystems with very high flora and fauna diversity.

3.3.2. Species Diversity

Plant species

Turkey may be considered quite rich in plant species, especially seed plants, considering the climate zone in which it is located.

Algae are the most primitive living things within the group of plants. The living things that fall under this group may be so small as can only be seen by microscope just as there are those which reach 50-60 metres or even 100 metres in length. Although there is an increased number of studies on algae conducted by members of teaching staff in universities, the inventory of the algal flora in Turkey has not yet been completed.

Lichens are a group of living things based on the symbiosis of fungi with algae. They are found almost everywhere in the world. The number of known lichen species across the world is around 20,000. Studies on lichens in Turkey have rapidly increased in recent years. The number of known lichen species in Turkey is around 1,000 and steadily increasing.

Mosses are the group of plants with the most primitive, underdeveloped bundle of transmission. It has been determined that 3 Horny Liverworts, about 165 Liverworts and about 740 Mosses occur in Turkey.

Ferns are the best-known group of plants together with seed plants. They occur in all areas of Turkey except very arid areas but the Black Sea region is the area where this plant group occurs mostly widely. Among the ferns, 8 species of the Equisetales, 6 species of the Lycopodiales and about 80 species of the Filicineae are present in Turkey.

The Seed Plants are the best-known plant group in Turkey and in the rest of the world and they are also the most developed plant group. The number of seed plant species identified in Turkey is currently about 9,200. The number of species and sub-species taxa has reached 11,000. This number increases every day with the identification of new species. Such species diversity does not exist in any European country. For this reason, Turkey has the character of a continent in terms of seed plant diversity. The number of species in all of Europe is about 12,500 (Table 3.1). At the same time, 34 % of the species in Turkey (3,150) are endemic. This high rate of endemism makes Turkey interesting in terms of seed plants and maintains its character as a centre of attraction in this regard.

Table 3.1. Taxon numbers of species and subspecies of varios plant groups; endemism, rare and endangered species, extinct species

Plant Groups	*Defined Species/ subspecies*	*Endemic Species*	*Rare and Endangered Species*	*Extinct species*
Algae	*2.150*	*----*	*unknown*	*unknown*
Lichen (Lichenes)	*1000*	*----*	*unknown*	*unknown*
Moss (Bryophytes)	*910*	*2*	*2*	*unknown*
Pteridophytes Ferns	*101*	*3*	*1*	*unknown*
Gymnospermae (Gymnosperms)	*35*	*5*	*1*	*unknown*
Monocotyledonous (Monocotyledons)	*1.765*	*420*	*180*	*-*
Dicotyledonous (Dicotyledons)	*9.100*	*3500*	*1100*	*11*

Endemic/endangered plant species

In its geographical zone, Turkey is one of the richest countries in endemic plants. Because species that belong to seedless plant groups are widely distributed as in the rest of the world, their rate of endemism is low. In addition, studies on seedless plant groups in our country are not yet at the desirable level. The Ferns (Pteridophytes) are the best-known plant group among seedless plants. The number of ferns at species and sub-species level identified in Turkey is 101, only 3 of which are endemic.

Tortum Falls Yusuf CERAN

The rate of endemism is low in the Gymnospermae, the most primitive group of seed plants. In this group, there are only 5 endemic taxa at variety and sub-species level. The rate of endemism is very high in the Angiospermae, which are among seed plants, and 3,925 of the nearly 11,000 flowery plant species and sub-species are endemic, which means an endemism rate of about 34 %. It has been determined that about 1,000 endemic plants exist in Greece, the European country with the highest rate of endemic species. This indicates how rich our country is in endemic plants. Some of the endemic plant species distributed in Turkey have a narrow distribution while others are widely distributed. The narrowly distributed endemics live mainly in certain mountains and mountain chains and in certain habitats. The principal mountains with a high rate of endemism are the Amanos Mountains, the Sandras Mountain, the Bey Mountains, the Bolkar and Ala Mountains, the Uludağ Mountain, the Kaz Mountain and the Munzur Mountains. Among the areas with a high rate of endemism other than mountain chains, one may count the Middle Taurus (Ermenek, Gülnar, Mut, Anamur), the Anti-Taurus (Maraş, Adana, Niğde), the gypseous areas around Sivas and Çankırı, the vicinity of Lake Tuz, the high mountains around Rize and Artvin, and the region covering the provinces of Van, Bitlis and Hakkari. The Compositae are the richest family in terms of endemic seed plants with some 435 endemic species. This family is also the family in Turkey that contains the greatest number of species. The second rank in this respect is held by the Leguminosae family with about 400 endemic species. This family also comes second in Turkey with respect to the total number of species it contains. The third rank is held by the Labiatae family with about 310 endemic species. The tragacanth (Astragalus) is the richest genus in terms of the number of endemic species, at about 250, followed by the motherwort (Verbascum) with 175 species, the centaury (Centaurea) with 115 endemic species and the Hieracium with 66 species. The rate of endemism is 100 % for the genera Ebenus (14 species) and Bolanthus (6 species), all of whose species distributed in Turkey are endemic, although they have a small number of species. Turkey may be considered rich in endemic genera as well as in endemic species. The endemic genera represented by one species are Kalidiopsis and Cyathobasis (Chenopodiaceae), Phryna and Thurya (Caryophllaceae), Physocardamum and Tchihatchewia (Cruciferae), Nephelochloa and Pseudophleum (Gramineae), Dorystoechas (Labiatae), Sartoria (Leguminosae), Crenosciadium, Ekimia, Postiella and Aegokeras (Umbelliferae).

Among the phytogeographical regions, the Irano-Turanian region contains the greatest number of endemic species. It is followed by the Mediterranean and Euro-Siberian phytogeographical regions. Among the geographical regions in Turkey, the greatest number of endemic species exist in the Mediterranean region with some 800 species, followed by Eastern Anatolia with 380 species and Central Anatolia with 280 species.

Distribution of endemic plant species among the phyto-geographical regions (including subspecies and varieties)

Euro-Siberian	**320**
Mediterranean	**1325**
Irano-Turanian	**1250**
Non-specific to particular phytogeographical region	**1030**
Total	**3925**

Although Turkey is very rich in endemic plants, some of these species are faced with serious threats. According to the IUCN 2001 criteria, about 600 of our endemic species are in the category of "Critically Endangered-CR" and about 700 in the category of "Endangered-EN". Through the "Turkish Endemic Plants Project" implemented with SPO support between 1992 and 1997, seeds of many endemic plants were collected and placed under conservation at the

Gene Bank of Menemen within the Aegean Institute of Agricultural Research affiliated to the Ministry of Agriculture and Rural Affairs.

The Turkish flora, which has a rather high rate of endemism, is also quite rich in medical and aromatic plants. Some of the important genera and species used for medical and aromatic purposes are: Delphinum sp., Digitalis sp., Gypsophila sp., Helichrysum sp., Leucojum aestivum, Linum sp., Liqiudambar orientalis, Malva sp., Matricaria sp., Mentha sp., Nigella sp., Orchis sp., Ophrys sp., Origanum sp., Pimpinella sp., Rosa sp., Salvia sp., Sideritis sp., Teucrium sp. and Thymus sp.

Animal species

Considering the zone in which it is located, Turkey is rich and interesting in fauna as well as in flora. Among the main reasons for this situation, one may count the fact that Anatolia forms a bridge between the continents of Europe and Asia and is therefore located on migration routes, that it has different types of climate and ecosystem, that it has a rich flora and, consequently, that many animal species can find here suitable habitats for themselves. All these diverse ecological factors are reflected in the diversity of the fauna.

Thanks to the large number of studies on the Turkish vertebrate fauna, it has largely been brought to light. According to latest data, 460 bird species, 161 mammal species, 141 reptile species, 480 sea fish species and 236 inland waters fish species are known to live in Turkey.

The group of insects (Insecta) is very rich in Turkey as in the rest of the world. However, it is not possible to give any estimates concerning the insect fauna in Turkey for reasons such as the complete lack of studies in certain groups and the insufficiency of studies in certain others. The number of insect species identified in Turkey so far is about 30,000, although the estimated number is between 60,000 and 80,000. These figures indicate how insufficient the studies are concerning insects. Nevertheless, the faunistic list of certain insect groups has largely been completed. For example, the dragonflies (Odonata) are represented in Turkey by 114 species, the locusts (Orthoptera) by 600 species (270 of them endemic), the beetles (Coleoptera) by 10,000 species, the molluscs (Mollusca) by 522 species (203 of them endemic), the bugs (Heteroptera) by 1,400 species, the plantlice (Homoptera) 1,500 species, the butterflies (Lepidoptera) by 6,500 species (600 of them diurnal, the others nocturnal) (Table 3.2).

Although some of the habitats in Turkey are degraded or even damaged, they provide shelter for endangered species such as the Mediterranean seal (Monachus monachus), the sea turtle (Caretta caretta) and the green sea turtle (Chelonia mydas).


Gazella subgutturosa Aykut İNCE


Ardeola ralloides Ümit N. ÜLKÜTAŞIR


Caretta caretta Ümit N. ÜLKÜTAŞIR

The table below shows the numbers of fauna species in Turkey:

Table 3.2. Taxon numbers of Species and Subspecies of various animal categories, endemism situation, number of rare and endangered specied, extinct species

Animal Groups	*Defined Species*	*Endemic Species/ subspecies, Variety*	*Rare and Endangered Species*	*Extinct Species*
VERTEBRATES				
Reptiles/Amphibian (Reptilia/Amphibia)	*141*	*16*	*10*	-
Birds (Aves)	*460*	-	*17*	-
Mammals (Mammalia)	*161*	*37*	*23*	*7*
Freshwater Fish (Pisces)	*236*	*70*	-	*4*
Marine Fish (Pisces)	*480*	-	-	-
INVERTEBRATES				
Mollusk (Mollusca)	*522*	*203*	*unknown*	*unknown*
Butterflies (Lepidoptera)	*4.500*	*89*	*89*	*unknown*
Locusts (Orthoptera)	*600*	*270*	-	-
Dragonflies/Damselflies (Odonata)	*114*	-	-	-
Beetles (Coleoptera)	*~10.000*	*~ 3.000*	-	-
Half-winged (Heteroptera)	*~1400*	*~200*	-	-
Aphids (Homoptera)	*~1500*	*~200*	-	-

Endemic/endangered animal species

Turkey is very rich and interesting from the point of fauna as well as flora. Many studies have been made and continue to be made on Turkish vertebrates. For this reason, healthy data are available concerning the endemism status of vertebrates, their danger classifications and the species placed under conservation. According to these data, 16 of the 141 reptile and amphibian species distributed in Turkey are endemic and 10 endangered. There are no endemic species of bird in Turkey. However, 5 mammal species and 32 sub-species, 16 reptile species and sub-species, and 70 inland waters bird species and sub-species are endemic.

Some of the endemic and endangered reptile and amphibian species are the following:

- Terrestrial salamander (Mertensiella luschani),
- Spotted salamander (Neurergus crocatus crocatus and N. strauchii barani)),
- Little crested salamander (Triturus vulgaris kosswiigi),
- Band crested salamander (Triturus vittatus cilicensis),
- Red frog (Bombina bombina arifiyensis),
- Taurus frog (Rana holtzi),
- Rock lizard (Lacerta saxicola),
- Kayseri lizard (Lacerta cappadocica),
- Taurus lizard (Lacerta danfordi anatolica),
- Great green lizard (Lacerta trilineata),
- Caucasian viper (Elaphe hohenackeri),
- Small viper (Vipera ursinii),
- Striped viper (Vipera pontica).

Of the 460 identified bird species, although none of them endemic, 17 are endangered. Some of the endangered bird species are the following:

- Dalmatian pelican (Pelecanus crispus),
- White-fronted goose (Anser albifrons),
- Red-breasted goose (Branta ruficollis),
- Ferruginous duck (Aythya nyroca),
- White-headed duck (Oxyura leucocephala),
- Spotted eagle (Aquila clanga),
- Imperial eagle (Aquila heliaca),
- Lesser kestrel (Falco naumanni),
- Corncrake (Crex crex),
- Great bustard (Otis tarda),
- Slender-billed curlew (Numenius tenuirostris).

Fallow dear Aykut İNCE

The bald ibis (Geronticus eremita), whose natural population is exhausted, is under effective conservation. A great majority of the other bird species are included among the species requiring conservation.

Of the 161 mammal species recorded in Turkey, 37 sub-species and/or varieties are endemic. 23 of these species are endangered and now under conservation. The gazelle (Gazella subgutturosa), the fallow deer (Cervus dama) and the wild sheep (Ovis orientalis), naturally occurring in Turkey, may be mentioned among important species. In addition, the hyena (Hyena hyena) is thought to have become extinct over the last 20-30 years. It is known that the leopard (Panthera pardus tulliana), the Caspian tiger (Panthera tigris virgata) and the lion (Panthera leo persica) have also become extinct in Anatolia.

Among the sea fishes, there are no endemic and endangered species, but 70 of the 236 species occurring in inland waterss are endemic and 4 extinct. Some of the endemic and endangered species occurring in inland waterss are the following:

- Salton pupfish (Aphanius asquamatus)
- "gökçe" fish (Alburnus akili)
- Bleak (Alburnus timarensis)
- Barbel (Barbus plebejus kosswiigi)
- Siraz (capoeta antalyensis)
- Gudgeon (Gobio gobio insuyanus)
- Chub (Leuciscus kurui)
- Salmon trout (Salmo trutta abanticus)

Although the Turkish invertebrate fauna is not as well known as the vertebrates, it is known that the total number of species may be around 60,000 to 80,000 although only some 30,000 of them have been identified. The rate of endemism is much higher among invertebrate animal groups.

3.3.3. Genetic Diversity

Plant genetic diversity is of great importance for both Turkish and world agriculture. Turkey has a very special position in terms of plant genetic resources. Of the centres of diversity and origin explained by Vavilov, the Mediterranean and Near Eastern Centres overlap in Turkey. According to J. Harlan, our country has 5 micro-gene centres where more than 100 species display a broad variation and is the origin or diversity centre of many important cultivated plants and other plant species.

Turkey is situated at the intersection of two important Vavilovian gene centres: Mediterranean and Near East. These two regions have a key role in the emergence of cereals and horticultural plants. Some of the cultivated plant species of Anatolian origin are the following: Linum sp., Allium sp., Hordeum sp., Triticum sp., Avena sp., Cicer sp., Lens sp., Pisum sp., Vitis sp., Amygladus sp., Prunus sp., Beta sp., etc. Turkey has five different "micro-gene centres":

- Thracian-Aegean Region: Bread wheat, durum wheat, Poulard wheat, stick wheat, small red wheat, lentil, chickpea, melon, vetch, lupine and clover.
- Southern-Southeastern Anatolia: Double-grain wheat (Tritucum dicoccum), small red wheat, Aegilops speltoides, squash, watermelon, cucumber, bean, lentil, broad bean, vine and fodder plants.
- Samsun, Tokat, Amasya: Large number of fruit species and varieties, broad bean, bean, lentil and various leguminous crops used for animal feed.
- Kayseri and its vicinity: Almond, apple, pea, fruit species, vine, lentil, chickpea, lucerne (alfalfa) and sainfoin.
- Ağrı and its vicinity: Apple, apricot, cherry, sour cherry, leguminous fodder crops and watermelon.

Turkey, situated where two different gene and diversity centres overlap, is the gene and origin centre of the following cultivated plants among others: Triticum, Hordeum, Secale, Avena, Linum, Allium, Cicer, Lens, Pisum, Medicago and Vicia. In Turkey, wheat (Triticum and Aegilops) has 25 wild relatives, barley (Hordeum) 8, rye (Secale) 5 and oat (Avena) 8. Turkey is also rich in wild relatives of edible grain legumes and fodder crops. Our country has 4 varieties of lentil (Lens), 10 of chickpea (Cicer), 104 of trefoil (Trifolium) of which 11 are endemic, 34 of lucerne (Medicago), 42 of sainfoin (Onobrychis), and 60 of vetch (Vicia) of which 6 are endemic (Açıkgöz et al. 1998). Turkey is also the micro-gene centre of the species Amygdalus spp., Cucumis melo, C. sativus, Cucurbita moshata, C. pepo, Malus spp., Pistachio spp., Prunus spp., Pyrus spp. and Vitis vinifera (Tan, 1998). Turkey is the home of many decorative plants including the tulip and the snowdrop.

Aware of the importance of agricultural plants, the Ministry of Agriculture and Rural Affairs grows many species and varieties of each such plant under the Seed Production and Distribution Programme. Field crops include wheat, barley, corn, chickpeas, lentils, dry beans, sunflowers, potatoes, soy beans, peanuts, sesame, tobacco, cotton and beet-roots, and fodder plants include sweet sorghum, rye, flat scots broom and spring grass. The programme covers more than 200 plant species. In addition, there are thousands of local varieties, ecotypes and transition forms raised by farmers out of their own resources.

The total number of cereal types developed through the use of local and imported breeds and recorded during the last thirty years in Turkey is 256, of which 95 are wheat types, 91 corn, 22 barley, 22 rice, 16 sweet sorghum, 11 oat and 2 rye. The National Seed Programme constantly raises new varieties and the number of cultivated species thus steadily increases, while field crops such as small red wheat (Triticum monococcum), double-grain wheat (Triticum dicoccum), bitter vetch and lupine are not used as much as in the past and consequently tend to disappear today.

Horticultural plants include about 50 genera which are cultivated and 100 varieties grown and distributed. Among them one may count tomatoes, peppers, aubergines, lettuce, cabbage, radish, onions, squash, cucumbers, melons, watermelons, beans, pumpkin, peas, spinach, carrots, broad beans, leeks, rocket, purslane, fennel, cauliflower, parsley, beans and gherkins. Considering the local varieties and the types obtained from other resources, it is estimated that the total number of varieties grown in the country reaches 200.

The richness of variety is also noticeable in fruit production. Of the fruit types estimated to number 138 in total, 80 are grown in Turkey. Among the fruit and nut varieties in Turkey, one may count apples, pears, quinces, cherries, sour cherries, apricots, peaches, figs, pomegranates, mulberries, almonds, hazelnuts, walnuts and pistachios. Viniculture holds an important place in our country's agriculture. Anatolia, which hosts the wild vine (Vitis silvestris), is the gene centre of the grape vine (Vitis vinifera).

Photo: Yusuf CERAN

Turkey is also quite rich in gene resources, including the valuable gene resources of the Taurus cedar, the oriental spruce and the oriental beech together with 5 pine, 4 fir, 20 oak and 8 juniper species among the local forest trees of national and global importance. The important forest trees are as follows: Pine species (Pinus brutia, P. nigra, P. sylvestris, P. halepensis and P.pinea), fir species (Abies nordmanniana subsp. nordmanniana, A. nordmanniana subsp. bornmulleriana, A. nordmanniana subsp. equitrojani, A. cilicica subsp. cilicica, A. cilicica subsp. isaurica), the Taurus cedar (Cedrus libani), the beech (Fagus orientalis), the spruce (Picea orientalis), the linden tree (Tilia spp.), the alder (Alnus spp. 2 species, a total of 6 taxons), the juniper (Juniperus spp. 8 species), and the oak (Quercus, about 20 species).

Turkey is an agricultural country where plants and animals have been raised since ancient times. Our Southeastern Anatolia region, also called Northern Mesopotamia, is considered one of the centres of cultivation where mankind first started sedentary agriculture. For this reason, it is considered that many local animal races were first bred here by past civilizations and spread to other regions of the world. Turkey has rich gene resources with 8 cattle, 18 sheep, 4 goat, 7 horse and 9 poultry races as can be seen in Table 3.3.

The cross-breeding of local race farm animals with imported culture races has led to the danger of the loss of local gene resources. On the Black Sea coastal strip, almost all local cattle have been turned into the Jersey race. Nevertheless, only 25 % of the local races have been crossbred with culture races and 75 % maintain their purity. Again, the 'Kıvırcık' sheep of Thrace has been crossbred with the German 'Ots-Friz' race to develop the Tahirova race, causing the genetic erosion of both endemic species. Certain sheep varieties such as 'Karakul' which lives in the northern transition zone and 'Tuj' which lives in the Kars region are faced with the danger of extinction. Another local animal race under threat is the Angora goat, which has been placed under protection to prevent its total extinction.

There are not sufficient studies on the genetic diversity of aquatic species and invertebrates (especially insects).

Danaus plexippus Sühendan KARAUZ

Table 3.3. Local Animal Races of Steppe Ecosystem

DOMESTIC ANIMAL BREED	*BREEDING REGION*
CATTLE BREEDS	
Yerlikara	*All regions except northeastern Anatolia and Thrace*
Doğu kırmızısı	*Eastern Anatolia to Ankara*
Bozırk	*Eskişehir, Kütahya*
Kutlak cattle	*Çorum*
Güney sarısı	*South and Southeastern Anatolia*
Kilis cattle	*Gaziantep*
Domestic buffalos	*Afyon,Kütahya,Uşak,Denizli,Kayseri*
SHEEP BREEDS	
Akkaraman	*From Eskişehir to Hakkari*
Morkaraman	*Erzurum, Erzincan, Bingöl*
Ulaş-Kangal karamanı	*Sivas, Malatya,*
Güney karamanı	*South and Southeastern Anatolia*
Karakaş sheep	*Southeast, especially Diyarbakır*
Ödemiş sheep	*Izmir*
Dağlıç	*Bilecik, from Eskişehir to the Aegean*
Ivesi	*Southeast Anatolia*
Herik sheep	*Eastern Black Sea Region*
Hemşin sheep	*East of Black Sea Region*
Tuj sheep	*Kars*
Wool sheep	*Trakya, South Marmara*
Karakaya sheep	*Eastern Black Sea Region*
Sakız sheep	*Aegean Coasts*
Imroz sheep	*Çanakkale*
Turkish Merino	*Marmara*
Central Anatolian Merino	*Central Anatolia*
Malya sheep	*Central Anatolia*
GOAT BREEDS	
Angora Goat	*Ankara, Central Anatolia*
Wool goat	*At all regions*
Kilis goat	*Southern Anatolia*
Akkeçi (1)	*Central Anatolia*
HORSE BREEDS	
Anatolian horse	*Central Anatolia*
Çukurova horse	*South and Southeast*
Domestic Arabian horse	*Southeast*
Uzunyayla horse	*Kayseri, Sivas*
Canik horse	*Black Sea Region*
Malakon horse	*Kars*
Arabian horse	*Southeast*
POULTRY	
Domestic breeds of fowl	*At all regions*
Denizli breed	*Denizli and its locations*
Gerze breed	*Sinop*
Çıplak boyun	*Muğla*
Zile breed	*Sivas*
Domestic breeds of turkey	*Throughout the country*
Domestic breeds of goose	*Throughout the country*
Domestic breeds of duck	*Throughout the country*
Angora rabbit	*Throughout the country*

4. THE CURRENT STATE OF BIOLOGICAL DIVERSITY

4.1. CURRENT MECHANISMS CONCERNING THE CONSERVATION AND SUSTAINABLE USE OF BIOLOGICAL DIVERSITY

4.1.1. The Institutional Structure

It is the responsibility of the MEF and its affiliated organizations to formulate the policies concerning the conservation and sustainable use of the environment and biological diversity, to designate and manage protected areas under various statuses, to develop and implement plans and programmes, to carry out activities in this scope and to ensure coordination among different institutions. These duties and responsibilities are performed through the central and provincial units of the Ministry and its affiliated organizations. The main service units of the central organization of the MEF are the following:

1- General Directorate of Nature Conservation and National Parks
2- General Directorate of Environmental Management
3- General Directorate of Environmental Impact Assessment and Planning
4- General Directorate of Afforestation and Erosion Control
5- General Directorate of Forest-Village Relations
6- Department of Research and Development
7- Department of Foreign and EU Affairs
8- Department of Training and Publication

The affiliated organizations of the MEF are the Special Environmental Protection Agency, the General Directorate of Forestry, the General Directorate of the State Meteorological Service, and the General Directorate of State Hydraulic Works. The provincial organization of the MEF consists of the Provincial Directorates of the Environment and Forestry and the regional directorates of the affiliated organizations.

The Ministry's unit with primary authority and responsibility for the conservation and sustainable use of biological diversity is the General Directorate of Nature Conservation and National Parks, which is also the CBD focal point. The General Directorate of Nature Conservation and National Parks is the principal unit responsible for the management of protected areas designated under the National Parks Law, for the conservation of wildlife and for the regulation and supervision of terrestrial hunting. Hunting is regulated in accordance with decisions of the Central Hunting Commission, headed by the MEF and composed of the representatives of relevant governmental agencies, voluntary organizations, specialists and hunting associations. The Special Environmental Protection Agency and the General Directorate of Forestry are the affiliated organizations responsible, respectively, for the designation, conservation and management of Special Environmental Protection Areas and for the conservation, development, operation and management of forests.

The Ministry of Agriculture and Rural Affairs is another important institution with authority and responsibility in the conservation and sustainable use of biological diversity. The MARA has assumed the responsibility for coordination and use concerning all agricultural resources and water products. The activities such as the conservation and management of pastures, the investigation, development and conservation of the wild relatives of cultivated plants and domesticated animals and of local varieties and races, the conservation of water products and management of water products hunting, and the taking of agricultural quarantine measures, conducted by the MARA in the scope of its duty under its founding law to protect and develop soil, water, plant and animal wealth and similar natural resources serve the conservation and sustainable use of biological

diversity. Those duties and responsibilities of the Ministry of Agriculture and Rural Affairs which concern biological diversity are performed by its central and provincial organizations through the General Directorate of Agricultural Research, the General Directorate of Protection and Control and the General Directorate of Agricultural Production and Development, which are among its main service units. In addition to agricultural research and development activities, the General Directorate of Agricultural Research also functions as the national focal point concerning biosafety, access to genetic resources and benefit-sharing under the CBD.

The Ministry of Culture and Tourism is another institution with authority in the designation of protected areas. With the aim of preserving our country's natural and cultural assets and carrying them over to future generations, the natural sites determined by the General Directorate of Cultural Assets and Museums under the Law for the Protection of Cultural and Natural Assets are registered and placed under protection by the Regional Protection Boards. Resolutions concerning the conservation and restoration of cultural and natural assets requiring conservation are adopted by the High Board for the Protection of Cultural and Natural Assets, headed by the Undersecretary of Culture and Tourism and composed of high-level officials from the relevant Ministries.

In addition to the agencies mentioned above, the other main institutions involved in the conservation and sustainable use of biological diversity as a result of their duties and authorities in the management of non-living natural resources are the following:

- Ministry of the Interior
- Turkish Coast Guard Command
- Undersecretariat of Maritime Affairs
- Ministry of Public Works and Housing
- Ministry of Energy and Natural Resources

The Scientific and Technological Research Council of Turkey and universities as well as the research institutes of the MEF and the MARA take part in the investigation of biological diversity.

In Turkey, there are many national and local non-governmental organizations contributing on a voluntary basis to the conservation and sustainable use of biological diversity, including public awareness- raising in particular.

As the competent agency in the preparation of national plans and programmes, the Undersecretariat of the State Planning Organization ensures the formation of environmental polices and planning of investments together with other sectors in the framework of development plans. The investment programmes prepared by the SPO constitute the basic financial mechanism for the activities towards the conservation and sustainable use of biological diversity. Fines and the incomes obtained from the pricing of environmental services as well as the respective shares allocated to the Ministries out of the general budget provide financial resources for conservation activities through revolving funds.

4.1.2. Nature conservation policies and environmental law

Nature Conservation Policies

Importance has been attached to the conservation of the natural environment since the early years of the Republic. The designation of the first National Park in 1958, when environmental problems were not yet intensive in our country, reflects a well-established approach to nature conservation. In the 1970s, when human pressure on the environment was beginning to rise in the world and in Turkey, environmental conservation policies started to become institutional in Turkey. The General Directorate of the Environment, established in 1984 as a body affiliated to the Prime Ministry, was converted in 1989 into the Undersecretariat of the Environment and later replaced by the Ministry of the Environment, created in 1991. In 2003, the Ministry of

the Environment was merged with the Ministry of Forestry and renamed as the Ministry of the Environment and Forestry.

The fact that Turkey is party to international conventions aimed at the conservation of biological diversity is a reflection of its nature conservation policy.

Starting from the Fifth 5-Year Development Plan, which covered the years 1985 to 1989, the environmental sector was included in national programmes as part of development plans. The subsequent Development Plans and Annual Programmes have included issues of biological diversity in the environmental and agricultural sectors, set forth policies for the conservation and sustainable development of biological diversity and for the augmentation of its economic value, and specified the necessary measures. The Ninth Development Plan, covering the years 2007 to 2013, determines it as a priority to carry out activities for the conservation and development of and the addition of economic value to the biological diversity that our country has. The Plan states in its point 459 that "the activities for the investigation, conservation and evaluation of and the addition of economic value to the biological diversity and genetic resources of our country will be accelerated" and in its point 508 that "the aim is to protect the natural forest ecosystem effectively against various threats, especially fires and pests, and to manage it in a multi-purpose and effective fashion, considering the conservation-utilization balance, biological diversity, gene resources, forest health, and the development of non-wood products and services and eco-tourism".

Membership of International and Regional Organizations

As a UN member country, Turkey is a member of many organizations affiliated to the UN such as the UNEP and the FAO in particular and of the bodies created within those organizations such as the International Commission of Plant Genetic Resources. In addition, it also participates in other international organizations such as the International Plant Genetic Resources Institute (IPGRI, Italy), the International Centre for Agricultural Research on Dry Areas (ICARDA) and the International Union of Forest Research Organizations (IUFRO) and in regional bodies such as the European Forest Genetic Resources Programme (EUFORGEN) and the European Cooperation Programme in Plant Genetic Resources (ECP/GR). These memberships are an indication of the importance attached by Turkey to the conservation of biological diversity.

At the Summit of EU Heads of State and Government held in Helsinki on 10-11 December 1999, Turkey was unanimously accepted as a candidate member of the European Union. In the light of the Accession Partnership Document formally adopted by the European Council on 8 March 2001, the National Programme for the Adoption of the Acquis was prepared on 19 March 2001. To achieve harmonization with the environmental acquis of the EU and to implement legislation effectively, the National Environmental Strategy (NEP) was completed in 2006. In the nature conservation sector, the NEP aims to strengthen the existing nature conservation system with a view to the fundamental goals of protecting biological diversity, ensuring its sustainable use and preventing the loss of biological diversity.

International Conventions

The international conventions to which Turkey is party have the force of law and are part of national legislation. The international conventions for the conservation of the environment and biological diversity to which Turkey is party are as follows:

- UN Convention on Biological Diversity (CBD) (1997) and the Cartagena Protocol on Biosafety (2004)
- UN Framework Convention on Climate Change (FCCC) (2004)
- Vienna Convention for the Protection of the Ozone Layer (1988) and the Montreal Protocol on Substances Depleting the Ozone Layer (1990)
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and

Their Disposal (1994)

- UN Convention to Combat Desertification (CCD) (1998)
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR) (1994)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996)
- Convention for the Protection of World Cultural and Natural Heritage (1983)
- International Convention for the Prevention of Marine Pollution from Ships (MARPOL) (1990)
- International Convention on Plant Genetic Resources for Food and Agriculture (2006)
- Convention on Long-Range Transboundary Air Pollution and the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmissions of Air Pollutants in Europe (EMEP) (1983)
- Convention for the Conservation of European Wildlife and Natural Habitats (BERN) (1984)
- European Landscape Convention (2001)
- The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (1981) and its protocols including the Protocol on Special Protected Areas and Biological diversity in the Mediterranean (1988)
- Convention for the Protection of the Black Sea Against Pollution (Bucharest) (1994) and its protocols including the Protocol for the Protection of Biological and Landscape Diversity in the Black Sea (2004)

National Environmental Strategies, Plans and Programmes

- National Environmental Action Plan (1998)
- National Plan for In-Situ Conservation of Plant Genetic Diversity (1998)
- National Biological diversity Strategy and Action Plan (2001)
- National Agenda 21 Programme (2001)
- National Wetland Strategy (2003)
- Turkish National Forestry Programme (2004)
- National Science and Technology Policies 2003-2023 Strategy Document (2004)
- Turkish National Action Programme Against Desertification (2005)
- National Environmental Strategy (2006)
- National Rural Development Strategy (2006)

Turkish Environmental Law

The Constitution

Article 63 of the Constitution adopted on 18.10. 1982 provides that the State shall protect historical, cultural and natural assets and take supporting measures for this purpose. This Article also provides for the conservation of species in their natural environments. In addition, even if they are not directly intended for the conservation of biological diversity, there are the provisions for environmental protection in Article 56, the limitation introduced by Article 35 on the exercise of private ownership in view of public benefit, and the provisions in Article 44 concerning the efficient use of land, in Article 45 concerning the prevention of the use of agricultural land, meadows and pastures for other purposes and in Article 169 concerning the conservation and development of forests, thereby securing the conservation of biological diversity through legal sanctions.

Laws and Regulations

The Environmental Law, dated 09.08.1983 and numbered 2872, aiming at the protection of the environment, the common asset of all living things, in accordance with the principles of sustainable environment and sustainable development, determines and provides for the basic principles related to protecting and improving the environment and preventing its pollution. Law 5491 of 26.04.2006 Amending the Environment Law states the importance of protecting biological diversity in Article 6 and introduces penal sanctions against damage to the environment, including the destruction of biological diversity, when detected through inspection and audits. The regulations issued on the basis of the Environment Law specify rules on the prevention of pollution and on environmental impact assessment.

The laws and regulations for species and site protection in Turkey are as follows:

1. Law on National Parks (2873 - 09.08.1983): It provides for the designation of national parks, nature parks, natural monuments and nature conservation sites with national and international value and for their conservation, development and management without spoiling their characteristics. Technical details for the implementation of the Law have been introduced by the National Parks Regulation.
2. Law for the Protection of Cultural and Natural Assets (2863 - 23.07.1983): It sets forth definitions related to movable and immovable cultural and natural assets requiring conservation and regulates the actions and activities to be carried out. Natural sites are designated according to this Law.
3. Decree-Law Establishing the Special Environmental Protection Agency (383 - 19.10.1989): This Decree-Law establishes the Special Environmental Protection Agency to take all measures for protecting the environmental assets of areas designated or to be designated as "Special Environmental Protection (SEP) Zone" and solving their existing environmental problems, to determine the principles of conservation and use for such areas, to make their development plans, to revise existing plans of every scale and planning decisions and to approve them acting on its own initiative. SEP Zones are declared by the Council of Ministers in accordance with this Law.
4. Terrestrial Hunting Law (4915- 01.07.2003): This Law includes provisions concerning the conservation and development of game and wild animals together with their natural habitats for sustainable hunting and wildlife management, the control of their hunting, the regulation of hunting, the utilization of hunting resources in such a way as to benefit the national economy, and cooperation with relevant public and private legal entities. Wildlife protection and generation areas are established in accordance with this Law. The "Regulation for Protecting Game and Wild Animals and Their Habitats and for Combating Their Pests", issued on the basis of the Law, sets forth the procedures and principles concerning the conservation of game and wild animals and of their habitats, the relocation of species, their placement, measures of protection, their hunting and collection from the wild, the management of predatory species and the combat against harmful ones, their diseases and their pests, and includes provisions related to the species of game and wild animals, their survival and conservation in the natural environment, their areas of protection and habitats, the catching and collecting of them, scientific research on them, the ringing and marking of them, their diseases, and penalties. This Law does not cover aquatic living things.
5. The Regulation for the Protection of Wetlands: Prepared with a view in particular to implementing the Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (the Ramsar Convention), this Regulation sets forth the principles for the protection and development of all wetlands, having or not having international importance, and for cooperation and coordination between agencies involved in this area.

6. Law on Aquatic Products (1380-04.04.1971): This Law includes basic provisions concerning the conservation, hunting, production, marketing, health and control of aquatic living things found in seas and inland waters, and other provisions concerning procedures, principles, prohibitions, restrictions, obligations and measures in other issues such as harmful and polluting substances prohibited from being discharged in production areas.
7. The Forest Law (6831-31.08.1956): It states principles concerning forest management such as the planning, operation and conservation of forests. Protection forests, gene protection forests and seed stands are designated under this Law.
8. The Regulation on the Collection, Production and Exportation of Natural Flower Bulbs: It sets forth principles concerning the collection from the wild, production, growing and storing of and domestic and foreign trade in seeds, bulbs or other parts of natural bulbous flowers without destroying and depleting their population.
9. The Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora: It sets forth procedures and principles for the control of international trade in fauna and flora species covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to ensure their sustainable use.
10. The Law for the Protection of Animals (5199- 24.06.2004): It aims to ensure animal welfare and proper treatment of animals, to protect them in the best manner from pain, suffering and cruelty, and to prevent all kinds of ill-treatment against them.
11. The Apiculture Regulation: The aims of this Regulation are to set forth basic principles concerning apiculture, research, the identification, protection and improvement of gene resources, the formation of new lines for bee-raising, the imports and exports of breeding material, and the commercial raising of queen bees, to determine and disseminate the criteria to be required for artificial insemination in beekeeping enterprises, and to take measures for the protection of bee health.

Although the legal provisions for species and habitat conservation also serve to protect genetic resources, there are legal provisions introduced by the MARA directly for the protection of genetic resources. They are as follows:

1. The Regulation Concerning the Collection, Protection and Utilization of Plant Genetic Resources: For the purpose of protecting and developing Turkey's plant genetic resources, this Regulation sets forth principles concerning their survey, their collection and the protection, conservation, production, replacement, characterization, assessment, documentation and exchange of collected material. The National Gene Bank and Herbarium has been established under this Regulation, which also covers the issue of permits for research on plant genetic resources.
2. The Regulation Concerning the Protection of Animal Gene Resources: It sets forth procedures and principles concerning the determination of the genotypical and phenotypical characteristics of Turkey's animal gene resources, their breeding for conservation, and the recording and conservation of those characteristics.
3. The Animal Improvement Law (4631-28.02.2001): This Law provides for all types of animal production and activities to render such production more effective, for improvement efforts to increase the productivity of animals raised for racing, competition or business, for protecting the gene resources of domestic and wild animals, for making animal production more efficient and competitive, for activities relating to these matters, for the keeping of pedigree records, for the improvement of animal races, for the raising of breeding animals in healthy and hygienic conditions and their transfer to producers free from diseases, and for their protection.
4. The Law for the Protection of Improver's Rights Concerning New Plant Varieties (5042-08.01.2004): The aim of this Law is to encourage the development of plant varieties and

to ensure the conservation of new varieties and of improver's rights. This Law covers all plant species.

5. The Seed-Raising Law (5553-31.10.2006): It replaced Law 308 of 21.08.1963 on the Registration and Certification of Seeds in order to improve quality and yield in crop production, to provide quality assurance for seeds, to make provisions concerning seed production and trade, and to implement the necessary actions for the restructuring and development of the seed-raising sector.

Decree-Law 551 for the Protection of Patent Rights, put into force on 24.06.1995, is intended to protect inventions by issuing patents or utility model certificates in order to encourage the activity of making inventions and to achieve technical, economic and social progress through the application of inventions to industry. It is also a legislative measure concerning genetic resources in the scope of the protection of intellectual property rights on biotechnological inventions.

The application and authorization procedures for research work in Turkey by foreign scientists are determined by the "Principles Governing Foreigners Wishing to Undertake Scientific Research and Studies or to Shoot Films in Turkey, or Persons Applying in Their Name, and Foreign Press Members" which were put into force through Council of Ministers Decision 88/12839 of 4 April 1988.

The laws and regulations that may contribute to the sustainable use of biological diversity and that include provisions concerning the management of resource use are the following:

1. The Forest Law (6831-31.08.1956): It sets forth principles concerning forest management such as the planning, operation and conservation of forests.
2. The Pastures Law (4342-25.02.1998) and the Pastures Regulation: They were put into force with the aim of ensuring the use of pastures, summer quarters, winter quarters, grazing areas and meadows in accordance with rules to be set, carrying out their maintenance and improvement, increasing and sustaining their productivity, continuously supervising their use, and changing their purpose of use when required.
3. The Coastal Law (3621/3830-04.04.1990): It sets forth principles for the conservation of sea, natural and artificial lake and river coasts and of the coastal strips that are under their influence and an extension of them, considering their cultural and natural characteristics, and for their use for public benefit.
4. The Agriculture Law (5488-18.04.2006): It includes procedures and principles for determining the goals, scopes and subjects of agricultural policies, defining the goals and principles of agricultural support policies and the basic support programmes, determining the market regulations, financing and administrative structure related to the implementation of these programmes, and making the legislative and administrative arrangements related to the priority research and development programmes to be implemented in the agricultural sector. It includes the conservation and development of natural and biological resources among the goals of agricultural policies and charges the MARA with the duty of conducting research for the conservation and development of biological diversity, genetic resources and ecosystems.
5. The Soil Protection and Land Use Law (5403-03.07.2005): It sets forth procedures and principles to ensure the conservation and development of soil by preventing its loss and degradation through natural or artificial ways and the planned use of land in accordance with the principle of sustainable development with priority for the environment.
6. The Law on National Mobilization for Afforestation and Erosion Control (4122-23.07.1995) and the Regulation on Afforestation: They specify principles and procedures concerning the activities of afforestation and erosion control to be undertaken by governmental agencies and natural and legal persons in order to enhance the forest area and forest wealth, to restore and improve the balance between soil, water and plants, and to protect environmental values. The Regulation sets forth principles concerning the activities of

afforestation, erosion control, pasture improvement, tree improvement, seed production, nursery and energy forest establishment, development and restoration to be undertaken in accordance with the provisions of Forest Law 6381.

7. The Organic Farming Law (5262-01.12.2004) and Regulation: They were put into force with the aims of protecting the ecological balance, conducting activities of organic farming, and regulating, developing and spreading organic agricultural production and marketing.
8. The Regulation on Good Agricultural Practices: It was put into force with the aims of conducting agricultural production not harmful to the environment and to human and animal health, protecting natural resources, and ensuring traceability and sustainability in agriculture and food safety.
9. The Regulation Concerning the Protection and Use of Agricultural Land: This Regulation sets forth procedures and principles related to ensuring the conservation of agricultural land and its use in accordance with its intended purpose, and the exceptional cases in which such land may be used for non-agricultural purposes.

Agricultural Control and Agricultural Quarantine Law 6968 of 15.05.1957 and Animal Health and Surveillance Law 3285 of 08.05.1986 rank first among the legislation to ensure the border control, for both health and conservation purposes, of living species that will enter or leave Turkey. In addition, Anti-Smuggling Law 5607 of 19.07.2003, in force since 1932 and updated in 2003, and Customs Law 4458 of 27.10.1999 regulate border controls.

4.2. BIOLOGICAL DIVERSITY CONSERVATION ACTIVITIES

Ex-situ (conservation outside the natural habitat or artificial conservation) and in-situ (conservation in the natural habitat or conservation on site) approaches are followed to protect biological diversity. Both approaches are generally accepted programmes with their own applications. Ex-situ conservation is implemented through organizations such as gene banks, seed banks, zoological gardens, botanical gardens, etc. However, the process of evolution is halted in ex-situ conservation since the interaction between the species and the environment does not continue. On the other hand, damage that may result from natural processes which it is not possible to prevent at in-situ conservation sites makes it necessary to protect species also outside such sites. For this reason, ex-situ and in-situ conservation activities are conducted as programmes that complement each other.

4.2.1. Ex-situ Conservation (Conservation Outside the Natural Habitat or Artificial Conservation)

Ex-situ conservation activities in Turkey were started in 1964 at the Aegean Institute of Agricultural Research, affiliated to the MARA, and seed specimens belonging to our country's plant genetic resources began to be preserved for the long term (basic collections) and for the short and medium term (active collections) at the national seeds gene bank established in 1972 within the same institute. The basic collections are preserved at -18/-20 °C for the long term and the active collections at 0°C for the medium term, in two sets. The national collection includes land races, wild and herbaceous relatives (in the collections of both seeds and living plants), other wild plant species of economic importance (such as medical, aromatic and decorative plants) and endemic plant species. Certain species peculiar to Southwest Asia and a small part of wheat and barley varieties in the world are also included in the collection. The seeds of endemic plants collected under the "Turkish Endemic Plants Project" with SPO support between 1992 and 1997 are also preserved in the National Gene Bank. Today, some 50,000 materials distributed over about 600 genera are kept in the National Gene Bank. Of those materials, about 10,000 belong to 2,400 wild species. This organization continues its activities concerning the classification, documentation and conservation of seeds, leguminous plants, fodder plants, vegetables, fruits, decorative plants, and medical and aromatic plants. The security backups of the basic collection are preserved at the Field Crops Central Research Institute.

16 of the research institutes within the MARA have field gene banks where material with vegetative propagation is preserved in field conditions. The field gene banks, distributed in various provinces such as Yalova, İzmir, Tekirdağ, Gaziantep, Malatya and Erzincan, include mainly collections of fruit species.

Outside the MARA, the Gene Bank of Osman Tosun within the Field Plants Department, the Faculty of Agriculture, the University of Ankara, has been active since 1936 and has medium-term preservation facilities. This organization keeps about 11,000 seed specimens. Atatürk and Çukurova Universities and other universities with a Faculty of Agriculture are also engaged in similar activities. Among these activities contributing to ex-situ conservation, one may count the Botanical Garden of the Aegean University, the Botanical Garden of the Istanbul University and the Atatürk Arboretum of the Istanbul University. In addition, other botanical gardens and arboretums have been established through private initiatives in recent years (Nezahat Gökyiğit Botanical Garden, Karaca Arboretum, etc.).

Ex-situ conservation efforts for forest trees (seed gardens, origin trials, progeny trials) are made by organizations affiliated to the Ministry of the Environment and Forestry, especially by the Directorate of Forest Trees and Seeds Improvement and Research. Turkey is a member of the EUFORGEN, and the agreement among member countries for the establishment of a core collection is at the stage of preparation. A total of 169 seed gardens in 8 species, a total of 35 seed plantations in 19 species and a total of 13 clone parks in 5 species have been established to date.

4.2.2. In-situ Conservation (Conservation in the Natural Habitat or Conservation On Site)

The conservation of species in their own ecosystems is an approach based on the idea that species depend on the natural environment for their survival. In-situ programmes such as National Parks, Nature Conservation Areas, Nature Parks, Wildlife Development Areas, Special Environmental Protection Zones, Natural Sites, Natural Assets and Gene Preservation and Management Areas have been conducted in Turkey since the 1950s. The in-situ conservation sites are given in Table 4.1 in terms of their status, number and surface area. The proportion of protected areas under various statuses to the country's total surface area increased from 4 % to about 6 % after 2000.

Kaçkar Mountains National Park Nihan Y.ARPA

Table 4.1. In Situ Conservation Programs in Turkey

Conservation Programs	*Foundation Year*	*Responsible Institution*	*Number*	*Area (acres)*
National Parks	*1958*	*MEF*	*39*	*878.801,00*
Nature Parks	*1983*	*MEF*	*29*	*78.868,00–*
Nature Conservation Areas	*1987*	*MEF*	*32*	*63.008,00–*
Nature Monuments	*1988*	*MEF*	*105*	*5.541,60-*
Wildlife Improvement Areas	*1966*	*MEF*	*80*	*1.205.599,00*
Wildlife Breeding Stations	*1966*	*MEF*	*22*	*4.551*
Protection Forests	*1950*	*MEF*	*57*	*394,853.00*
Gene Conservation Forests	*1994*	*MEF*	*193*	*27,735,60*
Seed Stands	*1969*	*MEF*	*338*	*46.086,04*
Special Environment Protection Regions	*1988*	*MEF*	*14*	*1.206.008,00*
Ramsar Areas	*1994*	*MEF*	*12*	*200.000,00-*
Natural Archaeological Protection Areas	*1973*	*Ministry of Tourism and Culture*	*1003*	
Natural Assets	*1973*	*Ministry of Tourism and Culture*	*2370*	
Gene Conservation and Management Areas	*1993*	*MEF/Ministry of Agriculture*	*Pilot study*	*Kazdağı and Bolkar Mountains, and Ceylanpınar State Production Farm*

National Parks, Nature Conservation Areas and Natural Monuments

Protected areas are designated with the statuses of National Park, Nature Conservation Area, Nature Park and Natural Monument under National Parks Law 2873.

The National Park is defined as "a tract of nature with conservation, recreation and tourism areas having rare natural and cultural resource values of national or international significance in scientific and aesthetical terms". There are 39 National Parks in Turkey. They have great importance for the conservation of biological diversity in forest, steppe, wetland and coastal ecosystems.

When the "National Parks Law" entered into force in 1983, the use of the term "tracts of nature" as well as the term "forests" enabled this law to be applied also to non-forest areas that require protection. Since the main objective is the conservation of nature, the term "Nature Conservation Area" was also added to the laws. Nature Conservation Areas are defined as "tracts of nature that contain outstanding examples of rare, endangered or vulnerable ecosystems, species and natural phenomena having importance for science and education, that require absolute conservation and that are allocated exclusively for purposes of science and education". As of 2007, there were 33 Nature Conservation Areas.

Bafra Lake Ümit N. ÜLKÜTAŞIR

Nature Parks are defined as tracts of nature that have a characteristic plant cover and wildlife and that are suitable for public recreation and entertainment within the landscape integrity. In our country, there are 22 Nature Parks designated for this purpose.

Natural Monuments are defined as tracts of nature that have characteristics formed by nature or natural phenomena and scientific value and that are protected under the same principles as National Parks. In our country, 104 sites are placed under conservation as "Natural Monuments".

Wildlife Conservation and Wildlife Development Areas and Breeding Stations

In the framework of Terrestrial Hunting Law 4915, areas hosting a natural population of wild animals that face the danger of extinction are placed under protection to conserve these species together with their habitats without spoiling their ecosystem characteristics. In some of these areas, species breeding is also carried out. In Turkey, 80 Wildlife Development Areas have been designated. Of these areas, "those which possess wildlife values and in which the habitats requiring conservation together with the plant and animal species are absolutely protected and maintained" will be designated as "Wildlife Conservation Areas". Through the Terrestrial Hunting Law and the decisions of the Central Commission of Hunting, 52 mammal species and 415 bird species have been placed under protection. Activities of conservation are being conducted on a project basis for endangered species such as the Anatolian wild sheep, the black vulture, the bustard, the Caucasian black grouse, the gazelle, the red deer and the bald ibis. Populations of the wild sheep (Ovis orientalis) in Boz Dağ, Konya, the gazelle (Gazella subgutturosa) in Ceylanpınar, Urfa, and the bald ibis (Geronticus eremita) in Birecik, Urfa have been placed under protection and their extinction has thus been prevented, even if partly.

Special Environmental Protection Zones

Article 9 of the Environment Law provides that land and water areas of ecological importance on a national or global scale which are vulnerable to environmental pollution and degradation shall be designated as Special Environmental Protection Zones to guarantee that their biological diversity, natural resources and related cultural resources can reach the future generations. In 1989, the Special Environmental Protection Agency was established by Decree-Law 383 to protect the environmental assets of Special Environmental Protection Zones, to address their current environmental problems and to protect and develop their historical and cultural assets as well as their biological and ecological resources. There are 14 "Special Environmental Protection Zones" currently registered in our country. These areas have great importance for the conservation and sustainable use of biological diversity especially as they provide spawning grounds for sea-turtles and habitats for Mediterranean seals.

Natural Sites

The Ministry of Culture initially started activities on the concept of "natural site" included in the "Antiquities Law" adopted in 1973 for the in-situ conservation of our natural assets as well as our cultural assets, and the "Law for the Protection of Cultural and Natural Assets" adopted in 1983 introduced the definition of "natural asset" as well as the definition of "site", with caves, rock shelters, special trees and tree populations included in the definition of natural asset.

Areas important for biological diversity are included in areas placed under protection as a natural site by the Ministry of Culture and Tourism.

As defined by decision 659 of 5.11.1999 adopted by the High Board for the Protection of Cultural and Natural Assets, natural sites are "areas located on or under the ground, or under the water, that require conservation for their rarity or special characteristics and beauties, dating back to geological, pre-historical or historical times".

Gene Conservation and Management Areas

The Gene Conservation and Management Areas concept was developed under the project "In-Situ Conservation of Turkey's Plant Genetic Diversity" (1993-1998; GEF-1 Project). Through this project, the necessary institutional and personnel capacity was developed for the in-situ conservation of the gene resources of the wild relatives of agricultural plants, and activities were implemented to create GPMAs, which are sites chosen from natural or semi-natural areas for the in-situ conservation of genetic diversity in selected plant species. They are also areas that enable the continuity of evolutionary formations and changes in populations of plant species determined as endemic, endangered and economically important target species".

Ramsar Areas

Turkey acceded to the Ramsar Convention in 1994 and, at the stage of accession, had its 5 wetlands (Lake Manyas, Lake Seyfe, Lake Burdur, Sultan Reedbed and Göksu Delta) recorded in the Convention List. In 1998, the whole of Lake Manyas (Bird) and Lake Burdur, already included in the Convention List in part, and Gediz Delta, Akyatan Lagoon, Lake Uluabat and Kızılırmak Delta were also included in the Convention List. At present, there are 12 wetlands covered by RAMSAR, extending over a total area of 206,830 hectares. Following assessments made in consideration of international criteria, there are 200 areas determined to be wetlands of international importance. In 13 of these areas, the "Bird Sanctuaries Project" has been started.

Seed Stands and Gene Protection Forests

They are stands in which there are trees with outstanding qualities in terms of required characters under the existing conditions, which are located in a certain geographical region, and which are subject to special management and operation for seed production. Seed Stands are intended to obtain high quality seeds with a known source. 339 Seed Stands in 27 species have been selected in our country to date.

Gene Protection Forests are natural stands selected and managed for the in-situ conservation of the genetic diversity of a species. They are intended to protect genetic wealth that exists in nature and to carry it over to future generations. 214 Gene Protection Forests in 28 species have been selected in our country to date.

Mastic Tree Ümit N. ÜLKÜTAŞIR

4.2.3. Important projects conducted at national level

Project for In-Situ Conservation of Turkey's Plant Genetic Diversity (GEF 1 Project)

The project was conducted between 1993 and 1998 jointly by the Ministry of the Environment, the Ministry of Agriculture and Rural Affairs and the Ministry of Forestry with GEF/World Bank grant support. Its aim was the in-situ conservation of the wild forms (relatives) of plant genetic resources. The possibilities of protecting on site the wild species of wheat, barley, oat, lentil, medical plants, decorative plants and other industrial plants, which have the character of genetic resources, and certain forest tree species (the Ida Mountain Fir, the black pine, the red pine, the Taurus cedar, the Taurus fir, the chestnut tree, the wild plum tree, etc.) and of determining and establishing their conservation areas were investigated under the project.

The GEF-1 project was conducted on the Kaz Mountains (Balıkesir), the Bolkar Mountains (İçel) and the Ceylanpınar State Breeding Farm (Ş. Urfa), selected as pilot areas. In the said three areas, sites having rich genetic diversity and containing target species were designated as "Gene Conservation and Management Areas (GPMA)". Under the project, a Geographical Information System (GIS) and a Remote Sensing Centre were established at the Ministry of Agriculture and Rural Affairs, and the National Plan for the In-Situ Conservation of Turkey's Plant Genetic Diversity was prepared.

Biological diversity and Natural Resource Management Project

The project, supported by the World Bank-Global Environmental Fund, which became effective in 2000, will be completed in December 2007. It is the most comprehensive Biological diversity Project to be conducted by Turkey so far with a large-scale GEF contribution. This project aims at efficient, intersectoral and participatory planning and sustainable management of nature conservation and natural resources in the application sites of İğneada, Camili, Köprülü Canyon and Sultansazlığı, representing the three important phytogeographical regions, and in 9 replication sites.

Through protected areas management plans prepared with the participatory and ecosystem-based approach, regarded as an alternative to the conventional planning approach, the project gives attention to meeting the needs of the people living in or around the protected areas as well as the requirements of nature conservation and natural resource management.

The national database called "Noah's Ark" and a Biological Diversity Monitoring Unit have been created to monitor the current state and the progress of biological diversity in Turkey and to use the data concerning biological diversity more effectively in conservation activities. In this context, gaps analysis work has also been started for the protected areas.

Again, the legal and institutional structure required for sustainable nature conservation and resource management has been reviewed and the "Draft Law for Nature Conservation" prepared. The Forest Management Regulation has been redrafted to ensure more effective conservation of biological diversity in exploited forests.

To ensure the participation of interest groups in conservation activities in the 4 pilot areas determined, grant support has been provided in the amount of USD 1 million for about 150 small-scale projects which may be considered biological diversity conservation-friendly.

Raising public awareness and training of relevant persons on biological diversity conservation and natural resource management have also been implemented under the project.

The Camili Biosphere Reserve, the first of its kind in Turkey, has been established under this project.

After this project is completed in 2007, the outputs of the project, the experience gained and the training provided under the project will considerably help Turkey carry out its future conservation activities in a more effective and sustainable manner.

Anatolia Water Basins Rehabilitation Project

The Project Loan Agreement was signed on 4 October 2004 and it is planned that the project will be completed in 2011. The aims of the project are to achieve sustainable resource management and participatory planning in the Central Anatolia and Black Sea regions, to reduce pressure on natural resources, to adopt environment-friendly agricultural and silvicultural practices, to enhance institutional capacity, to raise public awareness and to develop water and food management policies in the process of alignment with the EU. Also, in connection with the rehabilitation and income-raising activities, the project aims at identifying the Pollution of Agricultural Origin in the Kızılırmak and Yeşilırmak basins and eliminating or reducing the negative impacts of such pollution, with support from the GEF (Global Environmental Fund).

In the 28 micro basins determined under the project, a series of actions to develop natural resources will be implemented in cultivated areas, pastures and forest land, including the development of pasture management, the rehabilitation of pasture and forest areas, the enrichment of these areas in plant cover, the increased production of fodder crops, the reduction of agricultural areas left fallow, the adoption of environment-friendly farming techniques, the implementation of measures to increase animal feed and wood production and to promote soil conservation, and agricultural techniques to protect humidity.

Longoz forests Ümit N. ÜLKÜTAŞIR

4.3. AGRICULTURAL AREA AND STEPPE BIOLOGICAL DIVERSITY

4.3.1 Agricultural Area and Steppe Biological Diversity

Agricultural biological diversity is a broad term covering all of the biological diversity components related to food and agriculture and forming the agricultural ecosystems. It means the diversity and variety of the plants, animals and microorganisms at genetic, species and ecosystem levels that are necessary for agricultural ecosystems to maintain their key functions, their structures and their processes. In a more detailed definition, agricultural biological diversity covers plant genetic resources, including the genetic resources of species in pastures and non-agricultural areas and of trees as integral parts of farm systems, animal genetic resources, including fish and insect genetic resources, microbiological and fungal genetic resources, the components of agricultural biological diversity that provide ecosystem services and the abiotic factors that affect them (the food cycle, the decomposition of organic matters and the maintenance of soil productivity, pest and disease management, pollination, the enrichment and maintenance of local wildlife and habitats in their own landscapes, the maintenance of the water cycle, erosion control, climate and the carbon balance) and socioeconomic and cultural factors (traditional knowledge, cultural factors, agricultural landscapes, etc.).

Turkey's main ecological regions from the agricultural point are the Mediterranean Coastal Region, the Aegean Coastal Region, the Black Sea Coastal Region, the Thrace and Marmara Region, the Central Anatolia Region, the Southeastern Anatolia Region, the Eastern Anatolia Region and the Transition Regions (Northwestern Transition, Western Transition, Northeastern Transition, Eastern Transition, Southeastern Transition). This zoning system, based on main climatic elements, including rainfall and temperature in particular, covers agricultural product diversity and the regional and phenological characteristics of agriculture. The Coastal Regions may be defined generally as agricultural production areas located in the Mediterranean climatic zone. Central, Eastern and Southeastern Anatolia are regions dominated by the hard continental climate, with their agricultural product characteristics carrying the influences of these ecological regions. The transition zones are agricultural regions, differing more or less from each other in terms of their overall agricultural characters, each covering several provinces in the transitions across the middle of Central Anatolia to other regions.

Of Turkey's surface area, 52.8 % is agricultural land with 34.1 % cultivated and 18.7 % grassland and meadows. Field crops are raised in 68.5 % of the cultivated agricultural land, 18 % is left fallow, and horticultural plants, fruit orchards, vineyards and olive groves are present on 13.5 %.

Farming enterprises in Turkey are small, fragmented and scattered. With negative results for agricultural production, this structure creates an advantage in terms of biological diversity as it provides small habitats for wild plant and animal species. On the other hand, the fact that farming areas are generally located in steppe ecosystems makes it difficult to distinguish agricultural biological diversity and steppe biological diversity from each other. For this reason, these two ecosystem structures have been considered together.

Wild plants occurring in agricultural areas

Mainly, cosmopolitan species with high ecological tolerance occur in agricultural areas. They include medical and aromatic plants, the wild relatives of cultivated plants, and various fodder plants.

In the dry farming areas in the Central and Eastern Anatolia Regions, certain herbaceous plants occur. These include: the hoary pepperwort (Cardaria draba); the shepherd's purse (Capsella bursa-pastoris); the sea kale (Crambe orientalis); the flixweed (Descurainia sophia); the ball mustard (Neslia apiculata); the wrinkled gold-of-pleasure (Rapistrum rugosum); the wild mustard (Sinapis arvensis); the yellow weed (Boreava orientalis); the tumble mustard (Sisymbrium altissimum); the love-in-a-mist (Nigella arvensis); the gay schröd (Consolida orientalis); the corn crowfoot (Ranunculus arvensis); the corn poppy (Papaver rhoeas); Hypecoum imberbe; the perfiolate penny-cress (Thlaspi

perfoliatum); the chickweed (Cerastium dichotomum); the cow herb (Vaccaria pyramidata); the common corn cockle (Agrostemma githago); the tall spiny rest-harrow (Ononis spinosa); the hop clover (Trifolium campestre); the hare's ear (Bupleurum rotundifolium); the greater bur parsley (Turgenia latifolia); Scariola viminea; and the field bindweed (Convolvulus arvensis).

In the dry farming areas in the Mediterranean and Aegean Regions certain plants occur. These include: the perfoliate cabbage (Conringia orientalis); the garden rocket (Eruca sativa); the yellow sweet clover (Melilotus officinalis); the wild carrot (Daucus carota); the scorpion senna (Coronilla scorpioides); the dwarf mallow (Malva neglecta); Pterocephalus plumosus; the stinking chamomile (Anthemis cotula); the thistle (Cirsium arvense); the Iranian knapweed (Centaurea depressa); the blessed thistle (Cnicus benedictus); Vulpia ciliate; the corn poppy (Papaver rhoeas); the common corn cockle (Agrostemma githago); the yellow bluestem (Bothriochloa ischaemum); and the seaside barley (Hordeum murinum).

In the irrigated farming lands as well as orchards and vegetable gardens, certain plants occur. These include: the crowfoot (Ranunculus constantinopolitanu); the curlytop knotweed (Polygonum lapathifolium); the curly dock (Rumex crispus); the white clover (Trifolium repens); the common agrimony (Agrimonia eupatoria); the poison hemlock (Conium maculatum); the thyme-leaved speedwell (Veronica serpyllifolia); the greater plantain (Plantago major); the bitter sweet (Solanum dulcamaria); the wood avens (Geum urbanum); the common self heal (Prunella vulgaris); the creeping bent (Agrostis stolonifera); Polypogon viridis; the branched horsetail (Equisetum ramosissimum); the common fleabane (Pulicaria dysenterica); the cut-leaved teasel (Dipsacus laciniatus); the sulfur cinquefoil (Potentilla recta); and the bird's-foot trefoil (Lotus corniculatus).

Field Crops

The field crops are the main production branches of Turkey's farming. Turkey is a home to the wild relavites of many field crops and therefore makes significant contribution to biological diversity with local field crops varieties.

Wheat

The field crops harvested in Turkey can be classified as follows:

Cereals:

a) Cold Climate Cereals (wheat, barley, rye, oat, triticale)
b) Warm Climate Cereals (maize, paddy, millet, canary grass, buckwheat)

Culinary Legumes: Lentil, pea, bean, broad bean, green pea, cow pea

Industrial Crops:

a) Oil-seed Crops: (sunflower, soybean, sesame, peanut, rape-seed, cottonseed)
b) Starch-Sugar Crops (sugar beet, potato, Jerusalem artichoke)
c) Fiber Crops (cotton, linen, hemp)
d) Medical and aromatic crops (poppy, cummin, mint, thyme, etc.)
e) Other industrial crops (tobacco)

Fodder crops:

a) Leguminous fodder crops (clover, vetch, sanfoin, bitter vetch, trefoil.)
b) Poaceae fodder crops (Agropyron cristatum, bromine, grass)

Horticultural Crops

Thanks to its convenient ecological conditions, Turkey is one of the major producers of horticultural crops in the world. While 13.5% of the cultivated farmlands is used for horticultural crops production, the horticultural crops have 55.76% share in vegetable production value. Turkey's horticultural crops areas comprise vegetable gardens and orchards, oil groves and vineyards. As in field crops, the wild relatives of horticultural crops and their local varieties are significant components of agricultural biological diversity. In Turkey, around 50 vegetable species and 75 fruit species are yielded. This genetic diversity greatly contributes to choosing varieties adaptive to various environmental conditions, responsive to different market demands and, in particular, and resistant to diseases and pests today with organic farming increasingly gaining importance. The olive groves cover 2.5% of total farmlands and Turkey has a share of 10% in the world olive production. Olive trees, which have a cultural value, as well, are under conservation in Turkey. Turkey is also one of the leading countries in the world in viniculture. Its share in the world's fresh grape production is 6% and ranks 4th in the world with respect to the area of vineyards.

Meadows

In Turkey, grazing areas can be roughly classified as coastal meadows and steppe meadows. Coastal meadows include grazing lands in the Black Sea, Marmara, Aegean, Mediterranean and Thrace regions. Coastal meadows constitute approximately 25 to 30% of the country's all meadows. Annual rainfall in coastal meadows varies between 600mm and 2800mm. Herbaceous vegetation in these meadows turns to steppe formation as rainfall decreases. Thanks to high precipitation and better soil conditions, more productive meadow vegetation has been formed here.

In coastal meadows, there are valuable Poaceae and Leguminous fodder crops, in different proportions depending on rainfall. Valuable meadow plants are found in these meadows, which are considerably saved from harmful overgrazing. In the meadows highly destroyed by overgrazing, valuable meadow plants are replaced by Narduus, the shrubby wormwood (Artemisia), the Aleppo milk-vetch (Astragalus), the horned dock (Rumex), the knapweed (Centaurea), the goat-scented St. John's wort (Hypericum), the sage (Salvia) and wild grass species that animals do not feed on much.

The grazing lands of arid and semi-arid areas with a total rainfall of 200 to 700mm are classifiad as steppe meadows. Steppe meadows are divided into two categories as mountain meadow and plain meadow in terms of altitude and topography. Since altitude and rainfall amount are relatively higher in mountain meadows, more valuable poaceae and leguminous fodder crops are yielded. However, owing to continuous overgrazing, quality crops have largely been replaced by the thyme (Thymus) and the shrubby wormwood (Artemisia) species. Therefore, most of the mountain steppes have been turned into thyme steppes and are called with this name. These are large grazing areas, covering the Central, Eastern and South-eastern Anatolia Regions and the transition zones. The three-fourth of Turkey's meadows falls into this group. The Poaceae proportion of vegetation in the most arid parts of steppe ecosystems is around 20 to 30%. Most of leguminous are annual plants which yield a small amount of fodder in spring and dry up as temperature goes up. The rest of them are the thorny plants which animals don't feed on much during their development period.

In some parts of steppe meadows which are flat, with deep soil and near ground water, flat meadow stains exist. These meadow pieces are fertile areas where green fodder are found even in hot and dry periods of summer and on which animals graze throughout the grazing season. Arid vegetation is found in the vicinity of Tuz Lake and Aslım marsh in Central Anatolia, and Sultan reed in Kayseri. Such poaceae crops as Poa compressa, the bermuda grass (Cynodon dactylon), the weeping alkali grass (Puccinellia distans), P.ciliaris, Eremopyron orientale, Apera intermedia, such leguminous plants as Trigonella monantha, Astragalus lydius and such halophilics as Salsola plathyheca, Kochia prostrata, Atriplex tatarica and the slender grass-wort (Salicornia europea) can be found in these regions where only halophytic crops can grow.

Meadows in high plateaus and the alpine meadows over timberline are very important for animal breeding. Because these meadows offer green grazing areas for animals in summer time when other meadows are dry. Plauteu and alpine meadows, which cover large areas in the Eastern Anatolia, Northern Black Sea, Taurus and anti-Taurus mountains, are found as small stains on the high mountains of other regions. In these meadows, only some crops that can resist the cold weather persist as altitude become higher. With higher altitudes, leguminous plants and poaceae are replaced by crops that animals do not feed on. So, places near the limit of permanent snow cover are not much valuable as grazing areas. In addition, in some parts of forest ecosystem where trees do not grow or are destroyed, the in-forest-meadows have grown which are partly or completely covered by forest.

Plant species occurring in steppe ecosystems

Steppe ecosystems show wide occurrence on the high mountainsides of Central Anatolia, Aegean and Mediterranean regions and in the most part of Eastern Anatolia. The most prominent characteristic of steppe ecosystems is that the annual or multi-annual herbaceous plants (mostly members of wheat family) are dominant in these ecosystems. The floristic composition of steppe vegetation is quite rich with many endemic plants. The dominant plants of steppe vegetation are the feathergrass (Stipa sp.), the foxtail brome (Bromus sp., Astragalus sp.), the Lebanon acantholepis (Acantholimon sp.), the sainfoin (Onobrychis sp.) and the sage (Salvia sp.). Since the steppe vegetation of Turkey grows as secondary vegetation, except for the steppe vegetation of the area surrounding Tuz Lake, due to forest desruction, it has many sparse shrub and tree species. The bear's plum (Prunus sp.), the Lebanon barberry (Berberis sp.), the brom almond (Amygdalus sp.), the Syrian pear (Pyrus sp.), the gerland thorn (Paliurus spina-christii), the dog rose (Rosa sp.) and the hawthorn (Crataegus sp.) are the shrub and tree species mostly occurring in steppe areas.

The steppe ecosystem of Turkey is generally divided into two categories as the plain steppe and the mountain steppe based on the topographical structure of the area where it occurs.

Plain steps are found in flat or less-inclined areas with 800 to 1200m altitude. Its characteristic plants are halophilics around the Tuz Lake, and the members of Chenopodiaceae, Juncaceae and Cyperaceae families, as well as the wild rue (Peganum harmala), the shrubby wormwood (Artemisia sp.), the thyme (Thymus sp.) and the sage (Salvia sp.).

Plain steppes have numerous sub-ecosystems. Halophytic steppes, marl steppe habitats, gypsium steppe ecosystem, tuff habitats and antigorite steppe habitats are among the significant sub-ecosystems of plain steppes. Each sub-ecosystem has specific endemic species.

Halophytic steppes are mainly found in the area surrounding the Tuz Lake, in particular, and around the Seyfe Lake in Kırşehir, Sultan Reed in Kayseri, Burdur Lake and Acıgöl Lake in Afyon. Halophilic endemic plants contain the endangered plant species of Saponaria halophila, Limonium tamaricoides, Asparagus lycaonicus, Kalidiopsis wagenitzii and Silene salsuginea, as well.

The sub-ecosystem of marl steppe habitat of plain steppe ecoystem is mainly found in low altitude areas in and around Central Anatolia. This steppe ecosystem has been continuously decreasing due to anthropogenical pressures and is turned into a farmland. The ecosystem has a very rich floristic composition.

Gypsium steppe ecosystem is mainly found around Çankırı, Sivas, Beypazarı-Ankara and İliç-Erzincan. Although this ecosystem is not rich in floristic composition, it shows high endemism. The endemic plants of gypsium habitat which have a limited ecological tolerance have very restricted populations.

In Central Anatolia, there are tuff-habitats formed after various geological events and these cover large areas around Ürgüp and Göreme and in Ereğli and Karapınar plains. These habitats which have almost no inclination at all are considered a part of flat plain steppe ecosystem.

Serpentine steppe habitats are seen over antigorite parent rocks around Sivas, Erzincan and Kırıkkale but these are less in quantity. The endemic plants of antigorite habitat vary from one region to the other. While the endemics of Cochleria sempervivum, Acantholimon calvertii, Arenaria pseudoacantholimon, Campanula ptarmicifolia are found around Erzincan, the endemics of Achillea spikorensis, Atraphaxis grandiflora, Cousinia sivasica, Physoptychis haussknechtii, Salvia vermifolia and Silene ruscifolia occur in Sivas.

Table 4.2. Widespead and rare species of sub-ecosystems of plain steppes

Charachteristic endemic species of Gypsium steppes			
Gypsophila eriocalyx	*LR*	*Astragalus noeanus*	*LR*
Gypsophila parva	*LR*	*Reseda germanicopolitana*	*CR*
Gypsophila germanicopoliatana	*CR*	*Achillea gypsicola*	*VU*
Gypsophila heteropoda	*DD*	*Helichrysum noeanum*	*LR*
Genista involucrata	*LR*	*Thymus leucostomus*	*LR*
Campanula pinnatifida	*VU*	*Thymus pectinatus*	*LR*
Helianthemum germanicopolitanum	*EN*	*Isatis glauca subsp sivasica*	*VU*
Onobrychis germanicopolitana	*EN*	*Onosma sintenisii*	*VU*
Tanacetum germanicopolitanum	*CR*	*Scrophularia lepidota*	*VU*
Paracaryum paphlagonicum	*LR*	*Thesium stellerioides*	*VU*
Scorzonera aucherana	*VU*	*Chrysocamela noeana*	*EN*

CR: Critically Endangered **VU:** Vulnerable **EN:** Endangered **LR:** Lower Risk

Vegetation in Halophytic steppes			
Widespread halophytic species		*Some endemic /rare halophytic species*	
Scientific name		*Scientific name*	*Threat catagory*
Halimione portulacoides		*Limonium iconicum*	*LR*
Camphorosma monspeliaca		*Limonium lilacinum*	*LR*
Artemisia santonicum		*Limonium anatolicum*	*VU*
Halocnemum strobilaceum		*Limonium tamaricoides*	*EN*
Salicornia europaea		*Salsola stenoptera*	*LR*
Atriplex laevis		*Salsola anatolica*	*LR*
Suaeda altissima		*Verbascum pyroliforme*	*VU*
Petrosimonia brachiata		*Gladiolus halophilus*	*VU*
Frankenia hirsuta		*Onosma halophilum*	*VU*
Scorzonera parviflora		*Allium vuralii*	*VU*
Glaux maritima		*Asparagus lycaonicus*	*EN*
Juncus maritimus		*Ferula halophila*	*VU*
Aeluropus littoralis		*Hypericum salsugineum*	*VU*
Puccinellia convoluta		*Kalidiopsis wagenitzii*	*EN*
Salsola inermis		*Saponaria halophila*	*CR*
Inula aucherana andız otu		*Silene salsuginea*	*EN*
Cirsium alatum		*Taraxacum mirabile*	*VU*
		Microcnemum coralloides subsp. anatolicum	*VU*

Vegetation in marl steppe			
Widespread species		*Some endemic /rare species*	
Scientific name		*Scientific name*	*Threat catagory*
Astragalus microcephalus		*Alyssum niveum*	*EN*
Astragalus condensatus		*Aethionema turcicum*	*LR*
Bromus tomentellus		*Aethionema dumanii*	*LR*
Hypericum scabrum		*Scabiosa pseudograminifolia*	*LR*
Alyssum sibiricum		*Campanula damboldtiana*	*CR*
Noeana mucronata		*Asperula bornmuelleri*	*LR*
Onobrychis armena		*Cephalaria paphlagonica*	*LR*
Silene spergulifolia		*Sideritis galatica*	*LR*
Hedysarum varium		*Astragalus lycius*	*LR*
Eryngium campestre		*Astragalus wiedemannianus*	*DD*
Stipa holosericea		*Thymus sipyleus*	*LR*
Stipa lessingiana		*Cousinia birandiana*	*LR*
Koeleria cristata		*Scorzonera tomentosa*	*LR*
Poa bulbosa		*Verbascum natolicum*	*LR*
		Onosma isauricum	*LR*
		Salvia cryptantha	*LR*
		Salvia hypargeia	*LR*
		Asperula stricta	*LR*

Vegetation in Serpentine steppe			
Widespread species		*Some endemic /rare species*	
Scientific name		*Scientific name*	*Threat catagory*
Astragalus microcephalus		*Cochleria sempervivum*	*LR*
Bromus tomentellus		*Acantholimon calvertii*	*LR*
Poa bulbosa		*Arenaria pseudoacantholimon*	*LR*
Koeleria cristata		*Campanula ptarmicifolia*	*VU*
Astragalus angustifolius		*Achillea spikorensis*	*LR*
Astragalus condensatus		*Atraphaxis grandiflora*	*LR*
Acantholimon acerosum		*Cousinia sivasica*	*VU*
		Physoptychis haussknechtii	*EN*
		Salvia vermifolia	*VU*
		Silene ruscifolia	*LR*

Vegetation in Tuff habitats			
Widespread species		*Some endemic /rare species*	
Scientific name		*Scientific name*	*Threat catagory*
Peganum harmala		*Sphaerophysa kotschyana*	*LR*
Bromus tomentellus		*Alkanna cappadocica*	*LR*
Astragalus microcephalus		*Alyssum lepidoto-stellatum*	*LR*
Koeleria cristata		*Astragalus talasseus*	*VU*
Poa bulbosa		*Onobrychis paucijuga*	*VU*
Eryngium campestre		*Phryna ortegioides*	*LR*
Camphorosma monspeliaca		*Convolvulus assyricus*	*LR*
Artemisia santonicum		*Thymus sipyleus*	*LR*
Artemisia campestris		*Hypericum pseudolaeve*	*LR*
Eremopyrum bonaepartis			
Bromus tectorum			
Achillea wilhelmsii			

CR: Critically Endangered **VU:** Vulnerable **EN:** Endangered **LR:** Lower Risk

Generally, mountain steppes show wide occurrence between 1300 and 2000m altitudes. This ecosystem, which is above the forest limit, has certain characteristic plants of cushion-formed thorned milk-vetch (Astragalus sp.), horned sainfoin (Onobrychis cornuta), Acantholimon sp. and herbaceous-formed Asdphodeline sp and thyme (Thymus sp.) species.

The floristic composition of the Eastern Anatolia mountain steppe slightly differs from that of mountain steppes in other regions. The ferula communis species such as Ferula sp. and Prangos sp. are more dominant in the Eastern Anatolia Region.

In the high places of Eastern Black Sea and the north and northeastern parts of Eastern Anatolia, subalpine and alpine meadows are widespread. Subalpine and alpine meadows differ from steppe because the former incur more rainfall and have a shorter arid period than the latter. Gramineae, Ranunculaceae and Geraniaceae, which need humidity, are commonly found in subalpine and alpine meadows. Although most of the species that make up steppe vegetation dry up in summer months, subalpine and alpine meadows are not dried up.

In Turkey, mountain steppe is quite widespread. As endemic plants are generally concentrated on high mountains, almost every mountain has endemic plants, which often occur in the high-mountain-steppe habitat.

Tablo 4.3. Examples of plant species of mountain steppes

Endemics of Geyik Mountains (Antalya)	*Aladağlar (Kayseri-Niğde-Adana)*	*Binboğa Mountains (K.Maraş-Kayseri)*	*Tendürek Mountain (Ağrı)*
Aethionema subulata	*Alyssum argyrophyllum*	*Onobrychis cornuta*	*Prangos ferulacea*
Allium engini	*Alyssum aurantiacum*	*Gundelia tournefortii*	*Ferula orienatlis*
Allium koyuncui	*Asphodeline damascena*	*Asphodeline taurica*	*Aethionema speciosum*
Anthemis pestolazzae	*Ballota macrodonta*	*Asphodeline globifera*	*Atragalus maximus*
Arenaria isaurica	*Centaurea aladaghensis*	*Convolvulus asyricus*	*Astragalus pseudouytriger*
Campanula davisii	*Cirsium ellenbergii*	*Elymus hispidus*	*Bromus erectus*
Centaurea pseudokotschyi	*Ferulago pachyloba*	*Koeleria cristata*	*Eremurus spectabilis*
Doronicum cacalifolium	*Minuartia dianthifolia*	*Endemikler*	*Papaver orientale*
Erodium cedrorum subsp. salmoneum	*Onosma cappadocicum*	*Allium sintenisii*	*Tanacetum abronetifolium*
Eryngium davisii	*Thurya capitata*	*Silene nuncupanda*	*Tanacetum kotschyi*
Euphorbia davisii		*Allium glumaceum*	*Endemikler*
Gypsophila curvifolia		*Anthemis adonidifolia*	*Allium sternianum subsp. vanense*
Origanum bilgeri		*Campanula strigillosa*	*Astragalus chaldiranicus*
Poa davisii		*Doronicum haussknechtii*	*Astragalus lagopodioides*
Sartoria hedysaroides		*Graellsia davisiana*	*Campanula coriacea*
		Gypsophila aucheri	*Limonium vanense*
		Senecio jurineifolius	*Bellevalia fominii*
		Silene caryophylloides subsp. binbogaense	*Paltariopsis planisiliqua*
		Acantholimon goeksunense	
		Centaurea goeksunense	

Protected/Endangered Plant Species and the State of Endemism

Steppe flora is very rich in species diversity and it has very high endemism rate. In Turkey, steppe habitat is most widespread in the Central and Eastern Anatolia Regions. Both regions are in the Iranian-Turanian phytogeography. With 1.300 endemic species, the Iranian-Turanian phytogeography ranks first among the phytogeographies of Turkey in terms of endemism. This shows the utmost importance steppe ecosystems have for endemism. In particular, in the high-mountain-steppe areas, the endemic rate reaches up to 25 to 40%. Almost 70 to 80% of the plants growing in certain special steppe habitats are endemic. Both the gypsious and antigorite areas of Sivas and the gypsious areas around the Lake Tuz and in Çankırı show the highest endemism rates. Despite the rich species diversification and high endemism rates of steppe habitats, as demonstrated above, no steppe ecosystem at all enjoy effective conservation. The area surrounding the Lake Tuz is as a Special Environmental Conversation Zone. However, since the habitats of plant species like Kalidiopsis wagenitzii, Silene salsuginea and Asparagus lycaonicus, which have narrow occurrence and are found only in the Lake Tuz, have been destroyed day by day, these species are under the threat of extinction. Gypsophila germanicopolitana, which is known to have lived in the gypsious areas of Çankırı, have not been found recently despite special efforts made to find it in the area.

Wild animal species living in both agricultural and steppe ecosystems

Both agricultural lands and steppes are rich in fauna, as they are in flora. Being a bridge between the three continents and, owing to its climate, topography and different ecological environments, Turkey is one of the important countries in the world in terms of endemism. It was a home to animals migrated from north during the ice age and became a habitat for those migrating from south when the glaciers narrowed. In addition to its natural flora and fauna, certain species were introduced into Turkey. In fact, although Turkey is on the palaearctic belt zoo-geographically, it is a home to many species of African-Ethiopian, Iranian-Caspian, Eastern Asia, and from Angora in Central Asia.

Obviously, insects are the primary organisms that form the steppe fauna. However, as there is not much healthy data on insect categories, no information is given on insects that characterize steppe ecosystem on species basis. Nevertheless, steppe ecosystems are very rich in faunistic terms as they are in floristic terms and are a home to numerous endemic insect species.

Wild Horse Ümit N. ÜLKÜTAŞIR

Tablo 4.4. Wild animal species of agricultural and steppe ecosystems

Mammals		*Reptiles*		*Aves*	
Ovis orientalis anatolica	*Anatolian wild sheep*	*Testudo graeca*	*Turtle*	*Otis tarda*	*Great bustard*
Felis caracal	*Steppe lynx*	*Laudakia ruderata*	*Steppe lizard*	*Falco naumanni*	*Lesser Kestrel*
Lynx caracal	*Lynx*	*Ablepharus bivittatus*	*High plateau lizard*	*Circaetus gallicus*	*Short-toed Eagle*
Allactaga williamsi	*Black rabbit*	*Eremias strauchi*	*Wall lizard*	*Buteo rufinus*	*Long-legged Buzzard*
Lepus europaeus	*Wild rabbit*	*Lacerta strigata*	*Striped lizard*	*Falco vespertinus*	*Red-footed Falcon*
Mesocricetus brandti	*Turkish hamster*	*Coluber ventromaculatus*	*Spotted snake*	*Alectoris chukar*	*partridge*
Mesocricetus auratus	*Golden hamster*	*Vipera lebetina*	*Levatine viper*	*Calendrella brachydactylon*	*Greater Short-toed Lark*
Canis lupus	*Wolf*	*Vipera raddei*	*Ottoman viper*	*Hirundo daurica*	*Red-rumped Swallow*
Sicista caucasia	*Birch rat*			*Hippolais languida*	*Upcher's Warbler*
Talpa europea	*Mole*			*Petronia petronia*	*rock sparrow*
Citellus citellus	*Spotted souslik*			*Fringilla coelebs*	*Chaffinch*
Capra aegagrus	*Wild goat*			*Emberiza hortulana*	*Ortolan Bunting*
Rupicarpa rupicarpa	*Hook horned mountain goat*			*Circus sp.*	*Harrier species*
Gazella subgutturosa	*Gazelle*			*Otis tetrax*	*little bustard*
Vulpes vulpes	*Red fox*			*Upupa epops*	*Hoopoe*
Felis silvestris	*Wild cat*			*Coturnix sp.*	*quails*
Felis ocreata	*Steppe cat*			*Geronticus eremita*	*Northern bald ibis*
Ursus arctos	*Brown bear*			*Lyrurus mlokosiewiczi*	*Asian black grouse*
Erinaceus europaeus	*hedgehog*				

Protected/Endangered Animal Species and the State of Endemism

There are numerous mammals, reptiles, birds and insects species living in steppe ecosystem. With regard to vertebrates, there is considerable amount of systematical and population data on them. Based on this data, many animal species have been put under conservation. These include, for example: the bezoar goat (Capra aegagrus), the chamois (Rupicarpa rupicarpa), the Anatolian wild sheep (Ovis orientalis anatolica), the goitered gazelle (Gazella subgutturosa), the lynx (Lynx caracal), the wild cat (Felis silvestris), the caffer cat (Felis ocreata), the brown bear (Ursus arctos), the common hedgehog (Erinaceus europaeus), the ibis (Geronticus eremita) and the black grouse (Lyrurus mlokosieusiczi). However, no effective conservation of insects is in place for now due to the lack of data and regulations.

Pollinators

The roles of pollinators are significant for some cultivated plants and many flowering plants for their reproduction, evolution and perpetuation of their species. Pollinators are obligatory for improving the efficiency of some cultivated plants, in particular, and for achieving sustainable organic farming. Our country is rich in these kinds of pollinators. The Anatolia is one of the most significant bee gene centres. For example, the bumble bee (Bombus terrestris) has an important place in terms of the pollination of both the natural species and the cultivated crops. The Caucasian honey bee (Apis mellifera caucasica), which occur in the North-Eastern Anatolia, is one of the most important bee races in the world. The Anatolian honey bee (Apis mellifera anatoliaca) is an important bee race, which is resistant to cold weather and diseases and thus can live in hard conditions. Butterflies are important as a pollinator, as well, with 6.500 species although their definite number is not known. However, the systematic and biological studies concerning such pollinators are insufficient. In particular, there is little, if not at all, study showing the relationship between natural plant species and pollinators.

Microbial diversity and soil biota

There are no sufficient inventory studies, data and collections about the microorganisms and fungi which have/might have significant roles in quite different fields (food, medicine, environment, agriculture, forestry). On the other hand, the existing information and collections are segregated because these are kept by several different institutions and organizations. This demonstrates a need for the presence of a joint database (Table 4.2.). It will be useful to start appropriate initiatives and conduct studies for the viability of some industries where the microbial organisms are used.

Table 4.5. Turkish Institutions with Cell Culture Collecitons

Y: Local Strains (isolates), T: Total Strains, GT: Total sum

The name of the Institution	*Abbreviation for the Institution*	*Number of Bacterium Strains*	*Number of Fungus Strains*	*Total Sum*	*International Code*
Animal Cells Culture Collection Centre	*HUKUK*	*Y= 180 T=200*	*Y= 24 T=27*	*GT=227*	*WDCM756*
Centre of Application and Reserarch of Microorganism Culture Collection	*KUKENS*	*T=1010*	*T=285*	*GT=1295*	*WDCM101*
TUBITAK- Center of Research for Marmara Culture Collecitons	*MRC*	*Y=13 T=29*	*Y=1993 T= 2037*	*GT=2066*	*WDCM800*
Muğla University Microorganism Collection	*MU*	*Y=180 T=200*	*Y=17 T=37*	*GT=237*	*WDCM833*
Refik Saydam National Culture Collection	*RSKK*				*WDCM828*

Numerous micro- and macro-organisms live in soil. Micro- and macro-organisms living in soil include the roots of high plants, algaes, fungi, actinomycetes, bacteria, nematodes, protozoas, rotifers, arthropods, worms, snails, and some mammals. All of these micro- and macro-organisms living in soil provide a better environment for high-body plants by improving the soil. Therefore, to know the soil biota is important in identifying the gaps. In Turkey, the desired level is not achieved, as well, with respect to identifying the micro- and macro-organisms in the soil biota.

Genetic Biological Diversity

Turkey stands as a centre of genetic diversity of cereals like wheat and barley, fruit trees, and leguminous crops. The steppe ecosystem of Turkey is probably the most important of all the ecosystems in the country, being a home to the wild relatives of the above species, and from

economical and genetic resource aspects due to the fact that most of the cultivated crops are derivated from wild species.

Turkey's floristic richness provides a significant source for the various uses of plants. Seemingly backing this, several plants in Turkey's flora are used for various purposes. These categories of plants can be included in such plants: field crops (poaceae, leguminous crops, industrial crops, fodder crops); horticultural crops (vegetables and fruits, ornamental plants); medical and aromatic plant species; and forest plant species. Turkey has the genetic resources of the wild and the transition forms of many farmed crops.

Field Crops: Field crops category includes farmed poaceae and leguminous crops, fodder crops and industrial crops. Main field crops whose genetic diversity origins are supposed to be Anatolia and its surroundings or in respect of which Anatolia is considered to be among their diversity centres are as follows:

i) Cereals: Wheat species (Triticum spp., 10 species, 6 of which is being farmed and their wild relatives like Aegilops), barley (Hordeum vulgare and H. distichon), rye (Secale spp., S. Cereale, and 4 wild species as well as Dasypyrum villosum), oat (Avena sativa, A. byzanthina , and 6 wild species). Maize (Zea mays) and paddy (Oryza sativa) show a broad genetic diversity and are rich in form thanks to the special ecological conditions of the country although these two do not have a gene centre.

ii) Leguminous crops: Turkey demonstrates high genetic richness with respect to both culinary and fodder leguminous species. Main crops in this category are as follows: Pea (Cicer arietinum, and 9 wild species), lentil (Lens culinaris, and 6 wild species), green pea (Pisum sativum and its sub-taxons, Pisum fulvum), Vavilovia formosa, broad bean and vetch, bitter vetch (Vicia faba, V. sativa, and 60 wild species), vetchling (Lathyrus spp., 64 wild species), (sainfoin (Onobrychis spp., 56 wild species), trefoil (Trifolium spp., 104 wild species) clover and white melilot (Medicago and Melilotus; the former 31 species, whilst the latter has 10 species) species.

iii) Industrial Crops: Most of the crops of this category are farmed as raw material inputs to the relevant common and advanced industries. This category is divided into sub-categories of oil-seed crops, fiber crops, starch-sugar crops, medical crops, plants for pleasure and spice plants. Some of the species from the above sub-categories from Turkey include: sunflower (Helianthus annuus); Carthamus, rape-seed (Brassica), oil linen (Linum), peanut (Arachis hypogaea); cotton (Gossypium) and linen (Linum usitatissimum), hemp (Cannabis sativa); sugar beet and white beet (Beta vulgaris), potato (Solanum tuberosum), Jerusalem artichoke (Helianthus tuberosus), opium poppy (Papaver somniferum); tobacco (Nicotiana tabacum), anise (Pimpinella anisum), etc.

In Turkey, in addition to the farmed species as above, the Syrian scabious (Cephalaria syriaca) and the yellow weed (Boreava orientalis), which are found in Turkey naturally, offer potential values in this area. The hop (Humulus lupulus) and the gentian (Gentiana lutea) are the two important plants as an input to the pharmaceutical industry each. Also, several plants are used to extract dye. These include: The anil (Isatis spp.), walnut (Juglans regia), mader (Rubia tinctoria), and galilean alkanet (Alkanna spp.). The Turkish Redgum tree (Liquidambar orientalis) can be included in industrial crops category, as well.

Medical and aromatic plants: This category of plants is used in medicine or as spice or aromatic plants. Some of these plants are cultivated, but most of them are gathered from the wild as wild species and consumed locally or widespread. Licorice (Glycyrrhiza spp, 6 species), thyme (Thymus spp., 38 species and Origanum spp. 22 species), sage (Sideritis spp., 46 species), Salvia spp., 90 species), anise (Pimpinella anisum and 22 wild relatives), fox glove (Digitalis spp., 9 wild relatives), Tanacetum coccineum (insect killer) and Silybum marianu are included in this category.

Fodder Crops: In Turkey's meadows, many plant species of leguminoseae, gramineae families and of other families are found. Turkey's fodder leguminous crops include mainly: broad bean, vetch and bitter vetch (Vicia faba, Vicia ervilia and other Vicia species, 57 wild species), vetchling (Lathyrus, 59 wild species), sainfoin (Onobrychis, 52 wild species), trefoil (Trifolium, 95 wild species), clover (Medicago, 30 species) and white melilot (Melilotus, 10 species).

Horticultural Crops: The plants in this category can be divided into 3 sub-categories: vegetables, fruits and ornamental plants. Large-scale production with the plants in the above sub-categories depends mainly on cultivation, with more or less use of wild or transition forms by way of gathering from the wild.

i) Fruits: pear (Pyrus spp., P. communis, and 10 wild relatives); apple (Malus sylvestris subsp. mitis and its wild relative M. sylvestris ssp. orientalis); plum and relative species (plum: Prunus spp., P. domestica and 4 wild relatives); cherry and morello (Cerasus spp., C. avium, C. Vulgaris and 8 wild relatives); cherry laurel (Laurocerasus officinalis) and its wild and cultivated forms; almond (Amygdalus spp., A. communis) and its 12 wild relatives; pistachio and ve gumwood (Pistacia vera, Pistacia ssp. and 5 wild relatives); hazelnut (Corylus ssp., Corylus avellana, C. colurna, C. maxima); chestnut (Castanea sativa) and its wild and cultivated forms; fig (Ficus carica) and its wild and cultivated forms; olive (Olea europeae) and its wild and cultivated forms.

ii) Vegetables: lettuce (Lactuca sativa and 7 wild relatives); onion and relative species (Allium cepa, A. sativum, A. porrum) and 155 wild relatives; beet (Beta) and 8 wild relatives; carrot (Daucus carota) and 4 wild relatives; cabbage and relative species (Brassica oleracea, B. rapa, B. napus) and 5 wild relatives.

iii) Ornamental Plants: Most of the plant species of Turkey's flora can be raised in green areas, offering a potential in this regard. Those plants that bloom with beautiful flowers or those that cover the earth surface when grow, as well as those shrubbies with either small or high bodies, or trees, ivies, or grass can be included in this category of plants. Further, some can offer a potential for use as dried up and cut flowers. However, until recently, there have been no studies on the genetic diversity and cultivation of ornamental plants. Main ornamental plants growing on Turkey's nature include: Onion (Allium spp.), asparagus (Asparagus spp.), crocus (Colchicum spp.), cyclamen (Cyclamen spp.), snow-drop (Galanthus spp.), gladiolus (Gladiolus spp.), hyacinth (Hyacinthus orientalis), iris (Iris spp.), lily (Lilium spp.), grape hyacinth (Muscari spp.), narcissus (Narcissus spp.), early purple orchid (Orchidaceae spp.), rose (Rosa spp.), Sternbergia spp., tulip (Tulipa spp.).

4.3.2. Institutional Structure and Capacity

The Ministry of Agriculture and Rural Affairs has the primary authority and responsibility for farmlands and steppe ecosystems. Being the main affiliates of the Ministry of Agriculture and Rural Affairs, the Directorate General of Agricultural Researches, Directorate General of Agricultural Production and Development, and Directorate General of Protection and Control have the institutional capacity which contributes to researching, development and conservation of agricultural biological diversity. Also, there are 24 Agricultural Enterprises Directorates operating under the Directorate General of Agricultural Enterprises, an associated body of the Ministry. These are enterprises engaged in crops and stock farming, in particular the farming of seeds and breeding animals. 64 research institutes operate under the Directorate General of Agricultural Researches. The main institutes responsible for the conservation and management of genetic diversity (generally ex-situ conservation) are the Aegean Agricultural Research Institute (ETAE) and the Research Institute for Field Crops. The ETAE cooperates and coordinates with the Field Crops Research Institute and other basin and thematic research institutes, in particular, the studies concerning the conservation of plants genetic diversity. The National Gene Bank and herbarium are established within the ETAE. The Geographical Information System of the Field Crops Research Institute provides effective management of natural resources. In addition, with

around 30 thousand insect species, the Plant Conservation Museum of the Research Institute for Agricultural Combat in Ankara is engaged with the work of demonstrating Turkey's species diversity. Both the Directorate General of Agricultural Production and Development and the Directorate General of Protection and Control contribute to the conservation and sustainable use of agricultural biological diversity and steppe areas. This is achieved by the protection and rehabilitation of pastures and meadows, a work of the former, and by the reduction of agricultural pollution and support of environment-friendly agricultural activities, a work of the latter.

4.3.3. Policy and Legislation

Sectoral Policy

The first 4 items of the final declaration of the 2nd Agricultural Council, which took place in 2004 under the coordination of the Ministry of Agriculture and Rural Affairs, urged the preparation of a natural resources inventory, taking measures to prevent erosion, pollution and wrong use of natural resources, the conservation of genetic resources and biological diversity, and the completion of meadow rehabilitation work. The final declaration proved that the themes of conservation and sustainable use of agricultural biological diversity and steppe ecosystems have been incorporated in the plans and policies of the agricultural sector. Also, the National Rural Development Plan has mentioned of biological diversity conservation objectives.

Legal Status

The Decree-Law on the Establishment and Functions of the Ministry of Agriculture and Rural Affairs (the Decree-Law 441 of 07/08/1991) provides a general outline for the protection and improvement of farmlands. The Pasture Law of 1998 (the Law 4342 of 25/02/1998) has been an important step for the protection of meadows and pastures. The Law on Soil Protection and Land Use (the Law 5403 of 03/07/2005) establishes procedures and requirements for soil protection and improvement by preventing soil erosion and loss of soil features because of either natural or artificial reasons, and for ensuring a planned land usage pursuant to sustainable development principle with the priority given to the environment. In addition, the Regulation on Protection and Usage of Farmlands, which was issued to ensure protection of farmlands and the usage of them as dedicated to purpose, is one of the regulations that contribute to the sustainability of agricultural biological diversity. The Agricultural Law of 2006 (the Law 5488 of 18/04/2006) provides for the conservation and improvement of natural and biological resources as well as conducting researches on the conservation and improvement of genetic resources and ecosystems. The Organic Farming Law (the Law 5262 of 01/12/2004), together with the Regulation on Organic Farming and the Regulation on Good Agricultural Practices, urge environment-friendly agricultural activities. The Regulation on Uprooting, Production and Trading of Natural Bulbs (Official Journal No. 25563 of 24/08/2004), which establishes requirements for uprooting, production, growing, storing, and domestic and foreign trading of seeds, bulbs or other other parts of them without giving harm to and destroying perpetuation of their species, contributes to the conservation of the country's flora, including steppe ecosystems.

Instructions on In-situ Trials of the Transgenic Cultivated Plants (TGD/TOH-032), which were issued by the Ministry of Agriculture and Rural Affairs on 14 May 1998, have made it mandatory to make risk assessments of the transgenic seeds, with respect to agricultural production and the health and safety of humans, animals, plants, and to the environmental health and safety, in particular.

4.3.4. National Practices

The In-situ Conservation of Plant Genetic Diversity Project, which was implemented with GEF/WB funding, together with the concurrent Agricultural Research Project (ARP), which was implemented in 1991-2001 period, contributed considerably to the identification of agricultural biological diversity, its conservation and management as well as capacity building. This has led

to the initation of Master Plan activities and the establishment of Research Advisory Committees and of a Research Council. Activities are reviewed annually at Programme Evaluation meetings. The research programmes on natural resources conducted by the research institutes of the Directorate General of Agricultural Researches, an affiliate of the Ministry of Agriculture and Rural Affairs, are assisted through this system. A result of this is ongoing 57 and another planned 4 field studies on natural resources and environment. Among some case studies are: the cultivation of certain wild plants like thyme and sage, which are gathered from the wild; the introduction of new species and varieties into ornamental plants sector; the collection of genetic resources of the wild relatives of the cultivated crops, their characterization, conservation and utilization; the determination of use potentials of Turkey's agricultural ecological areas and products; stock improvements for at-risk fish species; the identification of impacts of fish farms on marine ecosystems; and the conservation of wild species and local varieties by farmers.

Having regard to Turkey's plant genetic diversity, the In-situ Conservation of Plant Genetic Diversity National Plan was adopted in 1998. The plan establishes legal, institutional and financial requirements for the in-situ conservation of the species that are important for agriculture, food, economy and culture (www.bcs.gov.tr).

4.3.5. Threats to Farmlands and Steppes Biological Diversity and their Causes

In Turkey, the most reduction and loss is in steppe ecosystems on ecosystem basis. The major cause of this is that steppe areas mainly occur in flat plains, that they are proximate to settlement areas and that they are abandoned. Table 4.6 summarises the threats to agricultural biological diversity and steppe ecosystems. While some of these threats arise out of internal factors connected with agricultural practices, the external factors that affect land and resource utilization cause some other to happen.

Meadow management: Turkey's meadows are considered a state property, but the Government gives a right to meadow use to the farmers living in the region. However, the right to meadow utilization given to villagers has not come with the terms or rules of utilization. Overgrazing is a case because grazing starts with early spring grasses and does not end until cold weathers begin affecting the animals. Central Anatolian meadows must be grazed for maximum 6 months in a year, however, the grazing lasts for 9 to 10 months. Also, there is a high number of animals grazing the country's meadows. The decades-long-waited Pasture Law provides for arrangements and projects for the solution of the above problems. Of course, it is not expected to improve centuries-long negligence and losses in a very short period of time, however, the implementation projects which involve farmers may bring forth good prospects for the future.

Use of agricultural inputs: In Turkey, the Çukurova and Aegean regions are the two areas where pesticides are highly applied. Over- and insensible application of pesticides have adverse impacts on these two regions' flora and fauna. When pesticides are properly applied as tailored to the related method of application, it may be possible to avoid all adverse environmental impacts as well as take intended results from pesticide application. In today's methods of biological combat, integrated combat and ecological farming, the pesticides have long before left their places to the use of the above production technologies both in Turkey and in several countries in the world. However, even in those countries where the environmental awareness is very high and the most advanced farming technologies are used, the level of the use of methods excluding pesticide application is low. In Turkey, the fertilizer amount per unit area is not high, as in pesticides, compared to other countries. Over use of chemical fertilizers is not common today. However, Turkey might face soil and water contamination problem in connection with the use of chemical fertilizers, a problem which threatens biological diversity. In particular, chemical fertilizers with nitrogen content, which shows a high washing rate, must be seen as a potential threat.

Irrigation: Only a half of Turkey's arable lands are irrigable. In addition, only a half of irrigable arable lands see irrigated farming. Even in some parts of Turkey's class I soils that offer the

highest yield potential, fallow and non-fallow unirrigated farming takes place. Only a part of those soils, which offers the highest yield, is irrigated. On the first three classes of soils, unirrigated farming takes place with a high proportion, and therefore those soils don't give high yields. Out of Class IV soils, which are the most susceptible to erosion, on 4.5 million ha processed farming takes place. However, on 6.1 million ha from Class V to VII, which are not suitable for processed farming, the processed farming takes place. On more than half of those farmlands, fallow farming takes place, making soil surface susceptible to erosion. Yet, those marginal lands have a low profile depthness, and therefore fallowing does not contribute much to annual water accumulation. On the other hand, since most of farms where irrigated farming is applied use the flood method, both the salinization and acidization of soil and drainage problems appear. Recently, efforts to make widespread dripping and sprinkling methods have been accelerated.

Erosion: Although there has been a moderate level of erosion in previous centuries in Turkey, it has become faster with wrong soil usage in the last five to six decades. 73% of Turkey's soils is affected by erosion to varying degrees. The soil will become more susceptible to erosion when the soil surface is deprived of vegetation and as the inclination increases, depending on the wind force and precipitation volume. 27.8 million ha of Turkey's soils have an inclination of 12% and below. 12% is recognized as the upper limit of inclination for use as a farmland, provided, however, that appropriate technical measures are taken to this effect. In Turkey, the areas with the above level of inclination are 35.7% of the entire soil surface. Since all the processed soils either as being farmed or planted have a surface area of around 28 million ha, most of farmlands are susceptible to erosion and are losing their yield efficiency. The main cause of the increase of yield at a slower pace despite the technical measures taken is the reduction of natural yield efficiency on the inclined soils. Productive soil layers erode with the loss of more than around 600 million tonne soils every year due to the moderate erosion of 20% of soils (15.6 million ha), to the severe erosion of 36% of soils (20.3 million ha), and to the very severe erosion of 17% of soils (13.2 million ha) of Turkey.

Land usage: Turkey's steppes and pastures, so-called herbaceous vegetation cover, is around 21 million ha today. Considering 44,300,000ha and 37,800,000ha steppes and pastures cover of Turkey in 1935 and 1950, respectively, it can be clearly understood the degree of destruction in this ecosystem. The major cause of this reduction of steppes and pastures cover of the country is that the steppe areas mainly occur in flat plains, that they are proximate to settlement areas and that they are abandoned. Most of the steppe areas have been turned into farming lands and settlement areas in order to meet the food and accommodation needs of growing population. A considerable part of the steppes and pastures cover which constitutes 28% of the country's surface area, has been degraded or become unproductive as a result of uncontrolled grazing, unplanned settlement development and industrialization.

Economic policies: Today, the global economic policy that is being tried to be exported to the remaining parts of the world by the industrialized countries pose progressive threats on agricultural biological diversity. Countries are gradually pushed towards agricultural production systems which focus on single product variety and intensive production, and therefore both the local varieties disappear and the food security becomes at risk with the expansion of the mono-cultivation-based agriculture. For example, although there were more than 100 different varieties of apple and more than 600 different varieties of pear in Turkish bazaars 50 years ago, since the appealing races have become widespread, the original apple and pear races have almost been lost today. Modern races do not have the pleasant odour, aroma, taste and deliciousness of original races. Also, the former do not have the latter's genetic diversity that provide resistance to the environmental stress and diseases. That is to say, modern races have seen genetic degradation. Genetically Modified Organisms' (GMO) becoming widespread insensibly is another progressive threat of the global economic policy on biological diversity. GMOs bring along a risk of genetical pollution for especially the countries like Turkey which are a centre of genetic diversity and origin.

Table 4.6. Common threats to agricultural biological diversity and steppe ecosystems

Threats to agricultural biological diversity	*Threats to steppe ecosystems*
• *The inappropriate usage of farmlands* • *Insensible irrigation and growing methods* • *The insensible use of agricultural inputs* • *The cross-breeding of local races with foreign ones* • *Deficiencies in land registry and cadastre areas*	• *The destroying effects of infrastructure and superstructure works* • *The over gathering of plants having an economical value* • *Wrong and insensible afforestation* • *Overgrazing*
Common threats to agricultural biological diversity and steppe ecosystems	
• *The adverse effects of global economic policies (mono-cultivation in agriculture, GMOs, etc.)* • *Unplanned and intensive urbanization* • *Unplanned and intensive industrialization* • *Soil erosion* • *Climate change* • *Bush fire* • *Wrong mining activities* • *The non-presence of a meadow rehabilitation and usage management and usage of meadows for farming purposes until '90s.*	

4.3.6. Gaps and Needs

Having regard to Turkey's plant genetic diversity, the In-situ Conservation of Plant Genetic Diversity National Plan was adopted in 1998. The plan establishes legal, institutional and financial requirements for the in-situ conservation of the species that are important for agriculture, food, economy and culture (www.bcs.gov.tr). However, an effective system has not been developed for the in-situ conservation of agricultural genetic diversity due to gaps in the legislation and to insufficient infrastructure. There is a need for strengthening the infrastructure for ex-situ conservation.

Despite having rich agricultural genetic resources and other medical and aromatic plant genetic resources which offer a very important economical potential, Turkey can use the least of its current potential in improvement, cultivation and production due to insufficient financial resources and to gaps in the conservation programme. Another aspect of this is the lack of legal and institutional mechanisms that will reexport to Turkey the benefits the other countries gain from the Turkish genetic resources.

Most of the endemic plants with narrow occurrence in steppe ecosystems fall into Critically Endangered (CR) category. Also, as read from the Red Book of Turkey's Plants, the habitat of the most of extinct plants was steppes. However, there is a legislative gap regarding the designation of conservation zone in steppe ecosystems. First of all, there is the need for the identification of the would-be zones of conservation from those which represent best each sub-habitat based on the current studies on the steppe ecosystems with different sub-habitats, and for removing legal and institutional gaps for the design of management plants related to those zones. In addition to these studies, it should be identified how many of the species that have to be conserved on steppe ecosystems are under conservation and whether there is a need for new conservation areas, in the light of scientific data.

On the other hand, some cereals species have gradually become restricted to the narrow farming areas, and therefore they serve no more as a statistics input. Among these species are: the canary grass (Phalaris canariensis); the millet of Milo variety (Sorghum bicolor Moench); Sorghum saccharatum; Panicum miliaceum; and Seteria italica. For the future usage for special ecological and consumption purposes, the genetic resources of this and this kind of species must be protected.

The lack of comprehensive knowledge about the functions of agricultural ecosystems makes it difficult to achieve holistic conservation and sustainability objectives. For example, there are no sufficient biological studies on pollinators. In particular, there is little, if not at all, study showing the relationship between natural species and pollinators. Similarly, the studies on soil biota are insufficient.

The identification and diagnosis of the species specific to steppe ecosystems is a matter of specialization. There is a need to hire more technical staff members who are specialized at steppe ecosystems in the relevant institutions. Since these ecosystems bear importance in terms of genetic diversity, more importance must be attached to increasing the number of researchers of genetic resources and to the improvement of infrastructure and facilities for the research and conservation of genetic diversity.

4.4. FOREST AND MOUNTAIN BIOLOGICAL DIVERSITY

4.4.1 Forest and Mountain Biological Diversity

Mountain Biological Diversity

Turkey's forest ecosystem has a surface area of 21,188,747ha (27.2% of the country's total surface area), of which more than half are degraded (15,496,000ha). Turkey's forests generally show a leaved-forest character. The coniferous trees are found at every height, from the sea level to the upper forest limit. Both in the Aegean and the Mediterranean regions, humid, semi-humid coniferous forests as well as dry forests (oak, black and red pine) in addition to shrubby areas and macquis are found.

Topographical structure, climate and soil differences make Turkey's forests highly rich in terms of plant diversity. Especially, rich relic and endemic plants increase the importance of Turkey's forests in terms of biological diversity. One of the main events that created this is the climatic changes that occurred during the quaternary geological period. Around one third of the plant species in Turkey belong to ancient geological periods and are mostly endemic. Most of the endemic species are in the Mediterranean Pythogeographical Region (especially in the Bolkar and Nur Mountains of Taurus) and the Iranian-Turanian Pythogeographical Region.

In Turkey, there are many ecosystems in forest habitats based on both ecologic and floristic compositions and the function of each ecosystem is more or less different than the other. Turkey's rich forest ecosystems provide a habitat for many endemic plant species, important bird species and many wild species. Also, these ecosystems are a home to the wild relatives of many cultivated crops, which are important for agricultural biological diversity.

The Mediterranean Pythogeographical Region covers all the areas bordering the Mediterranean and the western part of the Thrace. In these areas, the forest ecosystems show various vegetation series from the sea level to the highest parts of mountains depending on the soil-climate-plant relationships. In each vegetation series, different forest ecosystems develop depending on other ecological parameters, as well.

In Turkey, at altitudes between 0 and 100m in the Mediterranean and the Aegean Regions, where the Mediterranean climate is prevalent, the "Hot Mediterranean and the True Mediterranean Vegetation Layers" are seen and these layers have xerophilic macqui (oak trees, sandalwood, gumwood, myrtle, etc.) ecosystem, red pine (Pinus brutia) forest ecosystem, Aleppo pine (Pinus halepensis) forest ecosystem, sweetgum (Liquidambar orientalis) forest ecosystem, cypress (Cupressus sempervirens) forest ecosystem, mixed oak (Quercus cerris-Q.infectoria-Q.libani-Q. brantii) ecosystem, and nut pine (Pinus pinea) ecosystem.

Between 1000 and 2000m, the "Upper-Mediterranean and the Mediterranean Mountain Vegetation Layers" are found. At these altitudes, black pine (Pinus nigra), Taurus fir (Abies cilcica), cedar (Cedrus libani), beech-horn beech (Ostrya carpinifolia-Carpinus orientalis), and

mixed oak (Quercus petraea- Quercus cerris-Qurcus trojana) forest ecosystems are found. The Aegean High Mountain Forests, however, differ from the Mediterranean having mixed forest ecosystems containing chestnut, linden tree, hazelnut, yellow pine, oak and red pine trees.

At altitudes higher than 2000m, the "High Mountain Mediterranean Vegetation Layer" is found. At this part, mixed juniper (Juniperus excelsa-Juniperus foetidissima) forest ecosystem and the Mediterranean high mountain steppe ecosystem consisting of cushion-form semi-scrub and herbaceous plants are found.

The Iranian-Turanian Region is the widest of all the Pythogeographical Regions extending from the Central Anatolia to Mongolia. The continental climate and steppe plants are dominant in the region. Although the region covers a much wider area, the forest ecosystems of it contain arid area forests and high mountain ecosystems. These include mainly: the Steppe Forest (Tree)- Central Anatolia (hairy and feathery oack, black pine, juniper: 800-1500m); Arid Black Pline, Oak and Juniper Forests- Central Anatolia (Oaks <1200m; Black Pine: 1000-1500m; Yellow Pine >1500m); Arid Forests- Eastern Anatolian oak forests (oak species <850m).

The European-Siberian Pythogeographical Region extends from one end to the other in the Northern Anatolia and at the parts of the Thrace facing the Black Sea. It is the most rainy region and is covered largely by forests. In the region, at altitudes below 1500m, arid oak and pine forests (oak, black pine, red pine) and scrub-formed (macqui, false macqui) forest ecosystems are seen. At altitudes between 500 and 1200m, leaved-coniferous (beech (Fagus orientalis), chestnut (Castanea sativa), horn beech (Carpinus orientalis, Carpinus betulus), alder (Alnus glutinosa-)), at altitudes between 1000 and 1500m, humid and semi-humid coniferous forests (black pine, yellow pine (Pinus sylvestris), spruce (Picea orientalis), and fir (Abies nordmanniana) are found. At the high parts of the Eastern Black Sea, mixed forest rose (Rhododendron ponticum, Rhododendron luteum, Rhododendron ungernii, Rhododendron smirnowii), beyaz kumar (Rhododendron caucasicum) and birch (Betula pendula) forest ecosystems are found, in particular. In the Thrace and Western Black Sea regions, in the flat alluvial areas where the groundwater level is high, longoz mixed forest (Fraxinus angustifolius-Qurcus robur –Fagus orientalis) ecosystems are found.

Most of the big mammals in Turkey live in forest ecosystems. For eample, forests provide a habitat for such mammals as bear (Ursus arctos), fox (Vulpes vulpes), wolf (Canis aureus), jackal (Canis aureus), lynx (Lynx lynx), hyena (Hyena hyena), deer (Cervus elaphus), hook-horned chamois (Rupicapra rupicapra), wild goat (Capra aegagrus), wild pig (Sus scrofa scrofa), badger (Meles meles), marten (Martes martes), hedgehog (Erinaceus europea), rabbit (Lepus capensis), weasel (Mustela nivalis), squirrel (Sciurus vulgaris), for such reptiles as snake, chameleon (Chameleo chameleon), lizard (Lacerta agilis, L. armeniaca, L. parvula, L. derjugini, L. princeps, L. trilineata, L. viridis, Anguis fragilis), tortoise (Testudo graeca), and for pheasant (Phasianus colchicus), snowcock (Tetraogallus caspius), grouse (Tetrao mlokosiewiczi), woodpecker (Dendrocopus sp.), day raptors (eagle species: Aquila sp., Pandion sp.; hawk species: Accipiter sp.; Circus sp.; Buteo sp.; Falcon species: Falco sp., Pernis sp., etc.), various night raptors (tawny owl (Strix aluco), long-eared owl (Asio otus), tengmalm's owl (Aegolius fuenerus), etc.) and many perching birds. Of these species, the hook-horned chamois (Rupicapra rupicapra), wildcat (Felis silvestris), Dark Vulture (Aegyphius monachus), Shah Eagle (Aquila heliaca), Big-Forest Eagle (Aquila clanga) and Small-Forest Eagle (Aquila pomarina) are among the forest fauna species that are put under conservation by way of international conventions.

Mountain Biological Diversity

Mountain ecosystems provide a habitat for different forest flora and many fauna species depending on the factors like Turkey's variable topographical structure and distances to the sea. With regard to the ecosystem variety, mountains are divided into sub-ecosystems such as alpine meadows, sub-alpine meadows, moving slope, thorny cushion formation steppe, and

each ecosystem has a different floristic composition. The details on the rich mountain steppe species are provided in section 4.3.1 under the title Steppe Biological diversity of this plan. The above fauna species given under the forest biological diversity is seen in many mountain ecosystems. However, it is difficult to provide details since there are no sufficient fauna and flora inventory studies for mountain ecosystems.

The Mediterranen Region includes more than 25 big mountains which have a high-mountain ecosystem nature. The Mediterranean is followed by the Iranian-Turanian Pythogeographical Region with 19 mountains. The European-Siberian Pythogeographical Region includes 11 important mountain ecosystems. Mountains include birds, plants and species having an economic value and habitats that are important for wildlife. The number of total species and endemics in these mountain ecosystems is not known. Of those known, Bolkar Mountains, Nur Mountains, Munzur Mountains, Sultan Mountains, and Tecer Mountains are the mountain ecosystems with the most endemic plant species.

4.4.2. Institutional Structure and Capacity

The Directorate General of Forests (DG Forests), an affiliate of the Ministry of Environment and Forestry (MEF), has the responsibility and duty for the conservation, management and administration of forests. DG Forests has central and local administrations. Also, MEF has 8 regional and 3 specialized research institutes which assume research and development tasks concerning forests. The Directorate General of Natural Conservation and National Parks assumes the responsibility for conservation and management of the forests under conservation by way of the National Parks Law. The Directorate General of Forest and Villages Relations undertakes to develop forest villages and arrange forest and village relations, and the Directorate General of Afforestation and Erosion Control assumes the rehabilitation of the degraded forest ecosystems.

The mountain ecosystems have different ecosystems such as wetlands, steppes, meadows and pastures and forests, and therefore the institutional responsibility for them is segregated. For example, while the DG Forests assumes the management of the in-forest meadows, the management of other meadows is assumed by the Ministry of Agriculture and Rural Affairs (MARA). As a result, many agencies having either a direct or an indirect authority with regard to biological diversity exercise authority on the mountain ecosystems, as well.

4.4.3. Policy and Legislation

A number of studies are being conducted on the conservation of mountain ecosystems, as in other ecosystems. In particular, the National Parks, Natural Parks and Nature Conservation Zones, which are designated under the Law 2873 on National Parks, contain forest and mountain ecosystems.

The Forest Law 6831 specifies forest management requirements, e.g. forest planning, administration and conservation. Conservation forests, gene protection forests and seed stands are designated as provided for in the cited Law.

In order to implement the ecosystem approach to forest administration and management, the Forest Management Regulation was redrafted in 2006. The research, conservation, sustainable use, management and monitoring of forest ecosystems are achieved under the scope of the Regulation.

The Law on National Mobilization for Afforestation and Erosion Control (the Law 4122 of 23/07/1995) specifies requirements and procedures concerning the activities of afforestation and erosion control to be undertaken by governmental agencies and real and legal persons in order to enhance the forest area and forest wealth, to restore and improve the balance between soil, water and plants, and to protect environmental values.

The Afforestation Regulation specifies requirements concerning the activities of afforestation,

erosion control, pasture improvement, tree improvement, seed production, nursery and energy forest establishment, development and restoration to be undertaken in accordance with the provisions of the Forest Law 6381.

The 2004 National Forestry Programme had the following objectives:

- To address forestry issues from a broad viewpoint within the framework of sustainable development;
- To plan and carry out forestry activities paying the required attention to changes both in the society and in expectations from forests, which expectations are multi-sided, and to developments;
- To build appropriate capacities and mechanisms to enable the preparation, implementation, monitoring, evaluation and development in a participatory manner of development policies and strategies for the forestry sector;
- To promote a positive relationship between forests and people and make it widespread;
- To promote harmony and relations between the forestry and other sectors;
- To raise awareness and strengthen interest, involvement, contribution and support of both the community and the interest groups to achieve a forest management, conservation as well as sustainable development of forests with a view to the country's balanced and sustainable development;
- To improve and strengthen the living conditions of the actually poor and forest dependent forest villagers living either in or around forests and therefore achieve a multi-sided benefit from forests by way of enhancing a multi-functional and participatory forest resources management; and
- To achieve maximum use of both local and foreign financing sources for the forestry activities.

The principles and measures for the conservation of forest biological diversity as specified by the National Forestry Programme are as follows:

i. To raise awareness and interest and achieve the support of forest administration, society, and interest groups concerning the value of biological diversity and its conservation; To strengthen the forest administration's capacity in this area;

ii. To extend the conservation zone network to represent the biological diversity of the country's forests. To design and implement appropriate participatory planning and management systems for the above areas;

iii. For the conservation of biological diversity in the forests other than those under conservation: To achieve integration with forest resources inventory, planning and evaluation system and applications in an appropriate manner. To give priority on the natural renewal and rehabilitation of forests, and take due care for the conservation of biological diversity during afforestation and other forest development activities;

iv. To promote research studies concerning forests biological diversity. To this tend, to enhance dialogue and cooperation between forest administration and universities and research institutions;

v. To give priority on promoting rural development activities in the local rural communities having pressure on the natural resources in the conservation zones of special importance.

Mountain ecosystems enjoy no special legal regulations. The regulations mentioned in section 4.1.2 serve for conservation and sustainable use in mountain ecosystems by ecosystem type and by species.

4.4.4. National Practices

The Natinoal Parks and Conservation Zones Management, Biological Diversity Conservation and Rural Development Project, which was implemented in the Küre Mountains National Park in Bartın and Kastamonu, the Biological Diversity and Natural Resources Conservation and Sustainable Development in the Yıldız Mountains Project, and the Sustainable Forest Utilization and Conservation in the Kaçkar Mountains Project are the three examples showing the practices which were implemented or are ongoing for the conservation of the mountain ecosystems and their sustainable management.

The National Parks and Conservation Zones Management, Biological Diversity Conservation and Rural Development Project was designed and implemented between 1997 and 2000 years by the Directorate General of National Parks and Hunting-Wildlife of the Ministry of Forestry, with the United Nations Development Programme (UNDP) and the United Nationas Food and Agriculture Organization (FAO) funding. The project area is the Küre Mountains National Park in Kastamonu and Bartın provinces in the Western Black Sea region. The project aimed at training of the DG National Parks and Hunting-Wildlife staff about conservation zone planning, and designing a management plan for the national park, which was intended to be designated, to serve as a model for the management of other conservation zones. After the project, the area lying between Kastamonu and Bartın provinces was given a National Park status (18 May 2000) because of its national and international importance having natural (geological, geomorphological, etc.), cultural, aesthetic and, in particular, biological (old and virgin forest, wildlife) diversity.

The Küre Mountains Draft Development Plan, a guide to conservation and sustainable management of the area's resource values, has been prepared so that the area is managed in an integrated way with its surroundings and also a participatory approach has been pursued when drafting the plan. As a result, a model plan for the management of other conservation zones has been developed.

For the conservation and effective management of the area designated as the National Park, the studies have been conducted with the active involvement of local people, the relevant governmental agencies and organizations as well as voluntary organizations and universities in order to build and maintain an organic relationship between the national park and its close proximity in a sustainable manner.

At the end of the project;

- The Küre Mountains was given a national park status (an area covering 37,000ha was designated as the national park and the buffer zone concept was introduced to secure biological diversity, which was the first to be protected in Turkey), a draft management plan for the area was prepared, eco-tourism practices which aim to serve for the conservation of the traditional life style and architectural structure and cultural values of the area, in particular, were supported, and even an old house was restored and an Eco-tourism Centre was opened there.

- With the project, the buffer zone concept was introduced to cover the area surrounding the national park in order to secure the biological diversity, which was aimed to be protected in a national park in Turkey for the first time, against any likely threats from the close proximity of the park. Totally an area of 117,000ha added with 80,000ha buffer zone was studied and decisions were taken on it.

The Biological Diversity and Natural Resources Conservation and Sustainable Development in the Yıldız Mountains Project was incorporated in the 2006 programme within the framework of the EU-Turkey Financial Cooperation within the scope of Trans-border Cooperation with Bulgaria. The project is being implemented with the coordination of the DG Natural Conservation and National Parks and DG Forests of the MEF.

The overall objective of the project is to promote and improve trans-border cooperation for the conservation and sustainability of biological diversity and natural resources. To this end, it is assumed to build wide scale inventories (for natural and social data) pursuing a Biosphere Reserv approach in the Yıldız Mountains, and to establish a natural training centre to train children, in particular, and raise awareness among people.

With the project, it is aimed to protect the mountain, forest, wetland and coastal ecosystems of the Yıldız Mountains, and to introduce sustainable development practices. It is assumed that, based upon the data obtained after the studies to be conducted in an area of around 130,000 ha, the area is designated as a Biosphere reserv and is planned pursuing the Biosphere reserv approach.

The Sustainable Forest Utilization and Conservation in the Kaçkar Mountains Project is being implemented with the partnership of the Biology Department of the Middle-east Technical University (METU), and the Natural Conservation Centre (NCC), DG Forests, Artvin Culture and Solidarity Association and DG National Parks as an EU-financed project under the coordination of the TEMA Foundation.

The Project area is the Kaçkar Mountains (Hatilla Valley National Park, Altıparmak Mountains, Verçenik Wildlife Conservation Zone, Kaçkar Mountains National Park, Barhal Valley, Yusufeli). With the project, it is aimed to slow down biological diversity losses and the destroying of forest ecosystems in the Kaçkar Mountains, one of the hot points in the world, and achieve improvement there.

With the project;

It is assumed to build basic biological diversity inventories, identify and map land usage status, make socio-economic analyses, prepare a multi-sector plan, provide capacity building training (monitoring, production of income-generating activities, marketing of them, eco-tourism, etc.), set up a system for monitoring wildlife and biological diversity, identify potential income-generating activities and the marketing of them, and establish an eco-village for demonstration purposes. The project term is 4 years beginning from 2007 until 2010. The most important of all the above components is the preparation of a multi-sector plan, which will embrace all the sectors within the project area and laying out basic principles for the promotion of sustainable development.

BLACK VULTURE CONSERVATION PROJECT

The Black Vulture (Aegypius monachus) is a local endangered species, which reproduces in scattered colonies in Turkey. Limited studies on Black Vultures estimate that its population in Turkey is 50-200 pairs.

The "Black Vulture 2001" project, which is the first in our country being a project designed to include research, conservation and training activities, as well, was implemented between 2001 and 2002 in cooperation with the Bird Research Foundation, DG Natural Conservation and National Parks and DG Forests of MEF and with funding from the United Nations GEF Small Grants Programme. The largest colony of Turkey's Black Vultures is in Türkmenbaba Mountains in Eskişehir (26 pairs), together with another large colony in the forests of Kızılcahamam in Ankara (7-10 pairs). However, there is no sufficient information regarding other regions where the Black Vultures can be found in Turkey. The pine and mixed pine forests at both low and medium altitudes, i.e. from 600 to 2000m, in Turkey are the habitats of the Black Vultures.

Changes in the habitat in the breeding areas (Forestry Activities) are one of the major threats to the Black Vultures. There are also other threats of low and medium degrees varying, for example, from the use of toxins to the lack of food, to forest fires, to hunting and illegal trade, and to the disturbance caused by humans. The forestry activities which threaten the reproduction of the Black Vultures include: afforestation with exotic species; tree cutting in the breeding period; the destruction of forest plantation; the construction of new roads for production; and the cutting of old trees which provide a nest for the birds.

Within the scope of the Black Vulture 2001 project, at the end of a series of workshops and meetings held with the participation of officials and experts from the relevant Directorate Generals of the MEF, academicians, and experts from non-governmental organizations, the Black Vulture National Action Plan was prepared (Kuş Araştırmaları Derneği -Publication No: 5, Ankara, 2004). Under this action plan, the documentary, Dev Kanatlar: Karaakbaba (Giant Wings: Black Vulture) was prepared by the Turkish Radio and Television Broadcasting Corporation (TRT). This contributed much to awareness-raising and training of people. The documentary, which is about the life of the giant black vultures whose height is 1m and wing span is about 3m and which are endangered, has been shot in Kızılcahamam Soğuksu National Park and Eskişehir Türkmenbaba where the black vultures live.

As a result of the black vulture conservation activities, the black vultures in Kızılcahamam Soğuksu National Park (10-12 pairs) and Eskişehir Türkmenbaba (23-26 pairs) have been put under conservation.

4.4.5. Threats to Forest and Mountain Biological Diversity and their Causes

Mountain ecosystems include wetland, forest and steppe ecosystems, and therefore any pressure on those ecosystems in turn becomes a threat to mountain ecosystems. In addition, the factors that cause the reduction of Turkey's mountain biological diversity include:

- The excessive use of forests in mountain ecosystems without considering their bearing capacity both at ecosystem and species levels (hunting, grazing, lumbering, visitors, in-forest constructional activities, etc.);
- The impacts of atmospheric pollution and global climate change;
- Pressures arising from the dependency of communities living in and around forests on agricultural and forestry products (livestock, uncontrolled use, gaining farmlands and forest fires) and the insufficient number of income-generating programmes;
- Increasing construction due to tourism incentives, uplands tourism, the high number of visitors in the archaeological sites, and other tourism activities exceeding the bearing capacity;
- Alien species;
- The over gathering of plants having an economical value;
- Wrong mining activities;
- Wrong and insensible afforestation.

More than half of Turkey's forest ecosystems have been destroyed. The factors that cause the reduction of Turkey's forest ecosystems biological diversity include:

- The excessive use of forests without considering their bearing capacity both at ecosystem and species levels (hunting, grazing, lumbering, visitors, in-forest structures, etc.);
- The impacts of atmospheric pollution and global climate change;

- Pressures arising from the dependency of communities living in and around forests on agricultural and forestry products (livestock, uncontrolled use, gaining aricultural lands and forest fires) and the insufficient number of income-generating programmes;
- Increasing construction due to tourism incentives, uplands tourism, the high number of visitors in the archaeological sites, and other tourism activities exceeding the bearing capacity;
- Alien species;
- Taking forests out of the forest regime;
- The destroying of forests for gaining farmlands;
- Forest fires;
- Destruction by insects;
- The uncontrolled taking of flora and fauna samples.

The challenges against the mountain and forest biological diversity conservation include:

- Despite the presence of institutional, legal and other capabilities, the dependency of people living in and around forests on agricultural and forestry products (livestock, uncontrolled use, gaining farmlands, and forest fires) and the insufficient number of alternative income-generating programmes block the implementation of an effective conservation in many mountain and forest ecosystems.
- The lack of coordination between the MEF and the Ministry of Culture and Tourism blocks the implementation of an effective conservation in forest and mountain ecosystems in the areas where an intensive tourism business takes places. Increasing construction in forest and mountain ecosystems, uplands tourism, the excessive number of visitors in the agricultural sites, and other tourism activities exceeding the bearing capacity can be counted among the issues on which coordination has failed.
- The lack of coordination between the MEF and MARA blocks the implementation of an effective conservation in the in-forest and mountain meadows.
- Both coordination and assistance between the MEF and MARA are needed for the gene resources of non-forest products, but are aromatic, medical and have another economic value in forest and mountain ecosystems.

4.4.6. Gaps and Needs

The main obstacles to the conservation and sustainable use of mountain and forest biological diversity can be the lack of sufficient coordination between institutions regarding biological diversity studies, the non-completion of inventory studies, the non-completion of the setting up of a national database and monitoring unit yet, the insufficient number of experts and technical staff in the relevant institutions, and the most important of all, the lack of resources.

Although the ratio of conservation zones to the country's surface area has shown an increase in the recent years, this has not reached at the desired level, yet. The biological diversity inventory of conservation zones and of mountain ecosystems, which are many in number, has not been completed.

The relevant institutions do not allocate much from their budgets to biological diversity conservation activities, which vary from planning to programming.

There is a need to design administration and conservation plans that should be integrated with biological diversity conservation for mountain ecosystems and high-mountain steppe ecosystems.

The coordination among the relevant institutions is not at the desired level, and therefore tourism activities give damage to biological diversity, and the targets set for sustainable use, i.e. the protection of herbacaeous and ligneous genetic resources and gaining them in economy, cannot be achieved.

The lack of technically qualified/specialized staff is one of the biggest constraints to the conservation programmes in Turkey. Governments' instable policy regarding personnel allocation shows itself in frequently displaced personnel, and therefore they cannot focus on a specif region or subject. The lack of qualified personnel for field studies in rural areas and conservation zones where high biological diversity is seen, in particular, is a common challenge for all the Ministries.

There is a need to make widespread the integration of the targets set for biological diversity conservation with forest management planning process and with administration plans, and to put to work similar practices in such a manner that these can be expanded to cover non-forestry products. Also, there is a need to provide technical training to plan executors.

4.5. INLAND WATERS BIOLOGICAL DIVERSITY

4.5.1. Inland Waters Biological Diversity

Turkey has important inland waters ecosystems in terms of biological diversity with its rivers covering an area of around 10,000 km^2 (1.6% of the country's total surface area) and lakes. In the country, there are 7 drainage basins including 26 river basins, and it is estimated that the groundwater volume is 94 billion km^3. The annual rainfall is around 640mm, of which nearly one third flows into water reserves and contributes to the viability of wetlands. However, as far as annual water consumption per person has been considered, Turkey has no water abundance. Water for consumption is around 1.500 m^3 per person per annum.

Turkey's inland waters potential comprises: 33 rivers (177,714 km), 200 lakes (906,118 ha), 159 dams (342,377 ha), and 750 ponds (15,500 ha). Nine of Turkey's rivers are more than 500 km long: Kızılırmak, Fırat, Sakarya, Murat, Aras, Seyhan, Dicle, Yeşilırmak and Ceyhan rivers.

Lakes, in particular, have a special place in inland waters ecosystems. Because most of Turkey's lakes are surrounded by mountains and they are affected by their surrounding environments. As a result, their waters are more or less different from each other. Lakes in the closed basins have either fresh or salty or soda waters. The hydrophilic fauna elements of these lakes, most of which are isolated from each other, differ due to the blocking of gene flow. Most lakes have fish species unique to the lake. Turkey's biggest lake is the Lake Van. It is in the Eastern Anatolia Region and has an area of 374,000 ha. The Lake Van is highly salty. In the Central Anatolian Plateau, there are some shallow lakes. The biggest of them is the Lake Tuz (128,000 ha). The Lake Tuz is almost entirely dried up in summer months and is covered with a 30 cm thick salt layer. Around the Lake, only the halophilics occur.

Streams are sensitive ecosystems which separate natural habitats from each other. Valleys, caves, islets and flood plains which are formed by streams often provide a passageway for aquatic organisms and sometimes a shelter for them. Certain rivers in Anatolia have enriched aquatic fauna due to physical isolation of them.

Lakes, marshes, deltas, reeds and mud plains are very important for birds, in particular, and wildlife. More than half of Turkey's birds consist of migratory species. Wetlands are important resting and wintering areas for water fowls. The deltas of Meriç, Gediz, Büyük Menderes and Küçük Menderes rivers, which flow into the Aegean Sea, and of Göksu, Seyhan and Ceyhan rivers, which flow into the Mediterranean Sea, provide an appropriate habitat for several water fowl species especially during winter when the lakes are frozen. Further, the delta of Kızılırmak, which flows into the Black Sea, bears high importance for migratory birds which pass across the Black Sea, in particular.

Species Variety and Endemism in Wetlands

It is found out that 236 taxons live in Turkey's inland waters at either species or sub-species level. Out of those taxons, 70 are endemic to Turkey.

Due to the fact that Turkey's complex geographical structure and the separation of rivers from each other by mountainous areas block considerably the spread of species, a high endemism and genetic diversity have occurred. Therefore, most of the invertebrates living in river ecosystems are endemic. Since the waters in Köyceğiz and Dalyan region shows a salinity level varying from zero to excessive salinity, that region emerges as a good example from the aspect of the relationship of habitat with species diversity. Lindenia tetraphylla is a new species to Turkey and is an endangered species of Yugoslavia, as it is reported. The Artodiaptomus burduricus is an endemic invertebrate species, which lives in the Lake Burdur and adaptable to different conditions. It is very important for genetic biological diversity. Also the Aphanius burduricus is an endemic fish species living in the Lake Burdur, which is adapted itself to the conditions in the Lake. Similarly, the endemic Alburnus tarichi is adapted itself to the excessive conditions in the Lake Van. The sensitive ecosystems such as those above can be easily destroyed by the effect of the environmental changes.

Turkey's marine fish consist of 480 species, out of which 5 are under the threat of extinction. As a result of the studies conducted so far, 236 fish taxons of 26 fish families have been found at either species or sub-species level. Turkey's wetlands contain mainly the following fish species: trout, pike, carp, Clarias lazera, mullet, rudd, pike-perch, and perch. Being on the bird migration routes, Turkey has key importance for several bird species. It is known that 460 bird species live in Turkey. The white stork, flamingo, spoonbill, black-winged stilt, avocet, common crane, herons and ducks are the bird species commonly found in Turkey's wetlands. Surely, the inland waters fauna is much richer than this. Turkey's inland waters are a home to 10 species of amphibia, 5 species of reptilia, 8 species of mammalia and several aquatic invertebrate insects, as well. However, the studies on the inland waters insect fauna have not been completed, yet.

The common otter (Lutra lutra), which is found in many of Turkey's wetlands, is under the threat of extinction and put under conservation in the entire Europe.

The endemic darter (Anhinga melanogaster rufa) has become extinct when the Lake Amik has been dried up for gaining farmland.

The wetlands are a home to a considerable number of 460 bird species, which choose Turkey as their permanent or temporary habitat. For example, the Dalmatian Pelikan, marbled teal, cormorant, Audouin's gull, white-headed duck, slender-billed curlew, bittern, white-fronted goose, red-necked goose, and ferruginous duck, which are globally recognized as being under threat in Europe, breed in Turkey. Out of the world's entire white-headed duck population, around 70% winter in Turkey. The purple gallinule (Porphyro porphyro), which is found only in certain areas in the Mediterranean Region and is gradually decreasing in number, breeds in the Göksu Delta, in particular. The Lake Manyas is both a breeding area for the cormorant (Phalacrocorax carbo), pygmy cormorant (Phalacrocorax pygmeus), Dalmation Pelikan (Pelecanus crispus), night heron (Nycticorax nycticorax), squacco heron (Ardeola ralloides), little egret (Egretta garzetta), and spoonbill (Platalea leucorodia) species and a wintering area for the white-headed duck (Oxyura leucocephala), Dalmation Pelikan (Pelecanus crispus), and pygmy cormorant (Phalacrocorax pygmeus) species. The Lake Bafa is both a wintering area for the little grebe (Tacyhbaptus ruficollis), great crested grebe (Podiceps cristatus), black-necked grebe (Podiceps nigricollis), cormorant (Phalacrocorax carbo), pygmy cormorant (Phalacrocorax pygmeus), Dalmatian Pelikan (Pelecanus crispus), gadwall (Anas streperg), pochard (Aythya ferina), and coot (Fulica atra) and breeding area for the bald eagle (Haliaeetus albicilla), pratincole (Glareola pratincola), and spur-winged plover (Vanellus spinosus).

Table 4.7 Some of the fish species living in our inland waters

Common fish species living in our inland waters	*endemic fish species narrowly evolved in our inland waters*	*Extinct fish species in our inland waters*
Huso huso (White Sturgeon)	*Aphanius asquamatus (Toothed Carp)*	*Phoxinellus egridiri*
Acipencer sturio (Sturgeon)	*Alburnus akili (Bleak)*	*P. handlirschi*
Anguilla anguilla (Common eel)	*Barbus plebejus kosswigi (Barbel)*	*Phoxinellus zeregi fahirae (Minnov)*
Alosa fallax nilotica (Shad)	*Capoeta antalyensis*	
Gambusia holbrooki (eastern mosquitofish)	*Capoeta capoeta bergamae (Siraz)*	
Barbus plebejus (Barbel)	*Chalcaburnus tarichi (Silver-scaled fish)*	
Cyprinus carpio (Carp)	*Gobio gobio insuyanus (Gudgeon)*	
Leuciscus cephalus (Chub)	*Leuciscus kurui*	
Tinca tinca (Tench)	*Cobitis turcica*	
Orthrias angorae	*Salmo trutta abanticus (Salmon-trout)*	
Atherina boyeri (Silver Atherine)		
Proterorhinus marmoratus		
Perca fluviatilis (Perch)		
Stizostedion lucioperca (Giant Perch)		
Platichthys flesus (Dab)		
Salmo trutta macrostigma (Trout)		
Esox lucius (Pike)		
Silurus glanis (Catfish)		

Generally, the wetlands are rich in vegetation, but they are behind the continental habitats in terms of species diversity. Turkey's wetlands have large communities of Typha sp., Phragmites sp., Schoenoplectus sp., and Juncus sp. Also, water surface plants like lotus (Nymphae sp.), as well as underwater plants like Phodophyllum sp., Wolffia sp., Lemna sp. and Ceratophyllum sp., Myriophyllum sp., Potamogeton sp., which grow in shallow lakes, are found. Of in-water plants, Trapa natans and Salvinia natans are classified as Vulnerable Plants (VU) by the Red Book of Turkey's Plants.

The Book collects the flora of Turkey's wetlands under two categories: in-water flora and coastal-marsh flora. Then the coastal-marsh flora is divided into two sub-categories taking the fresh and salty aquatic habitats into consideration.

The coastal-marsh flora forms vegetation in the shallow parts of streams, lakes and marshes. These plants have well-developed roots and often have high cover. The coastal-marsh flora is both richer and more interesting than the in-water flora. In the salty marshes, plants such as Verbascum pyroliforme, Gladiolus halophilus, Onosma halophila, which are endemic to this kind of habitats, occur.

Table 4.8 Vegetation of inland waters

In-water (hydrophilic) flora	*Flora of fresh coastal-marsh flora*	*Flora of salty aquatic habitats*
Ceratophyllum demersum	*Phragmites australis*	*Halimione portulacoides*
Ceratophyllum submersum	*Thypha domingensis*	*Limonium gmelinii*
Nymphaea alba	*Thypha latifolia*	*Aster tripolium*
Nuphar lutea	*Bolboschoenus maritimus*	*Inula crithmoides*
Myriophyllum spicatum	*Schoenoplectus littoralis*	*Salicornia europaea*
Myriophyllum verticillatum	*Schoenoplectus lacustris*	*Samolus valerandi*
Ranunculus rionii	*Sparganium erectum*	*Calystegia sepium*
Ranunculus saniculifolius	*Sagittaria sagittifolia*	*Juncus maritimus*
Rorippa amphibia	*Alisma lanceolatum*	*Thalictrum lucidum*
Zannichelia palustris	*Carex distans*	*Aeluropus littoralis*
Vallisneria spiralis	*Cladium mariscus*	*Plantago maritima*
Potamogeton crispus	*Cyperus longus*	*Atriplex hastata*
Potamogeton perfoliatus	*Lythrum salicaria*	*Schoenus nigricans*
Potamogeton panormitanus	*Paspalum paspalodes*	*Bolboschoenus maritimus*
Trapa natans	*Eleocharis palustris*	*Scirpoides holoschoenus*
Salvinia natans	*Eleocharis mitracarpa*	*Cladium mariscus*
Lemna minor	*Alisma plantago-aquatica*	
Lemna trisulca	*Polygonum lapathifolium*	
Najas marina	*Butomus umbellatus*	
Lemna gibba	*Juncus gerardii*	
Schoenoplectus littoralis	*Juncus subulatus*	
Butomus umbellatus	*Juncus littoralis*	
Utricularia australis	*Juncus heldreichianus*	
	Juncus maritimus	
	Mentha aquatica	
	Gratiola officinalis	
	Orchis palustris	

4.5.2. Institutional Structure and Capacity

Basically, the Ministry of Environment and Forestry is responsible for the conservation of inland waters ecosystems. The identification, conservation and management of wetlands is done by a division of the DG Natural Conservation and National Parks. A National Wetlands Committee has been set up with functions of holding discussions on the issues related with wetlands and reaching a decision on them, of the approval of conservation zones and management plans, of the follow up of practices, and of the establishment of necessary national and international cooperation and coordination. The Committee consists of a total of 10 members. These include the Undersecretary and/or the Assistant Undersecretary, who is the chairman of the Committee, and the Director General of Protection and Control of the MARA, the Director General of State Hydraulic Works, the Director General of Cultural Assets and Museums of the Ministry of Culture and Tourism, the Head of the Special Environmental Conservation Institution, as well as two members from the biology and agriculture departments of universities, these two should not be from the same discipline, and lastly two members from non-governmental organizations having activities involving wetlands.

The Directorate General of State Hydraulic Works (SHW) is responsible for planning, management, development and administration of all the water resources of Turkey.

The Ministry of Agriculture and Rural Affairs regulates capture fisheries and four research institutes of the Ministry have research and development functions concerning fisheries.

Photo: Yusuf CERAN

4.5.3. Policy and Legislation

On 30 December 1993, Turkey ratified the Ramsar Convention. The Ramsar Convention has the aim to ensure conservation and rational use of wetlands and was opened for signing in the Iranian city, Ramsar in 1971. For the purposes of the implementation of the Convention in Turkey, the Regulation on Wetlands Protection was issued and it took affect after its publication on the Official Journal No. 24656 of 30/01/2002. The Regulation saw a revision in 2005 (the Official Journal No. 25818 of 17/05/2005).

Within the scope of the National Wetlands Strategy (2003-2008), the following objectives were set and approved by the National Wetlands Committee:

1. To build an inventory of all the wetlands of Turkey, monitor and utilize them;

2. To identify policies and laws, including an impact assesment of wetlands;

3. To integrate rational use of wetlands with sustainable development;

4. To achieve the restoration and rehabilitation of wetlands;

5. To control the invasive alien species in wetlands and prevent their occurrence in wetlands;

6. To encourage both people and private sector for active involvement of them with wetlands protection;

7. To achieve efficient communication, training and awareness-raising concerning wetlands at the national level;

8. To designate new RAMSAR zones, prepare and follow up RAMSAR zones management plans; and

9. To build an institutional capacity.

All planning activities which will entail wetlands will be carried out in accordance with the provisions of both the Ramsar Convention and the Regulation on Wetlands Protection. Pursuant to the Regulation, both the conservation of natural structure and ecological character of wetlands and all the land take and water utilization plans must be with an essential purpose: to protect the functions and values of wetlands. Activities entailing wetlands such as drying up and filling, water take, sand borrowing, peat extraction, reed cutting, gathering wild flora and catching wild fauna, afforestation, and wastewater discharge should be carried out in accordane with the provisions of the Regulation.

Further, inland waters capture fisheries production is regulated by the Communiques issued under the Fisheries Law, as specified in section 2.4.3.

4.5.4. National Practices

In Turkey, 135 wetlands with international importance have been identified (www.cevreorman.gov.tr). Due to the fact that those wetlands show different ecological and hydro-geological characteristics, data collection and inventory building studies as well as data update for each wetland are underway currently. So far, more than 1,000 studies have been conducted on inland waters biological diversity. 12 wetlands of Turkey have been designated as Ramsar Sites. Tablo 4.9 gives a list of those zones.

The MEF has been awarding projects for the conservation of Turkey's wetlands. Those projects are collected under the two headings: inventory and management plan studies. The Research of Wetlands Having International Importance from Biological and Ecological Aspects Project, as well as the inventory studies concerning the Seyhan Delta, Ceyhan Delta, Sultan Reed, Lake Seyfe, Lake Tuzla (Palas), Lake Tuz, Lake Samsam, Lake Kulu, Reed Lake Kozanlı, Lake Çöl, Lake Uyuz, Lake Bolluk, Lake Tersakan, Eşmekaya Reeds, Küçük Menderes Delta, Büyük Menderes

Delta and Lake Bafa, Güllük Reeds, Lake Köyceğiz, Lake Salda, Lake Çorak, Lake Eğirdi, Lake Karataş, Lake Yarışlı, Lake Kovada, Karamık Marsh, Lake Eber, Lake Akşehir, Lake Çavuşçu, Hotamış Reeds, Lake Beyşehir, Lake Burdur, Lake Marmara, Lake Acı, Hirfanlı Dam, Homa Pond-Çamaltı Salt Marsh, and Lake Işıklı have been completed. With the above projects, both physical and chemical analyses have been made and the fact-finding work has been completed in the wetlands covered by projects, together with the identification of their biological and ecological features. Also, both the environmental problems and the threats to the environmental values in the wetlands covered by projects have been identified and pollution maps have been prepared. The conclusions drawn will shed light on the future practices and allow taking of measures and formulating of recommendations for current problems.

The design work of Wetlands Management Plan Projects in the Burdur and Manyas Lakes and the Göksu and Gediz Deltas under the Wetlands Management Project has been awarded and that work has been completed and the projects have been put into force following their approval by the National Wetlands Committee. With those projects, explorations have been conducted in the mentioned wetlands to identify their natural environmental characteristics and their potentials for the utilization of natural resources and identify their socio-economic features followed by an assessment work. Also, the management plan project activities are currently underway in the Kızılırmak Delta, Lake Burdur, Lake Akşehir and Lake Eber, Sultan Reed, İğneada Longoz, Yumurtalık Lagoon, Ekşisu Reed in Erzincan, Lake Eğirdir, and Lake Gölbaşı in Adıyaman.

Table 4.9 Ramsar Sites in Turkey

Name of the site	*Province*	*Area (ha)*
Lake Uluabat	*Bursa*	*13500*
Lake Kuş	*Balıkesir*	*16000*
Delta Göksu	*Mersin*	*14480*
Lake Akyatan	*Adana*	*14000*
Delta Gediz	*İzmir*	*20400*
Lake Burdur	*Burdur*	*25000*
Lake Sultansazlığı	*Kayseri*	*39000*
Lake Seyfe	*Kırşehir*	*19500*
Delta Kızılırmak	*Samsun*	*21700*
Lagoon Yumurtalık	*Adana*	*16430*
Swallow hole Kızören	*Konya*	*127*
Meke Maar	*Konya*	*314*

Some studies have been adopted for an integrated land and discharge basin management for the purposes of the conservation, utilization, planning, management, and monitoring of inland waters biological diversity. The pilot projects on this have already been initiated, e.g. the management plan projects on the Konya Closed Basin, Lake Beyşehir, Lake Tuz Special Environmental Conservation Zone, Göksu Delta, and Sultan Reed.

4.5.5. Threats to inland waters biological diversity and their causes

The threats to inland waters biological diversity can be the occurrence of alien species, excessive or illegal fishing, pollution, the illegal hunting of birds, reptiles and their youngs or the gathering of their eggs, excessive grazing, the destruction of habitat, the uprooting of aquatic plants, the burning of reeds and uncontrolled cutting of them, secondary buildings, sedimentation, pressure from tourism, and interventions with the water regime.

The excessive use of inputs like fertilizers and pesticides to have better yield in agricultural products and both domestic and industrial wastewaters cause the contamination of inland waterss, changes in food chain, and the degradation of water quality.

Fish and similar species released to inland waterss for economic purposes either knowingly or unconsciously lead to irrecoverable changes in the natural inland waters biological diversity of the country. For example, the pike-perch species released to the Lakes Beyşehir and Eğirdir has caused the endemic Phoxinellus and P. Handlirschi species to become extinct.

Climate changes brought along with global warming with impacts felt more day by day and the resulting new practices that must be implemented in water sources utilization and management (e.g. the increased utilization of groundwater, increased utilization of inland waters resources as either drinking or irrigation water) will pose a stronger threat to the sustainability of many inland waters ecosystems.

4.5.6. Gaps and Needs

The main constraint to the conservation of inland waters biological diversity and its sustainable use is the population pressure which comes either directly or indirectly on water resources. The fact that water resources are invaluable for humanbeings in meeting fundamental needs as well as their main function in particular in agricultural, energy and industrial investments and the development process is a considerable challenge in striking a balance between conservation and utilization. Since Turkey is still a developing country and there exists a failure to integrate biological diversity issues with other sectors and to build a common understanding on this and the insufficient level of economic incentives, it becomes more difficult to strike such balance. There is a need to undertake a progressive modelling, by which the adverse changes in the ecosystem can be demonstrated, in wetlands investments which seek public benefit.

With regard to the improvement and implementation of conservation and sustainable use measures, the insufficient number of academic researches, the lack of experience and technology transfer, and the poor level of staff and technical facilities for monitoring and supervision are some major constraints. At the lakes and streams at high altitudes, the inventory studies have been limited, except for those on fish species.

There is an urgent need to build a detailed inventory, accomplish quality and dedicated-to-purpose bearing capacity identification works, and make mapping and gap analysis works, considering what purposes should be pursued for the future usage of Turkey's inland waters resources.

Although SHW's planning studies and practices suit to the "basin management approaches to inland waters ecosystems conservation and utilization planning", the criteria and indicators are still incomplete. The integrated land and discharge basin management approach should be made widespread.

4.6. COASTAL AND MARINE BIOLOGICAL DIVERSITY

4.6.1 Coastal and Marine Biological Diversity

Turkey is surrounded by the three seas, i.e. the Black Sea, the Sea of Marmara, the Aegean Sea, and the Mediterranean Sea, each having different characteristics. The different characteristics of these seas result in the diversification of their biological resources, too.

Black Sea

The Black Sea is a home to important fish species from the aspects of both biological diversity and economic value. One is the sturgeon. Sturgeons have a very long background, i.e. around 200 million years. This has led to calling them as the "living fossils". Therefore, sturgeons are very valuable for biological diversity. Sturgeons are represented by 27 species from both seas and inland waterss of the parts of Asia, Europe and America remaining on the northern hemisphere. Out of those 27 species, 5 [beluga (Huso huso), sturean (Acipenser sturio), russio sturgeon (Acipenser gueldenstaedti), stellate (Acipenser stellatus), and ship sturgeon (Acipenser nudiventris)] have natural stocks in Turkey's Black Sea waters. 4 sea mammal species live in the

Black Sea: Common dolphin (Delphinus delphis), bottlenose dolphin (Tursiops truncates), azov dolphin (Phocoena phocoena) and monk seal (Monachus monachus), this one was seen on the Ukranian coasts in 2005.

Despite being narrowed in area, there are 6 eelgrass species (Zostera marina, Z. Noltii, Potamogeton pectinatus, Ruppia maritima, R. Spiralis ve Zannichellia major) and these provide a spawning area for 34 fish species. The seagrass of Cystoseira barbata species is found in the shallow parts (1 to 10m) of the Tirebolu Islands. These can be the indicators of unpolluted parts of the Black Sea ecosystem.

The Black Sea has 1,619 fungus, alg and high aquatic flora species, and 1,983 invertebrate species. Anchovy, horse mackerel, bonito, bluefish, sprat, turbot, sturgeon, whiting and sea trout are the dominant fish species of the Black Sea. However, the number of tradeable fish species has fallen down from 20 to 6 due to pollution, excessive fishing, eutrophication, habitat change, etc.

There are 6 islands and islets in the Black Sea due to its geographical structure. These include: Kefken Island, Giresun Island, and Tirebolu Islands. The Kefken and Giresun islands represent the faunal diversity of the Western Black Sea.

İğneada and the areas around it on the coasts of the Western Black Sea are important habitats. Being defined as a balanced ecosystems complex with its developed waterlogged forests, wetlands on alluvial soils and coastal sands, İğneada is one of the few preserved areas in Europe in this regard. The area has ultimate importance for biological diversity and is a home to many flora and fauna species, a part of which are under threat. Many rare and endemic coastal sand plants like Centaurea kilaea, Jurinea kilaea, Aurinia uechtritziana, Pancratium maritimum and Crambe maritima and also Trapa natans are found in the area. In addition, it is a breeding area for the black stork (Ciconia nigra) and the white-tailed eagle (Haliaeetus albicilla).

Kilyos has a second name, Kumköy (Sand Village). The name comes from the area's sands which are rich in terms of botanic. Those sands are the second sand system with the richest flora diversity among those remained intact on the Black Sea coasts, and therefore it is highly important. The Kilyos sands have rare sand flora diversity and minimum 15 rare sand flora taxons in the entire country. The coastline extending from Karaburun to Kilyos in the north of İstanbul is a valuable coast for tourism with its natural beach, behind it laid the Belgrat Forests, and shallow waters.

Dilek Peninsula National Park — Ümit N. ÜLKÜTAŞIR

of habitats like sea, river, lake, reed, marsh, meadow, pasture, forest, sand and farmland each with different characteristics and rich nutrients and suitable weather conditions make the Delta have a very rare biological diversity. The Yeşilırmak Delta is the other big delta on the Black Sea cost. It is important for fishery with the small lakes and lagoons on the west of it.

The Turkish Straits

The Turkish Straits System formed of the Strait of İstanbul and Strait of Çanakkale together with the Sea of Marmara is an inland sea system, allowing water movement between the Aegean Basin of the Eastern Mediterranean Sea and the Black Sea. This system provides a barrier, biological corridor and acclimatization for the Mediterranean and Black Sea origin species, combining together biological, meteorological and hydrological characteristics. It is seen that the surface of the Sea of Marmara is affected by the Black Sea waters streaming through the Strait of İstanbul. However, at the deeper parts of the Sea of Marmara, the Aegean and Mediterranean waters stream and more than 400 benthic organisms are found at that level. The Sea of Marmara is a spawning area for several pelagic fish species. Turbot (Scopthalmus rhombus), swordfish (Xiphias gladius), common sole (Solea solea), tuna (Thunnus thynnus), mackerel (Scomber combrus), beluga (Huso huso), monk seal (Monachus monachus), common dolphin (Delphinus delphis), bottlenose dolphin (Tursiops truncatus), azov dolphin (Phocoena phocoena), red shrimp (Parapenaeus longirostris), crawfish (Palinurus elephas), common lobster (Homarus gammarus), big bear cancer (Scyllarus arctus, Scyllarus latus), common octopus (Octopus vulgaris) and sepia (Sepia officinalis) are the species of the Sea of Marmara which are considered under the threat of extinction. The black coral (Gerardia savaglia) lives at 30m deep and is under protection pursuant to the Fisheries Law.

Aegean Sea

The Aegean Sea, with around 180,000 km^2 surface area, has a very complex bottom topography and coastal geometry. Also, there are numerous large and small islands in the Aegean Sea. The basin can be said to have been formed of three deep cavities. The northern cavity is around 1,500m deep and is connected to the middle Aegean cavity with 1,100m depthness by a hill that is 200-500m deep. The Crete Basin is at the south most of the Sea. The Basin is the deepest part of the Aegean Sea with depths of more than 2,000m.

The sponges, which are usually black in their natural environment, are a commercial product caught from the deep waters of the Aegean. Their population has decreased recently.

The Aegean shoreline is a transverse shoreline and is highly indented because the mountains in the region lie steep to the shore. There are many gulfs, bays, penisulas and capes on the shoreline. The gulfs of Saros, Edremit, Çandarlı, İzmir, Kuşadası, Güllük, Gökova and Fethiye are the main gulfs. The penisulas of Reşadiye, Bozburun, Dilek and İzmir - Karaburun are the main penisulas. Being highly indented, the Aegean shoreline is Turkey's longest shoreline.

At the deltas, the displacement of rivers and resulting formation of isolated bays and gulfs from the sea with the alluvial soils accumulated before them have created many lakes and lagoons. The Karine Lagoon (the Lake Dil) having an area of around 2,100ha is the most important of all the lagoons of the Menderes Delta (the Karine Lagoon, the Lake Mavi, Lake Derin, Lake Kara) for bird presence and wildlife. The Kırdeniz (400ha.), Homa (1,824ha.), Çilazmak (725ha.) and Ragıppaşa (Taş) (500ha.) ponds of the Gediz Delta from north to south are separated from the sea by narrow land pieces. Sand-dune, halophilic, scrub and reed habitats are found at the Gediz Delta. The Delta, which has a rich fauna, is a breeding place for the Dalmatian Pelikan and the lesser kestrel, both are endangered in the world. It is an important breeding area, as well, for marine birds and, in particular, for the terns and seagulls in the entire Mediterranean.

Mediterranean

The Mediterranean shoreline is less indented and draws broad curves. With this, it is generally similar with the Black Sea shoreline. The coastal shelfs are not common on the Mediterranean shoreline. However, in the west most of the region, the shoreline shows a more indented structure with the mountains lying steep to the shore and is similar with the Aegean shores. These shores are supposed to have been formed after a rise of sea in recent ages. The small bays, islands and penisulas inserted in the rugged coasts have been a result of that rise of the sea.

The Eastern Mediterranean coasts are connected to the deep basin by a topograhical sloping belt of 10 to 20km, as in the Black Sea. Rhodes (4,000m), Antalya (2,500m), Çukurova (,1000m) ve Latakia (1,500m) basins are the major cavities in the Northern Mediterranean. The Çukurova Basin is shallower than the Antalya Basin and these are seperated from each other by a wall-like topography.

The sand-dunes and beaches on Turkey's Mediterranean shores are the breeding places of the logger head sea turtle (Caretta caretta) and green turtle (Chelonia mydas), both are under the threat of extinction. It is determined that 17 beaches on the Aegean and Mediterranean shores are important breeding places of turtle species. Further, it is determined that Turkey's Eastern Mediterranean shores are the most important breeding place of the green turtles, which are critically endangered, in the Mediterranean basin. In addition, the Southern Aegean and Mediterranean shores considered as important breeding places of the logger head sea turtles, which are under the threat of extinction. Also, the monk seal (Monachus monachus) living in the Aegean and Mediterranean is one of the endangered species in the world.

The results of the researches conducted in the Göksu, Belek, Patara and Datça-Bozburun Special Environmental Conservation Zones on the Mediterranean and Southern Aegean coasts have demonstrated that the sand-dunes in those areas contain important biotops. The coastal areas of the Eastern Mediterranean region are rich ecosystems with a very high flora and fauna diversity.

The Göksu Delta is one of the rare areas remained intact in the Mediterranean Region and, with its suitable weather conditions as well as being a home to diverse habitats, is a breeding, feeding, wintering area and a habitat for several water fowls. The Delta is at average 2m above sea level and its natural vegetation cover is formed of the Mediterranean macqui formation and dense sand-dune flora and halophytic steppes. The Paradeniz Lagoon and the Lake Akgöl are the two important formations for fishery in the Delta.

The Ceyhan and Seyhan deltas are other big deltas on the Mediterranean coast and these consist of inland waters marshes, meadows, salty marshes and large sand-dunes where numerous small lagoons and, in parts, reeds connected with each other exist. The Akyatan, Akyayan and Yumurtalık Lagoons are the major lagoons in these deltas. The three lagoons are important for fishery and for water fowls, sea turtles, Aleppo pine habitats and biological diversity, as well.

Sand-dunes

Studies on the coastal areas of Turkey provide information about the coastal sand-dunes and their biological diversity in the coastal areas given conservation status, e.g. Special Environmental Conservation Zone, National Park, Wetlands Having International Importance, etc. The results of the researches conducted in the Göksu, Belek, Patara and Datça-Bozburun Special Environmental Conservation Zones have demonstrated that the sand-dunes in those areas contain important biotops.

Sand movements often occur from the shore toward the hinterland behind by the effect of wind on the Silifke-Göksu shores that remain in the Göksu Special Environmental Conservation Zone. These sand-dunes are the habitats where a fast species loss occurs and are one of the sensitive habitats in the Göksu Delta. The area contains 22% of the coastal sand-dune flora of Turkey. Sand-dunes have a very special value for the delta. Because, the area is one of the rare

places where the two sea turtle species of the Mediterranean, i.e. the logger head sea turtle and green turtle, choose for leaving their eggs. The rest-harrow (Ononis natrix) and sea spurge (Euphorbia paralias), which can bloom during both summer and winter, are the dominant plants found on the sand-dunes around the Lake Akgöl. Sand hills at 0 to 3m height are covered by the myrtle (Mvrtus communis), Jerusalem thorn (Paliurus spina cristi) and chasteberry (Vitex agnus castus). Sand hills rise like a wall between the shore and the flora behind and stands as a barrier to wind for the great part. This allowed growing of the spring species, as well, such as bulb (Allium sp.), iris (Iris sp.) and hyacinth (Muscari sp.).

Currently, around 4.7% (594ha) of the Belek Special Environmental Conservation Zone is covered by the coastal sand-dunes. Researches have demonstrated that the area has sand-dune biotops and dominant species specific to them. While the macqui forms like the heather Erica manipuliflora, Sarcopoterium spinosum, Echium angustifolium occur on the stable sand-dunes, Polygonum maritimum and Echinops viscosus occur on partly stable sand hills in addition to the above and Thymelaea hirsuta, Echium angustifolium, Euphorbia paralias and Pancratium maritimum occur in the moving sand-dunes.

The Patara Special Environmental Conservation Zone: The Patara Beach was formed after a natural process in which the alluvial soils carried by the Eşen Stream at the delta of the stream by sea currents and winds. Lying on an 18km east-west direction and being 500m wide, the Beach is the most important topographical formation of the area. In the area, sometimes strong winds blowing from the sea towards the shore move the beach toward the hinterland and create sandstorm and sand depression. Therefore, the sand-dunes that have a broad spread and are moving are met on the beach. On the Patara Beach, the wet belt having 7km length and average 25m width from the Eşen Stream's mouth to eastwards have very fine clean sands. This part is the main area where the logger head sea turtles and green turtles leave their eggs. Generally, the halophytic plants are found on the sandy parts near the shore in the area. Laurus nobilis, Phillyrea media and Arbatus uneoda are found in the middle parts of the shore. Farther from the shore towards inner areas, however, glossy, leaved, strong oily textured, hairy, small and thorny Mediterranean vegetation, i.e. macqui, is found. In this area, macqui species called garig occurs. The prickly cedar, myrtle acacia, strawberry tree, wild olive and some shrub-like plants are some of such plant species.

The Datça-Bozburun Special Environmental Conservation Zone: The Gebekum sand-dune area located in the south of the Datça Penisula is a sensitive area with its vegetation. Medicago marina, Eryngium maritimum, Euphorbia paralias, Pancratium maritimum and Alkanna tinctoria, a medical plant, are the dominant species found in Gebekum. Sand-dunes in Kızılbağ, Eksera, Hisarönü Çubucak, İnbükü, Karabük Burnu, Periliköşk, Hayıtbükü, Mesudiye, Hisarönü Kocakür, Söğüt in addition to Gebekum can also be classified as sensitive similarly, having similar characteristics with those of the sand-dunes in Gebekum.

Akyaka Bird Sanctuary: It is one of the largest sand-dunes in Turkey, being a few km wide from the lake to the sea at some parts and with 20m height. There cavities below sea level between sand hills forming one or two hill ranges at some parts. Those cavities are filled with water in rainy weathers. Also, there are permanent inland waters accumulation and marshes which bear ecological importance in the north-east of sand-dunes. In the region, the Turanian-Iranian and Mediterranean pythogeographies are dominant. For plants, the most interesting part is the sand-dunes lying between the sea and lagoons. Towards sand-dunes from lagoons, the dominant species of rosebay and acantholimon are found. Farther, the broomrape, mouse-ear hawkweed, vetch and clover occur. Sand valleys are covered with many varieties and species of orchis (Ophrys sphegodes, Serapias sp. and Orchis sp.). Afforestation activities were started in 1955 to achieve sand-dune stabilization and, so far, around 3.687ha sand-dune has been afforested. Eucalyptus tree, orange wattle, false acacia, stone pine, red pine and ceypress have been used for afforestation. The reed-covered shores and shrub-covered sand-dunes which are quite rich

in insect presence in the lake offer an ideal feeding and nestling area for birds like hoopoe, roller and swallow. The tortoise, Montpellier snake, Dahl's whip snake, Snake-eyed Lizard, levant skink, chameleon, Crytodactylus kotschyii and Agama stellio are the other reptile species found on sand-dunes. Vast sand-dunes and shrubby areas between the lake and the sea offer a quite appropriate habitat for many carnivorous mammals. The jackal is the most common species in the region. Fox, wildcat, rabbit and hedgehog are the other species found in the region.

Datça-Bozburun Aykut İNCE

Sea caves

Along the coasts of Turkey, there are thousands of sea caves with very different geological forms and providing a habitat for many fish species and other organisms of marine origin. Some of those caves are designated as a sheltering and breeding area of the monk seal. So far, 51 caves on the Black Sea coasts and 39 other on the Aegean and Western Mediterranean coasts have been discovered by the Underwater Researches Association-Monk Seal Research Group (Sualtı Araştırmaları Derneği – Akdeniz Foku Araştırma Grubu (SAD-AFAG)). They have been used by monk seals.

35 to 40% of Turkey's sea caves are formed of carbonate rocks which allow cave formation. Therefore, it is estimated that there are around 30,000 to 35,000 sea caves which offer a shelter for several fish species. Out of those caves, only 1.100 have been examined and mapped and it is found out that the caves are in a degradation process.

Islands

When taken from island biogeography aspect, islands on Turkey's coasts bear considerable importance for biological diversity. Islands are important for several migratory bird species, e.g. song birds and marine birds, especially during the migration period. For example, the islands on Turkey's Aegean and Mediterranean coasts offer a habitat and breeding area for the Audouin's gull (Larus audouinii), a globally endangered species. Islands are quite important for the herpetefauna, as well. In Turkey, where around 125 amphibian and reptile species

live, it is found out that nearly 1/4 of those populations live in Turkey's islands. While Turkey's herpetofauna shows such a rate, the herpetofauna of Turkey in the central and western regions of the country are much more similar with that in islands. Also, islands offer quite important habitats for monk seals. For example, the islands area on the north-west of the Bodrum Penisula and the off-shore islands of the Foça Penisual are very important habitats of monk seals.

Calcareous Algae and Molluscs-Larva Terraces

The calcareous algae and molluscs-larva terraces are the rocky tidal areas formed by biotops and are proper shelters for typical communities. These ecosystems contain various macro alg and fauna communities. These terraces are found only in a restricted area on Turkey's coasts. These are generally found on Turkey's Mediterranean coasts. The terraces are characterized by the high number of species and genetic diversity from the biological aspect. Since the terraces are found in coastal areas, they are affected from human-origin pressures like pollution, riprapping for gaining beach, coastal constructions and erosion. The serpulid larva, vermetid molluscs and red algae (Lithophyllum lichenoides), especially the last one, are capable of forming small reef structures in a narrow and vertical area. These structures protect the rock layer where they occur against coastal erosion with cementation after lithification and allow sediment accumulation. In the east and south-west parts of the Mediterranean, the calcareous terraces, which are generally formed by the Dendroma petraeum, are found in the shallow sublittoral area. To many authors, the best terrace development areas are the coasts which are open to marine events (currents, plankton abundancy, etc.), The fauna communities forming the terrace (bivalves, serpulids) feed by filtering the water column. So, they benefit from wave movements on those coasts. The water turbulence and wave movements that pass through these biological formations help cementation and lithification processes. Although they protect the rock surface beneath, they tend to become affected from erosion with the damage given by in particular the clinoid sponges and the lithophaga of bivalves. These biological formations on carbonate rocks are vulnerable to changes and degradation in environmental conditions. More specific studies on the lithophyllum formations of the Mediterranean demonstrate that pollution (eutrophication and oil pollution, etc.) can give harm to algae and therefore cause erosion. Following the eutrophication, the ulva of green algae cover the terrace surface and compete with each other and cause bioerosion and the resulting destruction of calcareous algae like lithophyllum, which are valuable formations.

Organisms of marine origin in Turkey's seas

The Marine Fauna in Turkey's Seas Database, which was built under the SPO and TÜBİTAK assisted Turkish Fauna Database project, demonstrated that a total of 3.112 fauna species were identified in Turkey's seas. So far, however, around 1,000 species have been identified by various researchers. Out of 3.112 fauna species, 429 are vertebrates and the remaining 2.683 are invertebrates. On the other hand, any studies of this kind have not been conducted on marine flora and therefore there is no definite data on the number of marine flora species in Turkey's seas.

Of the faunistic categories, the arthropoda phylum comes first with 901 species (29%), followed by the mollusca with 796 species (26%) and by the chordata with 429 species (14%.) The further details are given in Table 4.10.

Tablo 4.10.Total number of species of main taxonomic groups in Mediterranean Sea, Black Sea and Seas of Turkey and Their Distribution in Turkish Seas.

Groups	The Mediterranean (total)	The Black Sea (total)	Turkey (total)	The Black Sea	Straits-Marmara	The Aegean Sea	The Mediterranean
Ciliates	unknown	unknown	82	17	5	82	10
Porifera	593	28	114	-	37	89	-
Cnidarians	420	33	104				
Hydrozoa					36	45	2
Scyphozoans				2	1	6	4
Anthozoa				-	22	13	3
Ctenophores	20	2	5	3	4	2	1
Plathelminthes	?	103	68	36	56	-	-
Nemertinea	94	33	8	-	8	-	-
Bryozoans	unknown	18	151	5	48	131	41
Phoronida	5	1	1	-	-	1	-
Branchiopods	15	17	1	-	1	-	-
Spinculida	22	1	5	-	3	3	-
Annelides	776	231	375				
Archiannelida				-	1	-	-
Polychaeta				52	196	248	131
Hirudinea				-	1	-	-
Arthropods	1935	599	901				
Pycnogonida				-	-	10	10
Crustacean				75	174	465	226
Mollusk	1376	207	796				
Caudofoveat				-	2	-	-
Polyplacophora				-	6	13	5
Gastropods				14	235	180	305
Bivalvia				35	150	125	120
Scaphopoda				-	6	4	4
Cephalopods				-	15	35	6
Echinoderms	143	14	72	-	47	67	34
Chordates	937	172	429				
Urochordata				6	13	30	8
Vertebrata							
Pisces				138	196	346	334
Reptiles				3	4	4	5
Mammals				3	3	6	11
Total	6336	1459	3112	389	1270	1905	1260

Not all of the reported fauna species, i.e. 3.112 species, and flora species, i.e. around 1,000 species, in Turkey's seas are utilized economically. Fish are the main species, being an item of capture fisheries production. Based on the list adopted by the Turkish Statistics Agency (TURKSTAT), 56 species/categories of fish, 8 species/categories of crustaceans, 4 species/categories of bivalve molluscs, 3 species/categories of cephalapods, and 1 species/category of common jelly fish, sponges and sea snails constitute Turkey's living marine resources. Among these living marine resources, fish include: leerfish, Greater amberjack, hake, red mullet, European hake, sprat, sea bream, sole, John dory, common sea bream, larger forkbeard cod fish, meagre, sandsmelt, anchovy, comber, European barracuda, black scorpionfish, annular bream, horse mackerel, brown meagre, blotched picarel, turbot, scad, slender goby, mullet, angel shark, swordfish, streaked gurnard, chub mackerel, shark, bogue, sea bass, brown rokfish, bluefish, saddled sea bream, common pandora, whiting, striped sea bream, corb, grouper perch, tuna, bonito, sardine, meagre, black bream, cow bream, common dentex, striped mullet, short-body sardinella, pagry, Atlantic bonito, pike, mackerel, thornback ray, gav fish, sauric; cephalapods include: octopus, squid, cuttlefish; crustaceans include: shore crab, crab, crawfish, green crab, swimming crab, lobster, shrimp; and bivalve molluscs include: mussel, oyster, commo scallop, carpet shell.

With the boost of researches and conservation attempts for the sea mammals in the last 25 years, the Mediterranean has also been a subject of the process although the sea has quite restricted biological diversity when compared to oceans. In that process, 20 dolphin and whale (Cetacea) species have been reported in the Mediterranean Sea to a varying density. However, of those 20 species, only 8 have permanent population in the Mediterranean. These include: Fin whale (Balaenoptera physalus), Sperm whale (Physeter macrocephalus), Cuvier's beaked whale (Ziphius cavirostris), Long-finned pilot whale (Globicephala melas), Risso's dolphin (Grampus griseus), Bottlenose dolphin (Tursiops truncatus), Striped dolphin (Stenella coeruleoalba) and Common dolphin (Delphinus delphis).

All the other species are represented by individual mammals which temporarily come from the North Atlantic or the Red Sea. 7 of those species are found in Turkey's seas. However, although the long-finned pilot whale (Globicephala melas) has permanent population in the Western Mediterranean, the presence of this species has not been proved so far. The azov dolphin (Phoceana phoceana) is another species having permanent stocks in the Black Sea and the Sea of Marmara.

From the west to the east of the Mediterranean, less research is being conducted on dolphins and whales. A compilation about the Eastern Mediterranean has reported that 14 species have been identified to have lived in the area as the researches conducted up to 1980 show, but that no data is available on their populations. Despite the two decades past, there is still no detailed data on the permanent stocks of the sea mammals in the Eastern Mediterranean.

So far, the number of studies on Turkey's coasts on dolphin and whale species has been very limited. 1977 study on Dolphin fishing in Turkey and 1980 study on the status of the Cetacea fauna in the Eastern Mediterranean, including Turkey up to early 80's are the two studies conducted in this area. Also, the bottlenose dolphin in the Strait of Çanakkale was reported in 1991. A study entailed fishermen and the Cetacea species living in Turkey's seas based on irregular observations and on the anthropogenic impacts on those species in 1996. It was reported that a striped dolphin was washed up onto the Silifke shore in the Göksu Delta in 1997. The areas where Cetacea were seen in the Turkish Straits and the Sea of Marmara between 1985 and 1996 were demonstrated in 1997. It was reported in 1998 that a total of 23 Cetacea were washed up onto the Aegean and Mediterranean shores in the 1990-1997 period and a total of 16 Cetacea onto the Sea of Marmara shores in 1999, and that they were caught in swordfish nets in 2001. The evaluations regarding the studies conducted in Turkey on the mammals living

in the Black Sea were presented at the 1st International Symposium on the Mammals Living in the Black Sea, which took place on 27-30 June 1994 in İstanbul.

The monk seal (Monachus monachus), which is the only representative of the pinnipeds in the Mediterranean and is classified as one of the critically endangered species by the International Union for Conservation of Nature (IUCN) shows a scattered, but a broad distribution on Turkey's coasts. It is estimated that it has a population of 100 individuals. In the 1994-2002 period, 17 breeding events and 22 dead seals were recorded. The main threats to this species include the destruction of its habitats, intentional killing, being caught up in the fishing nets, and reduction in fish stocks due to excessive and illegal fishing.

Marine Invasive Alien Species

A 2005 compilation reported the presence of a total 263 invasive alien species from 11 systematic categories in Turkey's seas. The molluscs with 85 species come first, among the invasive species, followed by the crustaceans with 51 species, fish with 43 species and phytobenthos with 39 species (the phyto-organisms at the sea bottom). 20 invasive species were identified in the Black Sea, 48 in the Sea of Marmara, 98 in the Aegean Sea and 202 on the Mediterranean coasts. While most of the invasive species in the Black Sea and the Sea of Marmara were carried by vessels, the invasive species blooms of Red Sea origin occurred on the Mediterranean coasts. The benthic habitats (soft and hard grounds) contain 76% of the total invasive alien species and 39 species are found in the pelagic waters. Around a half of these species are seen at depths varying from 0 to 10m on Turkey's coasts. However, 8 species are seen at depths greater than 100m.

The Mnemiopsis leidyi, a alien species carried from the Atlantic coasts of the North America to the Black Sea in vessels' ballast waters and feeding on pelagic fish fry and larva (e.g. anchovy, horse mackerel, mackerel, bonito, etc.), is just one of the important problems of the Black Sea. Grey mullet (Russia) (Mugil soiuy) is a alien species and is about to invade the domestic mullets on the Black Sea coasts. It is observed that the other species that either live in the Black Sea or are carried are trying to adapt to the euthrophic conditions of the Black Sea. The oyster and the Rapana venosa (syn; R. thomasiana) of the sea snails are among such species. The sea snail (Rapana venosa) is an important export item for Turkey and for a few countries bordering the Black Sea. However, this is an invasive species, which was carried to the Black Sea in ballast waters of vessels from Japan, and feed in particular on the Mediterranean mussel (Mytilus galloprovincialis), which is the primary nutrient of the bream species (Diplodus vulgaris and Diplodus annularis). It is reported that, as a result of this, the breams, which have commercial importance, have begun to decrease and have been under the threat of total destruction recently. Recently, also, following the reduction of M. Galloprovebcialis, the Anadora cornea, a new mollusc species, has been reported to have a population boost. Further, the dredging of the mentioned sea snail Rapana in the narrow continental shelf has given considerable damage to the coastal ecosystem and changed species compositions both qualititatively and quantitatively.

Marine organisms either under threat of extinction or endangered

Numerous marine organisms and their habitats have completely been destroyed or are under the threat of complete destruction with the increasing use of the seas and marine resources. The United Nations Environmental Programme (UNEP) - Regional Activity Centre for Specially Protected Areas (RAC/SPA) has reported certain marine organisms in the Mediterranean are either under threat of extinction or endangered. These organisms are given in Table 4.11. In addition, Table 4.12 lists those species known as being sensitive in the entire Mediterranean and likely to become under threat if no regulatory fishing measures are taken. Further, Table 4.13 lists the marine habitats that are under the threat of destruction as a result of the humanbeing-sea interaction.

Tablo 4.11. Endangered or Threatened Marine Species in the Mediterranean Ecosystems

Bryozoa *Hornera lichenoides*	***Magnoliophyta*** *Posidonia oceanica* *Zostera marina* *Zostera noltii*	***Mollusca*** *Ranella olearia* *Charonia lampas* *Charonia tritonis* *Dendropoma petraeum* *Erosaria spurca* *Gibbula nivosa* *Lithophaga lithophaga* *Luria lurida* *Mitra zonata* *Patella ferruginea* *Patella nigra* *Pholas dactylus* *Pinna nobilis* *Pinna rudis* *Schilderia achatidea* *Tonna galea* *Zonaria pyrum*	***Chlorophyta*** *Caulerpa ollivieri*
Crustacea *Ocypode cursor* *Pachylasma giganteum*			***Phaeophyta*** *Cystoseira amentacea* *Cystoseira mediterranea* *Cystoseira sedoides* *Cystoseira spinosa)* *Cystoseira zosteroides* *Laminaria rodriguezii*
Cnidaria *Astroides calycularis* *Errina aspera* *Gerardia savaglia*	***Porifera*** *Asbestopluma hypogea* *Aplysina sp. plur.* *Axinella cannabina* *Axinella polypoides* *Geodia cydonium* *Ircinia foetida* *Ircinia pipetta* *Petrobiona massiliana* *Tethya sp. plur.*		
Echinodermata *Asterina pancerii* *Centrostephanus longispinus* *Ophidiaster ophidianus*			***Rhodophyta*** *Goniolithon byssoides* *Lithophyllum lichenoides* *Ptilophora mediterranea* *Schimmelmannia schousboei*
Mammalia *Balaenoptera acutorostrata* *Balaenoptera borealis* *Balaenoptera physalus* *Delphinus delphis* *Eubalaena glacialis* *Globicephala melas* *Grampus griseus* *Kogia simus* *Megaptera novaeangliae* *Mesoplodon densirostris* *Monachus monachus* *Orcinus orca* *Phocoena phocoena* *Physeter macrocephalus* *Pseudorca crassidens* *Stenella coeruleoalba* *Steno bredanensis* *Tursiops truncatus* *Ziphius cavirostris*	***Pisces*** *Acipenser naccarii* *Acipenser sturio* *Aphanius fasciatus* *Aphanius iberus* *Cetorhinus maximus* *Carcharodon carcharias* *Hippocampus ramulosus* *Hippocampus hippocampus* *Huso huso* *Lethenteron zanandreai* *Mobula mobular* *Pomatoschistus canestrinii* *Pomatoschistus tortonesei* *Valencia hispanica* *Valencia letourneuxi*	***Aves*** *Pandion haliaetus* *Calonectris diomedea* *Falco eleonorae* *Hydrobates pelagicus* *Larus audouinii* *Numenius tenuirostris* *Phalacrocorax aristotelis* *Phalacrocorax pygmaeus* *Pelecanus onocrotalus* *Pelecanus crispus* *Phoenicopterus ruber* *Puffinus yelkouan* *Sterna albifrons* *Sterna bengalensis* *Sterna sandvicensis*	**Reptiles** *Caretta caretta* *Chelonia mydas* *Dermochelys coriacea* *Eretmochelys imbricata* *Lepidochelys kempii* *Trionyx triunguis*

Table 4.12. Endangered, Threatened and Vulnerable Species in accrodance with UNEP/MAP Criteria (UNEP/ MAP, 1999).

Critically endangered	***Endangered***	***Sensitive***
Acipenser sturio-sturgeon	*Acipenser gueldenstaedtii-Russian Sturgeon*	*Lutra lutra-otter*
Chelonia mydas-Green turtle	*A. nudiventris - Fringebarbel sturgeon*	*Phocoena phocoena-porpoise*
Monachus monachus-Mediterranean Monk Seal	*A. persicus-Persian Sturgeon*	*Tursiops Truncatus-Bottlenose dolphin*
	A. stellatus-Stellate sturgeon	*Stenella coeruleoalba-stripped dolphin*
	Caretta caretta	
	Huso huso-White Sturgeon	
	Delphinus delphis-Common dolphin	

Table 4.13. Endangered Marine Habitats (UNEP/MAP, 1999).

Plant Groups	*Cystoseira (At choppy coasts)*
Plant Landscapes	*Calcareous alga sidewalks* *Neogonioliton notarisii accumulation by bio-growing* *Dictyopteris membranacea pastures* *Posidonia oceanica reef-barriers*

Marine and Coastal Plants

A joint study by the marine plants specialists from the countries bordering the Mediterranean has demonstrated that 16 Rhodophyta, 18 Phaeophyta, 4 Chlorophyta Algae and 2 eelgrass species as well as 8 marine plant communities and 7 marine landscaping are under threat in the Mediterranean. A document from Red Data Book series has been prepared on the matter. Table 4.14 lists the species and categories of the above which are found on Turkey's coasts and are under the threat of extinction in the entire Mediterranean, as identified at the experts meeting. The marine plants which are rare in Turkey and are either under the threat of extinction or at risk include: Posidonia ocenia, Zostera marina, Acetabularia parvula, Cystoseria ergegovicii, Dilophus mediterraneus, Lithophyllum lichenoides, Tenarea tortusa and Gracilaria verrucosa.

Table 4.14. Endangered marine plant species (Boudouresque ve diğ. 1990)

Red Algs (Rhodophyceae) *Lithophylum lichenoides Philippi* *Naccaria viggii (Turner) Endlicher* *Nemastoma dichotomum J.Agardh* *Platoma cyclocolpa (Montagne) Schmite* *Tenarea undulosa Bory*	***Dark Algs (Phaeophyceae)*** *Cystoseira amentacea Bory* *Cystoseira spinosa Sauvageau* *Cystoseira stricta (Montagne) Sauvageau* *Dilophus mediterraneus Schiffner*
Gren Algs (Chlorophyceae) *Caulerpa ollivieri Dostal*	
Sea grasses(Spermatophyta) *Posidonia oceanica (Linneaus) Delile* *Marine plant population* *Posidonia oceanica populations* *Cystoseira populations in chopping coasts* *Cystoseira populations in deep seas* *Korallijen populations*	***Marine Landscapes*** *Neogoniolithon notarisii biyokonkresyonmanı* *Dictyopteris membranacea grasses* *Posidonia oceanica reef-barriers* *Calcareous Alg tretuar*

4.6.2. Institutional Structure and Capacity

General information on this subject can be found in section 4.1.1 of the plan. Being a body that makes regulations and does researches related to fisheries, the Ministry of Agriculture and Rural Affairs (MARA) is the other main governmental agency having duties and responsibilities regarding coastal and marine ecosystems than the Ministry of Environment and Forestry (MEF). The Directorate General of Protection and Control of MARA regulates capture fisheries production. 4 fisheries research institutes of MARA do fisheries researches, as well as takes restocking actions for the species that are under the threat of extinction. The Coast Guard Command plays an active role in the conservation of Turkey's seas, with the functions of the prevention of any smuggling by the sea, the control of fishing and making preventive controls on the pollution of the seas. Building its capacity day by day, the Coast Guard Command has been successful at controlling arrangements for the sustainable use of Turkey's living marine resources, the monitoring of fishing fleet, preventing the pollution of the seas, and taking actions for the conservation of marine ecosystems. With regard to capacity building and enhancing the effectiveness of controls, under the Legal and Institutional Alignment of the Fisheries Sector to the EU Acquis Project, the Vessel Monitoring System, which allows the satellite-based monitoring

of fishing vessels, has been installed and is at the trial stage. The attempts to expand and improve the legal basis of the VMS, which is recognized as a method that considerably enhances capacities of countries in the controlling of fishery regulations including fishery zones, fishing time, protected areas, and in the monitoring of fishing vessels, are underway.

The Undersecretariat of Maritime Affairs is the competent authority for all the maritime affairs. The Ministry of Public Works and Settlement has power in planning coastal areas as per the Coastal Law and the relevant regulations. More than 10 fisheries departments and 4 institutes of maritime sciences from various universities provide academic and technical research infrastructure and capacity.

4.6.3. Policy and Legislation

There are various regulations that aim to prevent the pollution of the seas. The Fisheries Law 1380 is the main regulatory tool with regard to the conservation and sustainable use of biological diversity. Under the Fisheries Regulation, associated with the Law 1380, two separate circulars are issued biennually to regulate commercial and recreational fishing activities both in seas and inland waterss. The fisheries cooperatives, universities and all the relevant institutions and organizations are consulted when drafting the circular. –The draft circular is submitted to the Fisheries Advisory Committee for approval. This committee consists of universities, non-governmental organizations, line Ministries and fisheries unions. In Turkey, fishing regulation comprises four main elements:

1. Regulations concerning the use of fishing gear;
2. Regulations by species and length;
3. Regulations by area and location;
4. Seasonal regulations.

All the above regulations are planned without taking into consideration a fact, i.e. a fish stock is based on different species and the ecosystem works as a whole. For example, the purse-seiner regulations for the Black Sea aim only anchovy, or the trawl regulations for the Mediterranean aim only the red mullet, with no consideration given to other fish species which are totally different from either anchovy or red mullet in their biologies. However, this appears to be an unavoidable practice in countries where the fishery areas have fish stocks with multiple species like Turkey. Nevertheless, scattered fishery activities and the use of fishing methods that are quite different from each other are the constraints to the implemantation of fishing quotas, one of the most common fishery management tools globally, in Turkey.

The Decree-law 383 on the Establishment of the Environmental Protection Agency for Special Areas allows the designation of coastal and marine protected areas. Under the cited Decree-law, the Environmental Protection Agency for Special Areas (EPASA) is authorized to take all the measures to protect the environmental values and resolve the existing environmental problems of the areas either already designated or to be designated as the Special Environmental Conservation Zones, establish the requirements for the conservation and use of those areas, design their development plans, revize their existing plans of any scale and plan decisions and approve such ex officio. The Council of Ministers is the body to designate Special Environmental Conservation Zones in accordance with the cited Decree-law.

It is assumed that commercial fishing activities should be regulated, as well as actions involving legal and administrative measures should be taken with regard to the alien species and in particular to the effects of the invasive alien species on biological diversity, an internationally-recognized priority issue. Considering that the invasive alien species pose a great threat to our seas and that this may prevent the sustainable use of the seas and the economic benefits of the

seas, the process should be accelerated to take actions regarding the issue with the cooperation of the relevant institutions.

4.6.4. National Practices

In Turkey, the actions for the conservation of coastal and marine biological diversity are taken based on the area and species conservation concepts. National Parks covering coastal and, partly, marine ecosystems, Nature Conservation Zone, Natural Park, Wetlands Having International Importance (Ramsar) and Special Environmental Conservation Zone are all the statuses given in the frame of area conservation concept. Çamburnu Nature Conservation Zone (Artvin), Hacıosman Forest Nature Conservation Zone (Samsun), İğneada Longoz Forests National Park (Kırklareli), Hamsilos Nature Park and Sarıkum Nature Conservation Zone (Sinop) lie along the Black Sea coasts. Also, the Kızılırmak Delta is a Ramsar area. The Gelibolu Penisula Historical National Park (Çanakkale), Ayvalık Islands Natural Park (Balıkesir), Special Environmental Conservation Zone in Foça (İzmir), Dilek Penisula-Büyük Menderes Delta National Park (Aydın), and the Gediz Delta Ramsar area are under conservation. Muğla, which is located at the junction of the Aegean and the Mediterranean, has a long indented shoreline and special habitats. In Muğla, there are seven protected areas. These include: Marmaris National Park, Ölüdeniz – Kıdrak Natural Park, Datça-Bozburun Special Environmental Conservation Zone, Köyceğiz-Dalyan Special Environmental Conservation Zone, Fethiye-Göcek Special Environmental Conservation Zone, Gökova Special Environmental Conservation Zone and Patara Special Environmental Conservation Zone. There are seven protected areas along the Mediterranean coasts, 4 of which are in Antalya province. (These include: Olimpos – Beydağları Shore National Park, İncekum Natural Park, Yumurtalık Lagoon Nature Conservation and Ramsar Area, Belek Special Environmental Conservation Zone, Göksu Delta Special Environmental Conservation Zone, Kaş-Kekova Special Environmental Conservation Zone, Göksu Delta Ramsar Area.)

The aquatic species are put under conservation either partly or wholly with regulations made in accordance with the Fisheries Law. Tablo 4.15 gives the prohibited species. With regard to the catch of other species, the restrictions on fishing method/technique, area and time provides partial protection for commercial aquatic species.

Table 4.15. Catching or collecting of the species prohibited

Species	Name in Latin	Species	Name in Latin
Beni balığı	*Cyprinion macrostamus*	*Starfish*	*Asterina pancerii*
Sandbar shark	*Carcharhinus plumbeus*	*Spider crab*	*Maia squinado*
Black sea salmon	*Salmo trutta labrax*	*Sturgeon*	*Acipencer sp*
Long-snouted seahorse	*Hippocampus hippocampus*	*Screw shell*	-
Sea turtles	*Caretta caretta*	*Musk octopus*	*Elodone moschata*
	Chelonia mydas	*Mühreler*	*Lamellaridae*
	Dermachelys coricea	*Grass Carp*	*Ctenopharyngodon idella*
	Trionyx triunguis	*Ocean sunfish*	*Mola mola*
Abalone	*Haliotis lamellosa*	*Pen shell*	*Pinna nobilis*
Seagrass	*Posidonia oceanica*	*Screw shell*	*Gourmya yulgata*
	Zostera nolti	*Black coral*	*Gerardia savaglia*
Silver carp	*Hypophthalmichtys molitriks*	*Triton*	*Charonia lampas*
Elephant ear sponge	*Spongia agaricina*	*Commercial Sponges*	*Spongia officinalis*
Mediterranean monk seal	*Monachus monachus*		*Spongia agaricina*
Basking shark	*Cetorhimus maximus*		*Hippospongia communis*
Horned octopus	*Elodone cirrhosa*	*Lickers (Strikers)*	*Garra rufa*
Red coral	*Corallium rubrum*	*Dolphin*	*Delphinidae*

Recently, Trabzon Fisheries Research Institute of the MEF has engaged in turbot fry (Psetta maxima) production and released them into the sea in order to enhance natural turbot stocks, which are decreasing rapidly. On the other hand, the Institute has also taken actions to protect the Black Sea brown trout (Salmo trutta labrax) species, which are endemic to the Black Sea and are endangered with the pollution of the rivers.

Monk Seal (Monachus monachus) conservation initiatives

The monk seal is one of the most endangered species in the world. It is one of the 12 species that was put under conservation by IUCN. Scientists estimate that there are around 300 to 400 monk seals in the world, with around 100 individuals in Turkey's waters.

The monk seal is at the list of the species that need conservation under the Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (BARCELONA), the Convention on the Conservation of European Wildlife and Natural Habitats (BERN), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to which Turkey is a party. Also, the monk seal enjoys conservation at national level under both the Fisheries Law 1380 and the Environmental Law 2872.

In 1988, the Council of Europe devised an action plan, which covers all monk seal habitats, and that plan was ratified by Turkey. Pursuant to the resolutions at the "International Meeting on the Conservation of Monk Seal, an event organized by the Council of Europe Bern Convention Committee and the MEF in 1991, a National Strategy was built up. The National Strategy envisages a nationwide cooperation. So, the strategy has been devised by the national officials and experts and should be implemented by them. It contains 3 main headings: Research; Conservation; and Training.


Monk Seal Adem AĞIR


Siren Rock Cliff Adem AĞIR

A national committee has been established involving all the interest groups under the coordination of the MoeEF in order to make evaluations on the studies concerning monk seals and ensure coordination. Pilot projects have been implemented in Foça and Bodrum-Yalıkavak within the framework of the implementation of National Strategy upon the decision of the National Committee on Seals. With those projects, the threats to the monk seal have been

identified and the effectiveness of conservation initiatives has been increased. Oil pollution has been observed at a monk seal habitat, which includes an important monk seal cave, too, in Çavuşadası, Bodrum, during those projects, and the habitat has been cleaned of oil with the assistance of the Underwater Researches Association and with funding from the MEF. So, the monk seals have regained their habitat. The MEF has produced a documentary film on that cleaning work and the film has been used for training and promotional purposes both at the national and international levels. The National Committee on Seals hold meetings coordinated by the MEF, and so far, 17 areas in the entire country have been designated as important seal areas. Activities (such as training, briefing, regulatory actions by means of circulars on fishing, imposing restrictions on tourism activities, etc.) are currently going on in those areas.

Sea Turtles conservation initiatives

8 sea turtle species live in the world. Among these species, out of 5 living in the Mediterranean Sea, 2 (Caretta caretta and Chelonia mydas) use Turkey's Mediterranean coasts as a nesting area. Based on the IUCN criteria, while Caretta caretta is at the "Vulnerable" status, the Chelonia mydas is at the "Endangered" status.

The endangered sea turtles have been put under conservation under the international conventions, to which Turkey is a party, and by means of initiatives started at the national level.

First of those initiatives came in 1988 when the Köyceğiz Dalyan, a part of the Gökova Gulf and a part of the Göcek Gulf, all these include the nesting areas of sea turtles, were given a Special Environmental Conservation Zone status by a resolution of the Council of Ministers. In 1989, a committee was set up for the conservation of sea turtles, and conservation measures were taken based on the academic publications. The setting up of a "Monitoring and Evaluation Committee on Sea Turtles followed this in 1990 in order to monitor the implementation of those measures. The Committee held meetings and conducted on site investigations. As a result, they identified the threats to the nesting areas of sea turtles and improved further the conservation measures.

Sea Turtle İrfan EKMEKÇİ

At the end of the studies conducted at the national level, 19 sand-dunes on the Mediterranean coasts have been identified as important nesting areas. Of those sand-dunes, Ekincik Dalyanı, Dalaman, Fethiye, Patara, Belek, Göksu Delta sand-dunes have been given a Special Environmental Conservation Zone status by a resolution of the Council of Ministers. The Yumurtalık sand-dune has been given Nature Conservation Zone and Akyatan sand-dune has been given Wildlife Conservation Zone statuses. Of other sand-dunes, Demirtaş, Gazipaşa, Anamur, Alata, Kazanlı, Tekirova ve Kale 1st Degree Natural Site, Kumluca, Samandağ and Kızılot sand-dunes have been put under conservation. The Conservation Zones of Sea Turtles have been divided into four parts as Primary Conservation Zone, Secondary Conservation Zone, Buffer Zone and Impact Area, with conservation and utilization requirements established for each of the above.

Establishment of Emergency Intervention Centres and Identification of the Current Situation at Turkey's Seas Project

Being one of the narrowest and most winding water routes in the world and serving as a significant corridor between the Mediterranean Sea and the Black Sea, the Turkish Straits is at constant risk of accidents and pollution with around 55,000 vessels using the straits every year. Nearly 18% of those vessels are tankers carrying hazardous substances. The Undersecretariat of Maritime Affairs has initiated a project, i.e. the Establishment of Emergency Intervention Centre and the Identification of Current Situation at Turkey's Seas Project, to prevent the pollution of seas, protect the marine environment and intervene effectively with emergencies, as well as for the purposes of fulfilling our obligations arising out of the international and regional conventions, to which Turkey is a party, within the framework of the risks caused by the hazardous substance traffic on Turkey's waters. Under the project, actions are taken to identify coastal and marine areas that are vulnerable to pollution, risk level, marine and coastal areas that need conservation, their natural resources, shore facilities, possible pollution causes and characteristics, the possible movement of pollution at the intervention stage, together with possible constant and variable factors that may have impact on this, and similar issues for the establishment and operation of emergency intervention centres to fight against any possible oil or other hazardous substance spills onto the sea in an accident and other events. To this end, 1/25,000-scale maps of all the coasts of Turkey have been prepared. These maps also provide economic, socio-economic and environmental information. The activities include field studies, as well, e.g. the identification of eelgrasses. The project is planned to be completed within the year 2009.

Control and Management of Harmful Aquatic Organisms which are carried in Ballast Waters Project

The carrying of harmful aquatic organisms in ballast waters is recognized as one of the biggest problems of the global ship industry. The Control and Management of Harmful Aquatic Organisms which are carried in Balast Waters Project has been initiated by the Undersecretariat of Maritime Affairs with the purposes of identifying the current situation in Turkey regarding ballast waters and developing Ballast Water Management Systems that can be applied at Turkey's seas. Under the project, the prediction values regarding ballast carrying situation in Turkey and its impacts on organisms, and the future ballast carrying and its impacts on organisms have been determined. The target invasive species which are carried to Turkey's seas by the existing marine traffic and occur in the seas where ballast waters are carried as the future tendencies show and which are identified to be harmful and may be invasive when carried to Turkey's seas have been selected for each sea and listed and their impacts have been demonstrated. Also, based on the project outputs, 263 alien species have been identified in Turkey's seas, out of which 176 have come from the Suez Canal, 6 from the Gibraltar Strait, 3 from aquaculture, and 66 have been carried in ballast waters. Of those organisms carried in ballast waters, 19 are considered harmful aquatic organisms. Initiatives on devising a national management plan are currently underway under the project, and the project is planned to be completed in June 2008.

4.6.5 Threats to coastal and marine biological diversity and their causes

The threats to coastal and marine biological diversity can be listed as the entry of foreing species, over fishing, illegal fishing, pollution, the destruction of habitats, tourism activities, and interventions with the water regime.

The coastal sand-dunes are the ecosystems that have become sensitive and vulnerable to destruction, even at some parts have been destroyed, due to the pressures of human origin in Turkey, as in the other parts of the world. Because of coastal erosion caused by road construction works, afforestation, sand hauling, secondary buildings and tourism investments, currently only 30 (27%) of 110 coastal sand-dunes on the Mediterranean and Aegean coasts are relatively in good condition.

Since the calcareous algae and molluscs-larva terraces are found in coastal areas, they are affected from the activities of human-origin like pollution, riprapping for gaining beach, coastal constructions and erosion. Studies on the lithophyllum formations of the Mediterranean demonstrate that pollution can give harm to algae and therefore cause erosion. Following the eutrophication, the ulva of green algae cover the terrace surface and compete with each other and cause bioerosion and the resulting destruction of calcareous algae like lithophyllum, which are valuable formations.

The Black Sea ecosystem, which has been known to have had a rich biological diversity and fish potential, has become so degraded today due to a number of climatic factors as well as to the factors of human origin in the last 20 to 30 years. Major factors of this kind include: terrestrial pollution from the countries bordering both the Black Sea and the River Danube which has increased in the last twenty-five years; adverse changes in water budgets as a result of over fall in inland waters input flow due to interventions with the water regime; the invasive alien species and some non-nutrient organisms carried to the Black Sea from other seas by shipping business which then have become dominant in the ecosystem and changed the biological structure; over fishing with the rapid technological advancements in the fisheries sector and the resulting reduction of fish stocks. Among the above factors, the pollution poses the highest risk. Because the Black Sea has one of the biggest hydrogen sulphur (H2S) reserves in the world, and the bacteria in the sea takes oxygen from sulphur ions instead of solved oxygen due to excessive euthrophication, there is the risk of degradation of the two-layer water body and of the passing of hydrogen sulphur at the bottom to the explosive phase and there resulting in an environmental disaster. Another significant threat comes from alien species. A total of 48 alien species were identified in the years between 1996 and 2005 in the Black Sea. Of those species, Mnemiopsis leidyi and Rapana thomasiana have the biggest adverse impact on anchovy stocks and mussel stocks, respectively. Organochlorine pollutants of PCB and DDT type have been found at the threshold levels on dolphin species. On the other hand, the sea mammals are under threat due to the pollution in the Black Sea and to by-catch. The endangered monk seal has almost completely been lost in the Black Sea as a result of genetic isolation and the destruction of its habitats.

The major threats to the Black Sea ecosystem, which is important, include the sea accidents in the Turkish Straits, pollution and alien species. The accidents in the Turkish Straits, where there is more intensive marine traffic than the other straits in the world, can be attributed for the great part to the navigational errors of vessels/tankers due to poor visibility and strong currents. For example, out of 50,000 vessels that passed through the Turkish Straits in 1999, 6,000 were oil tankers. With the marine traffic becoming more intensive constantly, an increase in the number of accidents, a higher environmental risk, and possibly higher numbers of alien species carried to the Black Sea in tankers' ballast waters should be expected.

In the Aegean and the Mediterranean, main pressure on the coastal and marine ecosystems comes from tourism and industrialization processes. The over pumping of water, pollution, the displacements of water flow directions, and natural threats like earthquake, settlement, abrupt flood can be counted among the major factors that cause the destruction of sea caves and the extinction of marine organisms.

4.6.6. Gaps and Needs

There are gaps at the legal and institutional levels in regard to the designation and management of marine conservation zones though some Special Environmental Conservation Zones, i.e. the Special Environmental Conservation Zones of Foça, Gökova, Datça-Bozburun, Köyceğiz-Dalyan, Patara, Kaş-Kekova, Belek, Göksu Delta, have been designated along the Turkey's shoreline. There is a need to designate more areas as Special Environmental Conservation Zone and marine conservation zone, e.g. underwater national parks, to devise management plans for those areas, and to designate strict conservation zones. Below is a summary of the gaps regarding the sustainable use of coastal and marine resources:

- The lack of political will and support (priority given to gaining economic benefit and to production increase in the use and development of fishing gears, fishing nets and fish-finder, etc.);
- Biological diversity issues unintegrated with other sectors and the lack of common understanding (failure to take measures to minimize the adverse impacts of fishing practices on the fishery stocks in the marine and coastal ecosystems, etc.);
- Insufficient capacity to take action due to institutional weakness;
- The lack of financial, human and technical resources (being unable to use developments in fishing technology for a multi-dimensional sustainable use of fish resources, the non-presence of inventories of fishing technology and fishing gears, insufficient research works on the identification of fishery stocks and on sustainable fishery, insufficient technical capabilities for protection/control/monitoring, etc.);
- The Lack of benefit-sharing (the lack of cooperation with the international fising and marine sciences committees, failure to stop the pollution of the Black Sea and the number of international attempts to protect biological diversity in the area being not at the desired level, etc.);
- Pressure from population (support to the alternative livelihoods of people being not at the desired level, over and unplanned constructional activities on the coasts, etc.).

Below is a summary of the needs for the sustainable use of coastal and marine resources:

- An inventory of marine and coastal flora and fauna should be built up to collect available information; any lacking information should be completed; and more resources should be allocated to maintaining inventory studies concerning marine and coastal biological diversity.
- Measures should be taken to ensure information exchange, cooperation and coordination between experts, laboratories and organizations; guides should be prepared; the participation of those experts in the international studies should be ensured.
- Studies concerning the conservation of eelgrasses (Posidonia oceanica), which have a very important role for the marine organisms in the Mediterranean Sea and have a wide occurrence, should be maintained and both short- and long-term scientific monitoring methods should be developed for the other important species and plant categories.
- Information booklets and documents should be prepared for the executives, the related groups and public on the endangered species and the Specially Protected Areas, and people's awareness should be raised using visual media.
- Sea aquariums should be built in big coastal towns and in the ecologically-sensitive regions of Turkey in order to contribute to the training of wider communities and establishing a marine culture in the country.
- Effective methods for the identification and observation of alien species should be developed and implemented; regulations on the entry of alien species into the new ecosystems, in particular, should be reviewed and made agreeing to the international conventions; and strict controls should be exercised to prevent foreign invasive species

from entering Turkey's waters both at the national and international levels.

- Measures should be taken to minimize the adverse impacts of fishing practices on the fishery stocks in the marine and coastal ecosystems; fishing control infrastructure, e.g. remote monitoring system, should be strengthened.
- An inventory of fishing technology and fishing gears should be built up, first at regional and then at the national levels.
- Research projects, which will establish a fishing structure that will not give any harm to the existing fishery stocks of the country and which will identify catch amounts on species and fishing gear bases should be designed in the shortest time possible, and such initiatives of project designing should be supported.
- Restocking by means of aquaculture of those species which were affected from over fishing pressure and saw a fall in their populations should be performed.
- Artificial reef application should be made widespread.
- With regard to aquaculture, off-shore cage culture should be supported with a view to protecting the environment.
- Regulatory actions should be taken to protect the sea caves of Turkey and conserve the organisms in those caves, and conservation and utilization models should be established.

4.7. CROSS-CUTTING ISSUES

4.7.1. Access to genetic resources and benefit-sharing

Current Situation

Below is a list of the current regulations on the access to genetic resources and benefit-sharing in Turkey:

- Those foreign researchers who will do researches in Turkey are subject to the Requirements for those Foreigners or those applying on behalf of Foreigners and for Foreign Members of the Press who will Do Scientific Research and Examination and Shoot Film in Turkey, which were put into force by the Resolution of the Council of Ministers No. 8/12839 of 4 April 1988. By the Resolution of the Council of Ministers No. 2003/6270 of 6 October 2003 amending articles 2, 3 and 7 of the above-cited Resolution of the Council of Ministers, the authorization to issue research permits other than those concerning archeological excavations and surface researches was granted to the relevant authority. Therefore, the MEF receives and finalizes any applications for research permits for living natural resources. The permits do not entail gathering materials and taking samples from the wild. Where a research entails gathering materials from the wild, there will arise a necessity for different regulations by different agencies depending on the categories of living things.

- For the research and gathering from the wild of the materials showing the qualities of plant genetic resources and of fauna and aquatic organisms genetic resources, the authority is granted to the MARA pursuant to the Regulation on Gathering, Storage and Utilization of Plant Genetic Resources, which was entered into force upon its publication on the Official Journal No. 21316 of 15 August 1992, to the Regulation on the Protection of Fauna Gene Resources, which was entered into force upon its publication on the Official Journal No. 25145 of 21 June 2003, and lastly to the Fisheries Regulation, which was entered into force upon its publication on the Official Journal No. 22223 of 10 March 1995.

- The catching of hunting and wild animals and the gathering of their larvas from the wild (all the mammals, birds and reptiles specified by the MEF, except for the animals which are hunted, protected and listed by the MEF and the aquatic mammals) is prohibited pursuant

to the Regulation on Procedures and Requirements for the Protection of Hunting and Wild Animals and their Habitats and combat with Pests (Article 10), which was entered into force upon its publication on the Official Journal No. 25976 of 24 December 2005. For the purposes of scientific research and training, the catching of hunting and wild animals and the gathering their larvas from the wild can be permitted in accordance with the relevant provisions of the above-cited regulation, provided, however, that the individuals to be caught and the larvas to be gathered do not have an adverse impact on the continuity of population in the natural occurrence of the species.

Being a member of the European network (EUFORGENE) for Forest Trees, Turkey fulfils its obligations concerning access to genetic resources with regard to the obtaining of agricultural plant genetic resources under the Agreement on Material Transfer. Turkey has very restricted access to other countries' genetic resources in agriculture and forestry sectors and this access is based on agreements on material transfer and therefore Turkey shares benefit with the resource-provider country.

Gaps

Since the sharing of benefits from genetic resources is directly related with taking measures to ensure the conformance of access countries to the Convention, the measures taken at the natinoal level is not at the desired level. As a result, foreigners are engaged in genetic material transfer, which action is neither bound to a permit nor taken legally.

The non-presence of an effective international mechanism, involving sanctions against biological material smuggling, as well, the insufficient number of technical equipment, the use of which will facilitate to detect rapidly any biological materials at the customs gates, the failure to keep records of genetic resources and to monitor them due to technical incapabilities are some of the significant issues.

4.7.2. Alien species

Current Situation

The Agricultural Combat and Agricultural Quarantine Law 6968 of 15/05/1957 and Animal Health and Surveiallance Law 3285 of 08/05/1986 are the two important laws provide for border controls for both the health control and protection of living thing species entering/exiting Turkey. International quarantine and health certificate practices for biological material transfer are legal requirements and constitute one of the control mechanisms. Also, any gathering and transfer of living things are subject to the MARA regulations.

A permit from the MARA is required for selling, transport, catching in harvesting areas, gathering, handling at any plants, releasing into water of fish, their broodstocks, fry, larvas, juveniles and spawners, as well as aquatic plants in order to ensure the nationwide control of fisheries production in accordance with the Communiques on Commercial Marine and İnland waters Capture Fisheries Production, which are renewed every year under both the Fisheries Law and Fisheries Regulation. The Communiques on Marine and İnland waters Recreational (Sport) Fishing classify both ecologically-unfavourable inland waters fish and potential ecologically-unfavourable inland waters fish and prohibits release of the fish of this class into rivers and lakes in an uncontrolled manner and without permission, use them as a live bait and the transportation of them from one place to another for the same purpose.

With a Draft Bill on the Amendment of the Fisheries Law, it is expected that the release of any alien species into water resources will be prohibited, unless this action is taken with the permission of the MARA.

The Maritime Undersecretariat continues its efforts to prevent the carrying of alien species in ballast waters.

Gaps

In Turkey, only the main alien species that have newly and recently entered the country have been identified; however, no tracking of the past entries is in place currently. There is no system which will enable the monitoring of alien species entries into Turkey has been set up. The only species monitored is Caulerpa, a foreign alg species, and this takes place only at the local level.

The risks posed by the alien species on ecosystems, habitats and species have been identified for only some alien species. Section 4.4.1 provides details on the invasive alien species entering the marine ecosystems. Some alien species, e.g. Caulerpa racemosa and Minemiopsis leidyi, have been a subject of some studies.

Turkey has established regional cooperation mechanisms concerning the invasive alien species, although these are small in number. However, Turkey could implement only a part of the guidelines on the alien species, which threaten ecosystems, habitats or species. For example, although national biological diversity strategies and action plans have been devised regarding the invasive alien species, these have not been integrated into the sectoral and cross-sectoral policies since the designation of the coordinating institutions is at an early stage.

Turkey should develop ways and means to establish cooperation with the neighbouring countries in order to determine the threats of the invasive alien species on biological diversity in the transborder ecosystems.

A sufficient capacity should be built to enable the making of a risk assessment and analysis on the threats to biological diversity by the invasive alien species, and integrating the related methodologies into the Environmental Impact Assessment (EIA) and Strategic Impact Assessment (SIA).

4.7.3. Incentives

Current Situation

There are no special incentive programmes for the conservation and sustainable use of biological diversity. However, the SPO's Development Plans and Annual Programmes establish measures and policies which in a way work as incentives for the conservation and sustainable use of biological diversity. In addition, the Undersecretariat of Treasury establishes and implements incentives for the prevention of the environmental pollution based on Article 29 of the Environmental Law upon the recommendation from the Ministry.

Gaps

The lack of financial, human and technical resources as well as of economic incentives and policies and legislation dedicated to purpose is identified as constraints to and gaps for the implementation of incentives for biological diversity conservation and sustainable use.

Some incentives put to work in the other sectors can have adverse impacts on biological diversity. For example, despite the known adverse impacts of the Tourism Incentives Law on biological diversity and in particular on the coastal ecosystems, a full coherence of the development policy with the conservation policy could not be achieved since the tourism is a sector open to development. However, the Special Enviornmental Conservation Zones of Belek, İztuzu and Ihlara are good examples to that coherence (between tourism and environmental conservation). The local administrations need funding to be able to effectively implement sustainable tourism activities with the cooperation of voluntary organizations.

4.7.4. Monitoring and Indicators

Current Situation

The conservation zones (6%) in the entire country are monitored at the ecosystem level. The regular monitoring of the species listed in the Hunting and Fisheries Laws is in place at the species level. A national monitoring unit has been established in the MEF to perform monitoring at both the species and ecosystem levels, and it is currently gaining effect.

The MEF conducts controls and investigations at the local level under the Regulation on the Environmental Impact Assessment and monitors any activities that may have adverse impacts on the environment and takes measures to remove the impacts to the greatest extent possible.

Also, any activities that may have adverse impacts on the monk seals and sea turtles (sand hauling from the sea, fishing, industrial wastes, etc.) are followed up under the monitoring programmes implemented for the two species, which are endangered.

Climate change is monitored by means of meteorological data and air quality parameters.

Pollution/euthrophication is monitored by means of regular controls by local authorities.

Land changes and degradation throughout the country are monitored via a Central Remote Monitoring System (GIS).

The Turkey's Plants Data Service of TÜBİTAK (www.tubitak.gov.tr/tubives) has established coordination in part in data collection and management concerning plants. The Turkey Biological diversity Information System Project, TUBIOS, was initiated in 2003 to improve the system in such a way as to fully cover biological diversity with all aspects.

Gaps

There are difficulties in standardized and systematized data collection and management. The data in various institutions and non-governmental organizations which have been prepared for different purposes should be transferred to national databases. The lack of coordination and cooperation is observed among national databases which are important for the updating of and benefiting from biological diversity data.

The lack of accessible available information, the poor level of the available scientific and traditional information use, the lack of financial, human and technical resources, and the lack of commitments from the academic circle are challenges to developing indicators and implementing a systematized monitoring programme.

4.7.5. Environmental Impact Assessment

Current Situation

The EIA Regulation has been issued based on the related article of the Environmental Law and is currently being implemented, going through regular revisions to adapt to current conditions. The factors causing a reduction in biological diversity are dealt with in the sectoral investments and measures regarding those factors are motivated under the EIA Regulation.

The Annex to the Regulation classify EIA requiring activities as the Projects for which an EIA will be implemented and the Projects for which Selection and Elimination Criteria will be implemented. The activities under the first group of projects are evaluated by the MEF central administration, while those under the second group of projects are evaluated by the local administrations of the MEF.

Gaps

The activities are evaluated on case basis since the biological diversity data at the genetic diversity level, in particular, is not sufficient in Turkey. Strategical evaluation is restricted and can only be made in certain situations based on the complaints raised either at the meetings aiming at ensuring public involvement in the EIA process or communicated to the local administration. New regulations are needed for a comprehensive SIA.

The environment-related issues do not receive much attention during the decision-making process due to the priority development issues, economic constraints, and increasing need for resource and investments in connection with the rapid population growth. Although sustainable use understanding tends to become widespread in the sectoral applications, there are practical difficulties arising from development needs. The lack of awareness concerning biodiveristy loss, together with the loss of benefits from it, and the failure to document the loss also is a challenge to application.

4.7.6. Liability and Redress

Current Situation

Article 28 of the Environmental Law 2872 brings forth an approach, which envisages that the private or legal person giving damage to the environment should be held responsible with no negligence proviso. Further, the liability to recompensing the losses occurred by those giving damage to the environment is reserved in accordance with general provisions under the cited article.

Considering the conservation of biological diversity and the ecosystems having biological diversity as specified in article 6 of the Law 5491 of 24/04/2006 amending the Environmental Law within the framework of revision to the latter, article 14 of the cited law establishes administrative penalties regarding damages to biological diversity.

Further, regulations on special issues bring forth sanctions regarding liability and compensation, in support of biological diversity conservation and sustainable use. The Hunting Law (4915-01/07/2003) and Fisheries Law (1380-04/04/1971), both laying down the sanctions to be imposed in the event of any breaches of hunting and fishing bans; the National Parks Law (2873-09/08/1983) and Law on the Protection of Cultural and Natural Assets (2863-23/07/1983), both laying down the sanctions to be imposed in the event of any breaches of regulations and bans in conservation zones; the Forest Law (6831-31/08/1956), laying down the sanctions to be imposed in the event of forest damage; the Coastal Law (3621/3830-04/04/1990), layin down the sanctions to be imposed in the event of any breaches of coastal regulations; and the Law on Soil Protection and Land Use (5403-03/07/2005), laying down the sanctions to be imposed in the event of farmlands use out of purpose are all examples to the above.

Gaps

Since currently it is not known to what degree damage is given to biological diversity, the punitive sanctions provided for by the Law cannot be implemented fully. There is a need for the specialized lawyers at this area.

4.7.7. Education and Awareness-raising

Current Situation

The MEF and the Ministry of National Education conduct regular training and awareness-raising activities. A national strategy which urges public awareness-raising and involvement under the Biological diversity and Resource Management, a GEF-financed project, has been developed. This is followed by a strategy and action plan which urges capacity building of NGOs concerning biological diversity under the same project. The national biological diversity website has been

constructed both in English and Turkish. On the other hand, NGOs from the environmental sector play a significant role in public-awareness raising and enhancing their sensitivity.

Gaps

There is a need for more financial resources and a better coordination mechanism between institutions for an effective implementation.

4.7.8. Technology transfer

Current Situation

Turkey opens its available technology to the developing countries' access through either bilateral and regional agreements or joint programmes. However, Turkey needs technology transfer in regard to clean and environment-sensitive technologies, in particular.

Gaps

Turkey cannot make use of technology transfers which will support either directly or indirectly biological diversity conservation and sustainable use because of the fact that the other countries do not take actions that facilitate technology transfer, that no access is made to the technologies owned by the private sector, and that no technology transfer is in place to support research and development fitting to the country's needs.

5. DETERMINATION OF STRATEGIC GOALS, PRIORITIES AND ACTIONS

5.1. THE METHOD USED IN THE DETERMINATION OF STRATEGIC GOALS AND ACTIONS

A participatory approach has been applied to the reviewing and updating of the Biological diversity Strategy and Action Plan. To this end, workshops have been organized with more than 100 representatives from governmental agencies and institutions, universities. professional organizations and non-governmental organizations.

At the first workshop, the thematic area has been prioritized in order to determine tendencies within the scope of ecosystem elements and ecosystem management elements. At the first meeting, four thematic groups have been formed among the participants in such a way as to address the work programmes and guides approved under the Convention, considering the legal and institutional situation in Turkey. Three of those groups are ecosystem-based: agricultural biological diversity; forest biological diversity; and inland waters and coastal and marine biological diversity. The last group would deal with alien species in order to ensure that various institutions concerned with different ecosystem types take the issue in a combined manner and adopt a wholistic approach. The results of the study are given in section **5.2**.

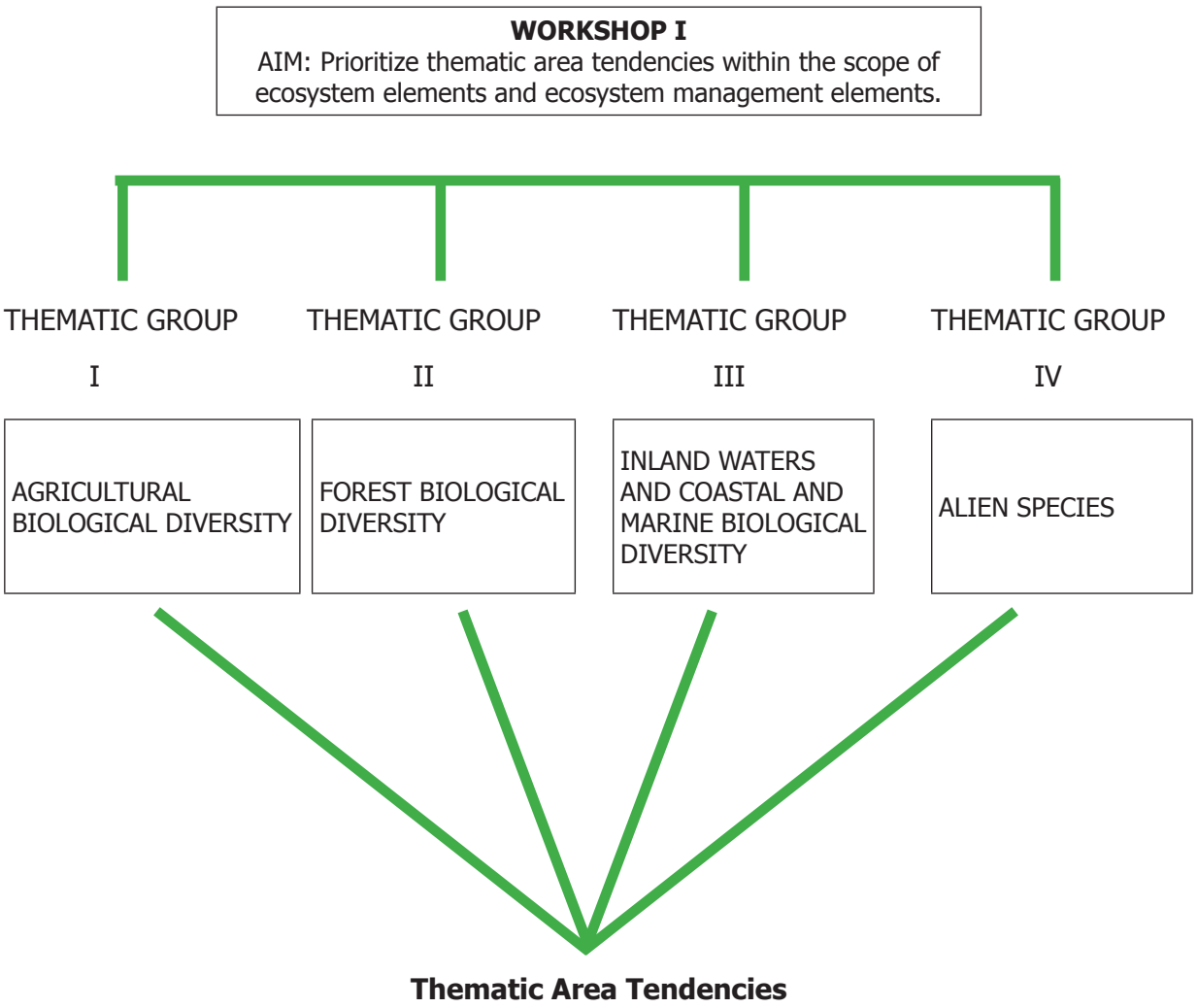
Prior to the workshops organized later on, a comprehensive targets list has been made considering the NBSAP 2001 and the work programmes and guides approved under the Biological diversity Convention. At the workshops, 6 thematic groups have been formed among the participants for agriculture, steppe, forest, mountain, inland waters, and coastal and marine. The groups have selected the targets specific to their thematic areas and created thematic area based targets lists, adding to lists the issues they consider necessary. Later, the participants have been asked to divide the targets into priority categories on a scale of 1 to 5. At the end of this study, the results of the Thematic Area Priorities (tendencies) study conducted at the first stage of this study have been used as input, as well, with the help of special software on which all the digital data are analysed, and priorities are set on the basis of both overall priorities and specifically the thematic area. In this method, the findings are not based on linear relations, but the method puts to work the findings reached at one or more steps beforehand uses them as weight factor when making prioritization. At the further stages of the study, the thematic groups have written down the actions for the the priority targets and determined how, by whom, with which resources and

in which period the actions should be taken. Also, they have determined the degree of relevance between the actions and the periods in which the actions can be introduced have been tried to be founded on a logical base. At the last stage of workshops, a gap analysis has been made determining the needs in regard to human resources, financial resources, infrastructure, legislation and institutional structure to be able to take priority actions. The results of the gap analysis are given in section **5.3**.

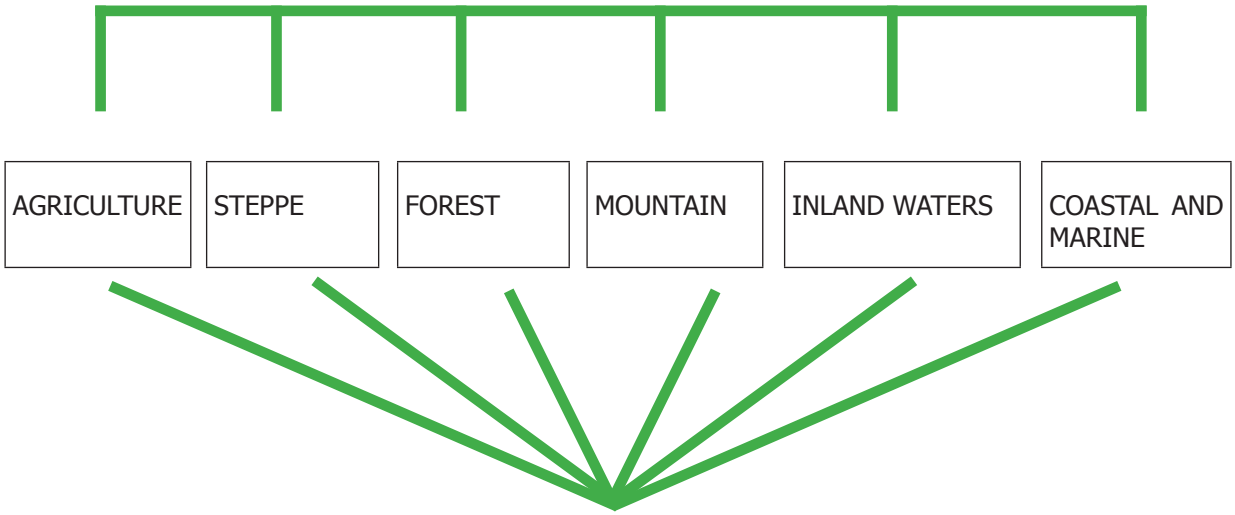
The NBSAP report prepared at the end of workshops have been submitted to the related institutions and organizations in an effort to take comments from a wider community.

The final NBSAP is based on both the findings of workshops and the views and comments received. The common priority targets of all the thematic areas at the workshops have been collected under basic goals for genetic resources including conservation, sustainable use and benefit-sharing. The priority targets and actions as considered by the groups for their thematic areas have specifically been grouped under Thematic areas. The findings of the gap analysis made by participants have also been reflected on the NBSAP as targets and actions.

PROCESS



WORKSHOP II
AIM: Make a comprehensive list of targets considering the NBSAP 2001 and the work programmes and guides approved under the Biological Diversity Convention.



Thematic Area based targets lists and priority categories on a scale of 1 to 5

TOOL: SPECIAL SOFTWARE ASSISTANCE
RESULT: The determination of priorities on the basis of both the overall priorities and specifically the thematic area

↓

The identification of actions for the priority targets by the thematic groups (action name and how, by whom, with which resource and in which period it will be taken)

↓

The determination of human resources, financial resources, infrastructure, legislation and institutional structure to be able to take priority actions, gap analysis.

NBSAP Report

↓

The submission of the NBSAP Report to the related institutions and organizations to receive their comments on the report

↓

FINAL NBSAP REPORT

5.2. TENDENCIES IN THE CONTEXT OF THEMATIC AREAS

5.2.1. Thematic areas tendencies in the scope of ecological management

List of Ecological Management (EM) Sub-Areas is given in the Table 5.1, and the relative[1] prioritization order made by participants is given in the and Figure 1.

Elements listed in the Table 5.1 in terms of their prioritization orders, have both correlated by the Thematic Areas and prioritized. Figure 1, shows both relative priority order of the EM areas and also that each of the sub-areas are involved by how many Thematic Areas.

Table 5.1 Ecological Management (EM) Elements

EM01	Water Pollution across bank of rivers
EM02	Land use
EM03	Increasing population and poverty
EM04	Waste management
EM05	Hunting Grounds and Hunting Control
EM06	Conservation, Management and Use of the Flora and Fauna Gene Resources (in situ, ex situ)
EM07	Effective Conservation of the Biological Diversity in the Protected Areas and out of the Protected Areas, and Sustainable Use
EM08	Fight against destructive diseases threatening the biological diversity
EM09	Benefitting from the biological diversity and financial sustainability
EM10	Planning and operation of the biological diversity integrated forests
EM11	Environmental Impact Assessment (EIA) practices
EM12	Natural food cycle – Ecosystems – Sustainability
EM13	Management plans for the main alien species threatening ecosystems, habitats and species
EM14	Preserving the capacity of ecosystems for delivering goods and services and supporting livelihood
EM15	Effects of the energy production on the environment and biological diversity
EM16	Integrated marine and coastal area management
EM17	Erosion control
EM18	Flora fauna centers
EM19	GDO control
EM20	Protection of the traditional information, inventions and implementations
EM21	Maintaining the hydrologic cycle
EM22	Climate change
EM23	Management of the protected areas and capacity building
EM24	Institutional responsibility – efficiency
EM25	Structures such as port, marina, etc.
EM26	Mining laws
EM27	Caves
EM28	Meadow Law – Sustainable Meadow Feeding

1 *In the relative Priority / importance ranking, importance and priority of each element is measured according to how many times it is more precedent or important than the foregoing. For example, in Figure 3, an item having a leading position in the list with a 1.00 relative priority value is twice more precedent than the item in the 15th rank with 0.50 value.*

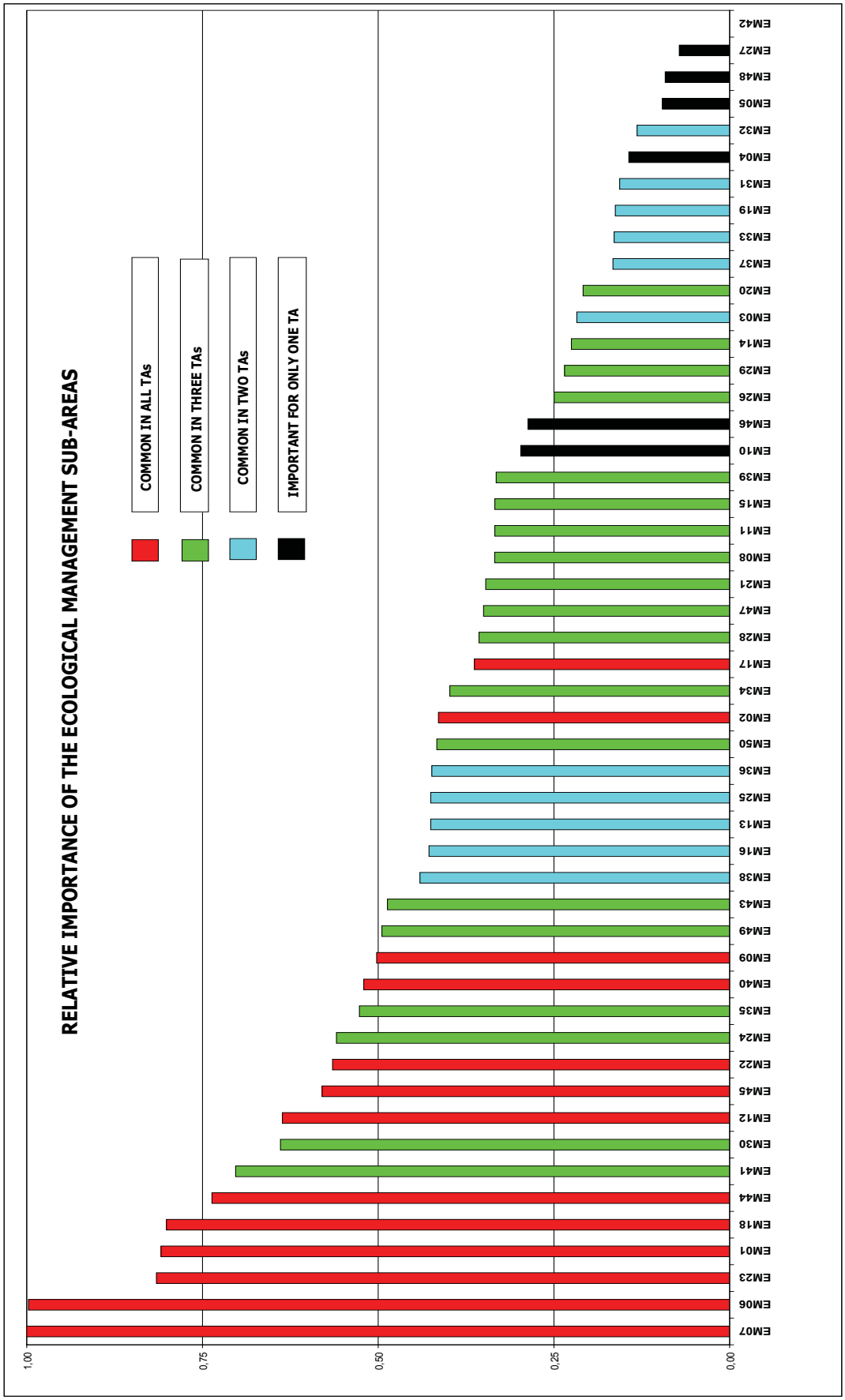
EM29	Change in the microorganisms
EM30	Updating the plans – Cooperation with the Ministry of Environment and Forest
EM31	Recreation– ecotourism
EM32	Restoration
EM33	Potentially hazardous materials for the health
EM34	Aquatic Cultivation – Sustainability – Alternative sources of income
EM35	Wetlands
EM36	Supporting the sustainable use and consumption
EM37	Soil pollution
EM38	Effects of the tourism on biological diversity
EM39	National consciousness of resources
EM40	Information delivery at national and international levels
EM41	Training for the enforcement personnel
EM42	The canons of inheritance
EM43	Wildlife Conservation
EM44	Inventory and control office of the alien species / their effects on the endemic and rare species
EM45	Local participation and local consciousness of resources
EM46	Water Pollution across bank of rivers
EM47	Land use
EM48	Increasing population and poverty
EM49	Waste management
EM50	Hunting Grounds and Hunting Control

Examination of Figure 1 reveals that the sub-areas of

- EM 07 Effective Conservation of the Biological diversity in the Protected Areas and out of the Protected Areas, and Sustainable Use and
- EM 06 Conservation, Management and Use of the Flora and Fauna Gene Resources (in situ, ex situ) are seen to be outstanding.

The sub-areas of

- EM23 Management of the protected areas and capacity building,
- EM 01 Water Pollution across bank of rivers and
- EM18 Flora fauna centers are found second outstanding group.


RELATIVE IMPORTANCE OF THE ECOLOGICAL MANAGEMENT SUB-AREAS
COMMON IN ALL TAs
COMMON IN THREE TAs
COMMON IN TWO TAs
IMPORTANT FOR ONLY ONE TA
1,00
0,75
0,50
0,25
0,00
EM07
EM06
EM23
EM01
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EM04
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EM05
EM48
EM27
EM42

Figure 1.

5.2.2. Thematic areas tendencies in the scope of ecosystems

Consisting of 48 items, Ecological System (ES) Sub-Areas list used in the prioritization studies by participants is given in the Table 5.2 and relative priority order is shown in the Figure 2.

During the prioritization process, items listed in the Table 5.2, have been both correlated by the Thematic Areas and prioritized. In Figure 2, the relative priority rankings and the number of Thematic Areas they are related for each ES area is indicated.

Table 5.2 Ecosystems components

ES01	Streams
ES02	Algae
ES03	Game Animals
ES04	Marshy – turbary areas
ES05	Steppe flora and fauna
ES06	Steppes
ES07	Insect Genetic Resources
ES08	Bush formations
ES09	Meadow Lands
ES10	Livestock and their wild relatives
ES11	Marine meadow
ES12	Deep sea systems
ES13	Industrial Plants
ES14	Broadleaf Forests
ES15	Lakes
ES16	Animal Genetic Resources
ES17	Beaches
ES18	Drought Forests– Central and Eastern Anatolia
ES19	Birds
ES20	Wild relatives of the cultivated plants
ES21	Lagoon estuarine areas
ES22	Meadow
ES23	Orchard
ES24	Microbial and Fungus genetic resources
ES25	Humid Meadows
ES26	Humid – Semi-humid coniferous forests
ES27	Genetic Resources of the Forest tree
ES28	Plant Genetic Resources including grazing lands and meadows
ES29	Vegetable Garden
ES30	Cool climate crops
ES31	Fruit Trees having hard seeds
ES32	Warm climate crops

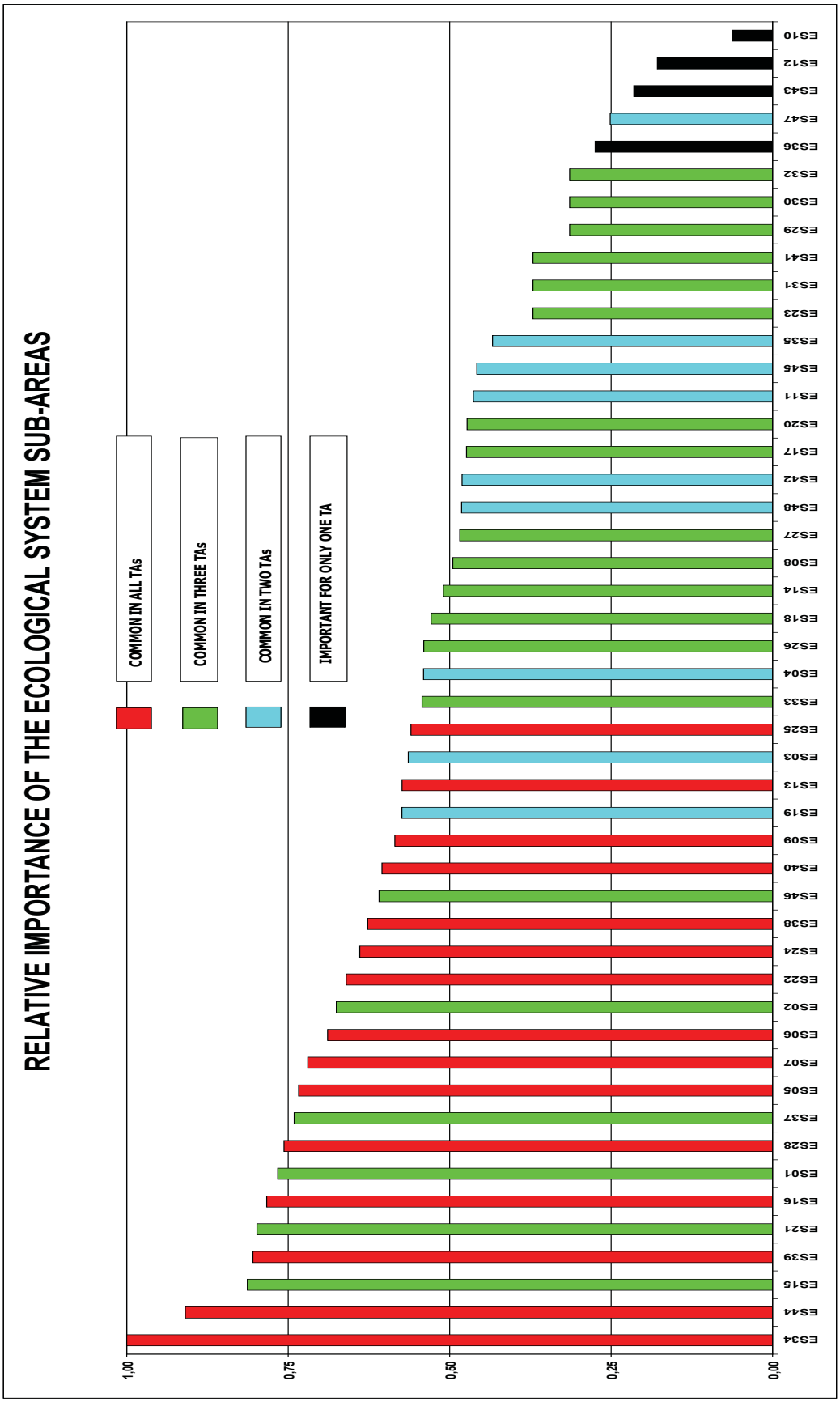
ES33	Steppe Forests
ES34	Fishery Genetic Resources
ES35	Underwater and coastal caves
ES36	Sponge fields
ES37	Reptiles
ES38	Ornamental Plants
ES39	Stony – Rocky Coasts
ES40	Medical Plants
ES41	Citrus Fruit Areas
ES42	Salty Steppes
ES43	Vermitid terraces
ES44	Artificial Lakes and Ponds
ES45	Leaved coniferous forests
ES46	Plateaus
ES47	Grass Plants
ES48	High Mountain Forests

When Figure 2 is analyzed, the following sub-areas are seen as the relatively most important items.

- ES 34 Fishery Genetic Resources
- ES 44 Artificial Lakes and Ponds
- ES 15 Lakes
- ES 39 Stony – Rocky Coasts
- ES 21 Lagoons estuarine areas

and the following sub-areas are observed as a secondary group of a fairly relative importance.

- ES 16 Animal Genetic Resources
- ES 01 Streams
- ES 28 Plant Genetic Resources including grazing lands and meadows
- ES 37 Reptiles
- ES 05 Steppe flora and fauna


RELATIVE IMPORTANCE OF THE ECOLOGICAL SYSTEM SUB-AREAS
COMMON IN ALL TAs
COMMON IN THREE TAs
COMMON IN TWO TAs
IMPORTANT FOR ONLY ONE TA
1,00
0,75
0,50
0,25
0,00
ES34
ES44
ES15
ES39
ES21
ES16
ES01
ES28
ES37
ES05
ES07
ES06
ES02
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ES24
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ES43
ES12
ES10

Figure 2.

5.2.3 Correlation of Ecological Management and Ecologic Systems Sub-Areas

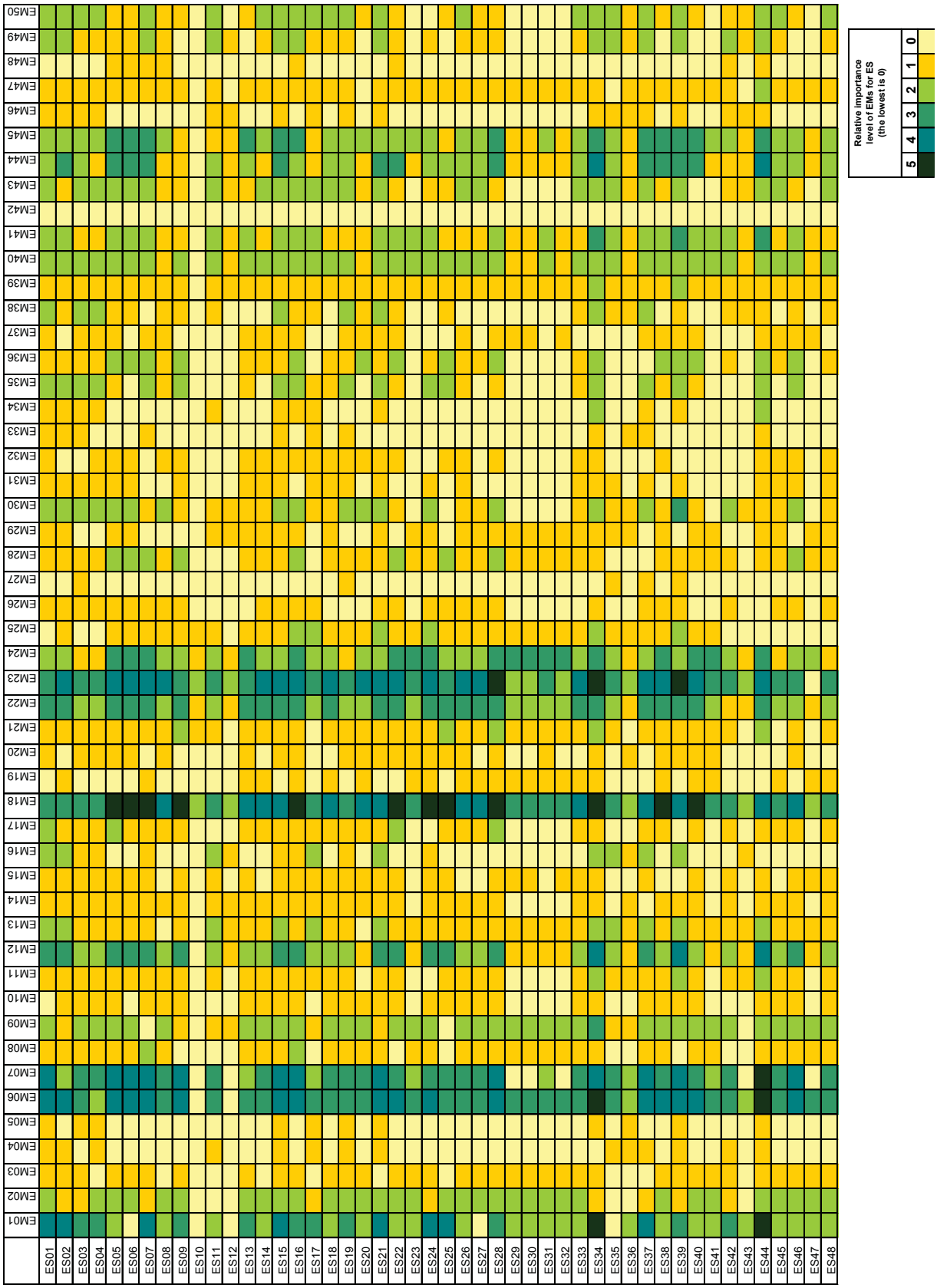


Figure 3

The matrix of Figure 3 has been formed by the participators through grading necessity of Ecological Management (EM) sub-areas for each and every Ecologic System (ES) sub-areas on the 0–5 scale. Grading results, "5 = most important", are shown in Figure 3 as the synthesis of all thematic areas of the biological diversity.

EM sub-areas, the headings of the darker coloured columns, are assessed to be more important than the EM sub-areas, the headings of the lighter coloured columns.

In this context, EM sub-areas which are outstanding within the framework of necessity can be summarized as following:

- EM 18 Flora and fauna centers
- EM 01 Stream banks – Water Pollution
- EM 06 Conservation, Management and Use of the Flora and Fauna Gene Resources (in situ, ex situ)
- EM 07 Effective Conservation of the Biological Diversity in the Protected Areas and out of the Protected Areas, and Sustainable Use
- EM 22 Climate Change
- EM 23 Management of the protected areas and capacity building

5.3. GAP/NEED ANALYSIS

The participants have determined the gaps that need to be filled in achieving priority and strategic targets and these have been reflected on the final NBSAP document as targets and actions. Below is a summary of the gaps. Table 5.3, on the other hand, gives a full account of these gaps.

The lack of qualified personnel in the **human resources** area draws attention. In relation with the strategic targets and actions, the gaps determined are as follows:

- the insufficient number of qualified personnel in the areas of biosafety, genetic resources, information management systems, GIS, modelling, mapping, database, medical plants, taxonomy, climatology, storage, ecology, environmental law; lack of specialized lawyers in the area of international conventions, specialized personnel for the preparation of patent applications, for the recording of genetic resources, carrying out the related transactions, for registration and after-registration transactions, the employment of experts and other personnel in herbariums and mesuems, researchers in the international environmental policy and implementing personnel in the area of alien species;
- the insufficient number and quality of personnel in conducting researches, implementation, monitoring, control and land studies;
- the insufficient number of personnel having appropriate technical equipment and experience for the development of methods and technologies that support the sustainable use of biological resources and reduce the adverse impacts of resource utilization on biological diversity, conducting educational and information studies within a programme, and the introduction of special conservation measures.

The employment policies that lead to interruptions to qualified personnel employment is another significant aspect of human resources area.

With regard to **financial resources**, the insufficiency of resources as well as the unbalanced distribution and ineffective use of resources and the lack of economic incentives draw attention. Stress has been put on the need for additional resources due to the high cost of determination and recording of genetic resources, in particular, and the establishment and maintenance of remote monitoring and display systems. It has been determined that economic incentives are needed in the areas of R&D, the creation of alternative income-generating resources, rehabilitation, the sustainable use of meadows, the expansion of effective irrigation methods, and the compensation of treatment plant costs.

With regard to the **infrastructure**, although different needs are determined for the target groups, it has been observed that the infrastructure needs play a key role in achieving the targets of determination of genetic resources, their protection and recording. To this end, the need to modernize the existing research infrastructure and gene banks and increase their capacities appears to be prominent.

With regard to the **legislation**, while gaps have been determined in some areas, some have shown implementation and sanctionary deficiencies. Biosafety, the utilization of genetic resources and benefit-sharing, alien species, micro-organizms, steppe conservation zones, and coastal and marine conservation zones are the main areas where legislation gap is seen. The areas needing coherence, implementation and sanctionary measures are mainly concentrated under the planning and sustainable use targets.

With regard to the **institutional structure**, the lack of cooperation and coordination is significant. Therefore, the NBSAP defines targets and actions for achieving cooperation and coordination and institutionalization of both. A need for new institutional structure has been a case only in the areas of biosafety and genetic resources. For the other areas, the existing institutional structure appears to be capable of meeting the needs when the task definitions become clearer and the capacity is strengthened.

2nd National Working Group Meeting, 5-8 April 2007, Antalya

Table 5.3. Gap Analysis

	HUMAN RESOURCES				FINANCIAL RES.			INFRASTRUCTURE				LEGISLATION				INSTITUTIONAL STR.			
TARGET	NUMBER OF PERSONNEL	QUALITY OF PERSONNEL	TRAINING OF PERSONNEL	EMPLOYMENT POLICIES	LACK OF RESOURCES	INEFFECTIVE UTILIZATION	APPLICATION DIFFICULTY OF BIDDING PROCEDURES *	LABORATORIES	EQUIPMENTS AND CHEMICALS FOR ANALYSIS	EQUIPMENTS FOR FIELD STUDIES	INFORMATION SYSTEMS	INCONSISTENCIES IN LEGISLATION	LACK OF LEGISLATION	LACK OF ENFORCEMENT	LACK OF PUNISHMENT	LACK OF COMMUNICATION AND COORDINATION	LACK OF RELEVANT INSTITUTION	DUBLICATED OR UNCERTAIN TORs	LACK OF CAPACITY
INVENTORY		x		x	x	x	x			x	x					x		x	
MONITORING	x	x		x	x	x				x	x			x		x		x	
RESEARCH & DEVELOPMENT		x		x	x	x		x	x							x			
INFORMATION MANAGEMENT		x	x	x		x					x		x			x			x
DESIGNATION OF PROTECTED AREAS		x								x			x**			x		x	
MANAGEMENT OF PROTECTED AREAS	x	x	x	x		x	x			x	x	x				x		x	
PUBLIC AWARENESS AND PARTICIPATION		x				x										x			
IMPLEMENTATION OF MEASURES FOR CONSERVATION AND SUSTAINABLE USE	x	x	x	x	x	x					x	x			x	x			x
REHABILITATION		x	x		x	x								x	x	x			
ALIEN SPECIES		x	x		x						x		x	x		x			x
LMO's (BIOSAFETY)		x			x			x					x				x		
EMERGENCY CASE MANAGEMENT		x	x	x	x									x		x			x
WASTE TREATMENT			x		x	x			x					x		x			
CLIMATE CHANGE ***		x	x	x	x					x	x					x			
STRATEGICAL ENVIRONMENTAL IMPACT ASSESSMENT		x	x			x					x			x					
ECOSYSTEM BASED PLANNING		x		x		x				x	x	x		x		x		x	
INCENTIVES					x	x							x			x			x
SECTORAL INTEGRATION		x	x	x		x						x		x	x	x			
IDENTIFICATION OF GENETIC RESOURCES		x	x	x	x	x		x	x							x		x	
REGISTRATION OF GENETIC RESOURCES		x	x	x	x			x	x		x		x			x	x		x
IN-SITU CONSERVATION AND MANAGEMENT OF GENETIC RESOURCES	x	x	x	x	x	x				x	x		x			x		x	
EX-SITU CONSERVATION AND MANAGEMENT OF GENETIC RESOURCES		x	x	x	x	x		x	x					x		x			x
TRADITIONAL KNOWLEDGE		x			x						x		x			x			
BENEFIT SHARING		x	x		x								x			x			x

* timing and period of bidding procedures causes delays in field studies which may resulting in missing vegetation periods

** legislative gaps have been determined in designation of protected areas for genetic diversity centers, steppe ecosystems and marine-coastal areas

*** considered in the scope of determination and monitoring of impacts of climate change on biological diversity

6. NATIONAL BIOLOGICAL DIVERSITY STRATEGY AND ACTION PLAN

6.1. GOALS AND OBJECTIVES

Starting from the state of biological diversity in Turkey, tendencies and gap analysis, 10 goals have been defined under the three broad objectives of the Biological Diversity Convention. Three of these goals are the priority goals adopted by all the thematic groups and therefore they cover all the thematic areas. As the common objectives of thematic areas, the strategic objectives have been combined under those three goals and the critical actions needed to achieve the objectives have been identified.

Under the remaining six goals, the priority objectives of each thematic area as well as those objectives that should be dealt with under the related thematic area to achieve common objectives have been listed. Under those objectives specific to thematic areas, the actions that support both thematic area objectives and common objectives have been identified. When formulating those actions, the actions for capacity building have been included, too, considering the needs determined at the gap analysis. The relevance of the actions under thematic areas to common objectives is indicated in a tabulated form.

The tenth goal specifically aims to find a solution to cooperation and coordination problems. The capacity needs, which have been determined at the gap analysis and will play a key role in the implementation of NBSAP, have been made a part of the actions under the tenth goal.Table 6.1 gives goals and objectives collectively.

Based on the examination of priority objectives under at least three thematic areas, the issues below appear to have a strategic importance in achieving the goals of the Biological diversity Convention:

- The identification of important indicator species for biological diversity and the building up of an inventory of species and populations as well as ecosystems, and the effective implementation of the monitoring and classification system;
- The identification, recording, protection and management of components of genetic diversity which have importance in terms of biological diversity, agriculture, food and economic value
- Setting up a central information management system, by which the research results are shared in such a way as to allow the implementation of those results by decision-makers, users and other stakeholders and the biological and biophysical data is rapidly analysed and distributed;
- The development of special conservation measures by giving priority to the ecosystems that are either sensitive or under threat or endangered, to the classification categories which saw the least number of studies, to the classification categories having an economic value, to the areas with high level diversity, and to the areas that are most harmed from both rural and urban development and the damages of human origin.
- The identification of the impacts of climate change on biological diversity, the monitoring of those impacts, and taking measures to protect the most affected ecosystems and species;
- The identification and conservation of the unique and sensitive mountain ecosystems, of other biological diversity hot points and accompanying species;
- The establishment of relations and coordination between the implementation processes of the National Biological diversity Strategy, agricultural strategies or the other related national initiatives like national plans;
- The promotion of the sustainable use of biological resources and the removal or minimising of the adverse impacts of resource use on biological diversity.

Table 6.1. NBSAP's Goals and Objectives

GOAL	OBJECTIVE
1. To identify, protect and monitor biological diversity components which have importance for Turkey	**1.1.** In order to determine and monitor any changes in ecosystems, species and genetic diversity, to develop and implement biological diversity inventory and monitoring methods and programmes, by considering rapid assessment methods and biological diversity indicators, as well **1.2.** To include the less-represented ecosystems, species and genetic diversity centres into protected areas of both terrestrial and aquatic ecosystems, and to achieve an effective protected area management **1.3.** To prevent or minimize as far as possible any pressures on and threats to biological diversity
2. To use biological diversity components in a sustainable manner by applying the methods and at a level fitting to their renewal capacity by taking the future generations' needs into account	**2.1.** To establish harmony among legal, administrative and institutional regulations and applications having relevance to the conservation of biological diversity and sustainable use of its components **2.2.** To develop and put into practice the ecosystem-based planning and management systems for the purposes of the biological diversity conservation and the sustainable use of biological resources **2.3.** To raise public awareness and sensitivity concerning the conservation and sustainable use of biological diversity
3. To identify, protect and benefit the components of genetic diversity, including the traditional knowledge, which have importance for Turkey	**3.1** To identify, record, protect and manage the components of genetic diversity which have importance in terms of biological diversity, agriculture, food and economic value **3.2** To control access to genetic resources and guarantee the sharing of the benefits arising out of the utilization of these resources with Turkey
4. To identify, protect and monitor the components of biological diversity which have importance for agricultural biological diversity; to protect genetic resources which have actual and potential values for food and agriculture, and to ensure the sustainable use of such resources; and to ensure the fair and equitable sharing of the benefits arising out of the utilization of genetic resources	**4.1** To identify, protect and monitor the biological diversity elements which have importance for agricultural biological diversity **4.2** To develop management applications and technologies as well as policies which support the positive impacts of agriculture on biological diversity, on one hand, and minimize its adverse impacts, on the other hand, and to increase yield from agricultural ecosystems and its capability to sustain as a source of livelihood **4.3.** To prevent or minimize as far as possible any pressures on and threats to agricultural biological diversity which come from the genetically modified organisms (GMO's) and the alien species **4.4.** To ensure conservation and sustainable use of genetic resources which have actual and potential values for food and agriculture; and to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources

5. To protect steppe biological diversity, to ensure the sustainable use of its components, as well as to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources; and to combat against the loss of steppe biological diversity and the socio-economic results of that}	**5.1.** To fill the information gaps concerning steppe biological diversity **5.2.** To identify ecological, physical and social processes such as grazing, drought, desertification, aridity, salinity, flood, fires, tourism, agricultural transformation or abandonment which have adverse impacts on the biological diversity of steppe ecosystems and mainly on the ecosystem structure and function, and to take measures regarding the above **5.3.** To establish mechanisms and frameworks in order to support the fair and equitable sharing of the benefits from the utilization of the genetic resources of steppe areas
6. To establish an effective monitoring, management and coordination system for the conservation of forest biological diversity and the sustainable use of its components	**6.1.** To develop and put into practice the monitoring programmes for better evaluation of the status and tendency of forest biological diversity **6.2.** To establish appropriate mechanisms for more effective conservation and sustainable use of forest biological diversity
7. To establish an effective monitoring, management and coordination system for the conservation and sustainable use of mountain biological diversity, together with its different ecosystems, pursuing a holistic approach	**7.1.** To effectively implement biological and ecological inventories, monitoring programmes and classification systems **7.2.** To establish appropriate mechanisms for the conservation and sustainable use of sensitive mountain ecosystems
8. To develop and implement effective methods for the conservation of inland waters biological diversity, the maintenance of ecological functions of inland waters ecosystems, and the sustainable use of these ecosystems	**8.1.** To strength technical and institutional capacity for the conservation and sustainable use of inland waters biological diversity **8.2.** To take actions for the conservation and sustainability of inland waters biological diversity and reduce threats to it
9. To develop and implement effective methods for the conservation of coastal and marine biological diversity, the maintenance of ecological functions provided by coastal and marine ecosystems, and the sustainable use of these ecosystems	**9.1.** To strengthen necessary administrative, legal, institutional and technical capacity for the identification, monitoring, conservation and sustainable use of coastal and marine biological diversity **9.2.** To fill the information gaps concerning coastal and marine biological diversity, to identify and put under conservation the areas and species which have importance for biological diversity and are under threat, and to develop and implement monitoring programmes **9.3.** To combat against the threats to coastal and marine biological diversity
10. To establish a mechanism for the implementation of the Biological Diversity Strategy and Action Plan and the follow-up of implementation and reporting	**10.1.** To establish coordination among the relevant institutions as regards the conservation and sustainable use of biological diversity **10.2.** To achieve the integrity and sustainability of financial structure for the identification, conservation and sustainable use of biological diversity

6.2. COMMON STRATEGIC OBJECTIVES FOR THEMATIC AREAS

6.2.1. STRATEGIC OBJECTIVES FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY

GOAL 1: To identify, protect and monitor biological diversity components which have importance for Turkey

Objective 1.1 In order to determine and monitor any changes in ecosystems, species and genetic diversity, to develop and implement biological diversity inventory and monitoring methods and programmes, by considering rapid assessment methods and biological diversity indicators, as well

Strategic actions:

1.1.1. The preparing and putting into practice a plan to compile inventory, data and collection of invertebrates (especially insects), micro organisms and fungi

1.1.2. The preparing and putting into practice a macro-level inventory plan for biological diversity in order to have an interrelated and coordinated works

1.1.3. The identification of reliable and economic biological diversity inventory methods and technologies

1.1.4. Correlation between biological diversity inventory studies and the researches on soil, climate and other issues

1.1.5. The development and use of biological diversity indicators which are expressive, scientifically justifiable, practical and ecosystem-based

1.1.6. The development and implementation of programmes for the monitoring of the ecosystems, species and populations which are under pressure and of the functional relations within ecosystems

1.1.7. In order to identify, classify and store the collected samples scientifically, the strengthening of academic institutions' capacity and the achievement of an effective sharing of the data and information obtained by those institutions

1.1.8. The periodical update of red lists relating to Turkey's species which are either endangered or under threat

Objective 1.2 To include the less-represented ecosystems, species and genetic diversity centres into protected areas of both terrestrial and aquatic ecosystems, and to achieve an effective protected area management

Strategic actions:

1.2.1. The identification and conservation of the unique and sensitive mountain ecosystems, of other biological diversity hot points and the species in those ecosystems in particular the species under threat

1.2.2. The increasing of efforts to protect biological diversity in inland water ecosystems by establishing protection status for the species and ecosystems at risk, endemic species, sensitive breeding areas and representative ecosystems

1.2.3. The designation of special areas in the steppe ecosystems which are especially important for biological diversity and/or are specifically under threat, and establishing protection status for these areas

1.2.4. The establishment and maintenance of marine and coastal protected areas which are managed efficiently and are ecology-based

1.2.5. The development of policies and taking regulatory actions which will support the designation and management of the protected areas consulting with the related stakeholders, and devising inventories, plans, monitoring programmes and taking other appropriate measures in that regard

1.2.6. The maintenance of the integrity of the protected areas and minimizing the impacts of human activities on the biological diversity within and around the protected areas by exchanging views with land owners, local authorities and the related bodies

1.2.7. The training of the staff from governmental agencies who may involve with the management of the protected areas in order to enable them to analyze scientific data and relate that data with plans and policies

Objective 1.3 To prevent or minimize as far as possible any pressures on and threats to biological diversity

Strategic actions:

1.3.1. The development of special conservation measures by giving priority to the ecosystems that are either sensitive or under threat or endangered, to the classification categories which have the least number of studies and have an economic value, to the areas with high level diversity, and to the areas that are most harmed from both rural and urban development and the human based damages

1.3.2. Increasing the efforts to identify and to eliminate or decrease to an acceptable level the cumulative environmental changes caused by human impacts in ecosystems, species and genetic diversity

1.3.3. The development of rehabilitation programmes, techniques and technologies for the species either endangered or under threat, or for the degraded ecosystems, using such objective criteria as the ecological and habitat needs of the species at risk, and the implementation of the above and evaluation of their success

1.3.4. Taking appropriate legal and institutional measures, including the improvement of human resources, for the identification of the alien species that are introduces or most probably will be introduced into Turkey, the prevention of the introduction of invasive alien species, the determination of any possible adverse impacts of them on biological diversity and the elimination and control of those impacts

1.3.5. Increasing the effectiveness of the legal sanctions for the control of the entry/exit of the GMO's to Turkey, and the establishment of inspection standards and other related mechanisms including risk assessment and management

1.3.6. Devising plans to prevent the environmental disasters and to take urgent measures in situations in which great risks to biological diversity might occur

1.3.7. The identification of the impacts of climate change on biological diversity, the monitoring of those impacts, and taking measures to protect the most affected ecosystems and species

	Table 6.2.1. Time Schedule for Goal 1	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1.1.1.	The preparing and putting into practice a plan to compile inventory, data and collection of invertebrates (especially insects), micro organisms and fungi										
1.1.2.	The preparing and putting into practice a macro-level inventory plan for biological diversity in order to have an interrelated and coordinated works										
1.1.3.	The identification of reliable and economic biological diversity inventory methods and technologies										
1.1.4.	Correlation between biological diversity inventory studies and the researches on soil, climate and other issues										
1.1.5.	The development and use of biological diversity indicators which are expressive, scientifically justifiable, practical and ecosystem-based										
1.1.6.	The development and implementation of programmes for the monitoring of the ecosystems, species and populations which are under pressure and of the functional relations within ecosystems										
1.1.7.	In order to identify, classify and store the collected samples scientifically, the strengthening of academic institutions' capacity and the achievement of an effective sharing of the data and information obtained by those institutions										
1.1.8.	The periodical update of red lists relating to Turkey's species which are either endangered or under threat										
1.2.1	The identification and conservation of the unique and sensitive mountain ecosystems, of other biological diversity hot points and the species in those ecosystems in particular the species under threat										
1.2.2	The increasing of efforts to protect biological diversity in inland water ecosystems by establishing protection status for the species and ecosystems at risk, endemic species, sensitive breeding areas and representative ecosystems										
1.2.3	The designation of special areas in the steppe ecosystems which are especially important for biological diversity and/or are specifically under threat, and establishing protection status for these areas										
1.2.4	The establishment and maintenance of marine and coastal protected areas which are managed efficiently and are ecology-based										
1.2.5	The development of policies and taking regulatory actions which will support the designation and management of the protected areas consulting with the related stakeholders, and devising inventories, plans, monitoring programmes and taking other appropriate measures in that regard										
1.2.6	The maintenance of the integrity of the protected areas and minimizing the impacts of human activities on the biological diversity within and around the protected areas by exchanging views with land owners, local authorities and the related bodies										
1.2.7	The training of the staff from governmental agencies who may involve with the management of the protected areas in order to enable them to analyze scientific data and relate that data with plans and policies										
1.3.1	The development of special conservation measures by giving priority to the ecosystems that are either sensitive or under threat or endangered, to the classification categories which have the least number of studies and have an economic value, to the areas with high level diversity, and to the areas that are most harmed from both rural and urban development and the human based damages										
1.3.2	Increasing the efforts to identify and to eliminate or decrease to an acceptable level the cumulative environmental changes caused by human impacts in ecosystems, species and genetic diversity										
1.3.3	The development of rehabilitation programmes, techniques and technologies for the species either endangered or under threat, or for the degraded ecosystems, using such objective criteria as the ecological and habitat needs of the species at risk, and the implementation of the above and evaluation of their success										
1.3.4	Taking appropriate legal and institutional measures, including the improvement of human resources, for the identification of the alien species that are introduces or most probably will be introduced into Turkey, the prevention of the introduction of invasive alien species, the determination of any possible adverse impacts of them on biological diversity and the elimination and control of those impacts										
1.3.5	Increasing the effectiveness of the legal sanctions for the control of the entry/exit of the GMO's to Turkey, and the establishment of inspection standards and other related mechanisms including risk assessment and management										
1.3.6	Devising plans to prevent the environmental disasters and to take urgent measures in situations in which great risks to biological diversity might occur										
1.3.7	The identification of the impacts of climate change on biological diversity, the monitoring of those impacts, and taking measures to protect the most affected ecosystems and species										

6.2.2 STRATEGIC OBJECTIVES FOR SUSTAINABLE USE

GOAL 2: To use biological diversity components in a sustainable manner by applying the methods and at a level fitting to their renewal capacity by taking the future generations' needs into account

Objective 2.1 To establish harmony among legal, administrative and institutional regulations and applications having relevance to the conservation of biological diversity and sustainable use of its components

Strategic actions:

2.1.1. The identification of any inharmoniousness between biological diversity related legislation and other regulatory measures to eradicate authority chaos and repetitions and to fill the gaps, and taking actions to harmonize them

2.1.2. Reviewing important sector policies and programmes such as agriculture, water, energy, trade and initiating attempts to set up ecologic, economic, social and cultural objectives agreeing with each other

2.1.3. Making arrangements to include the issues of biological diversity conservation and the sustainable use of natural resources into the selection and evaluation criteria of development projects

2.1.4. The development and the implementation of appropriate socio-economic policies and incentives as a way of biological diversity conservation, the sustainable use of biological resources and the development of new sustainable use patterns for biological resources

2.1.5. The examination of the effects of the recommended biological diversity conservation policies and programmes on economic actions and taking measures which will enhance their positive effects on the economy, on one hand, and will minimize their adverse effects on it, on the other hand

2.1.6. The search, development and use of alternative management tools to urge the integration of the Biological Diversity Strategy and Action Plan with development plans and for the integration of social, cultural and economic targets with nature conservation targets and for the sustainable and rational use of water resources

Objective 2.2 To develop and put into practice the ecosystem-based planning and management systems for the purposes of the biological diversity conservation and the sustainable use of biological resources

Strategic actions:

2.2.1. The examination and modeling of the benefits, functions and components of ecosystems

2.2.2. Rising the knowledge about the species, the status of their populations, their genetic diversities and ecological relationships by way of scientific studies in order to develop an ecosystem-based planning and management

2.2.3. Searching new and sustainable usage patterns for economic applications relevant with biological resources

2.2.4. The development of methods and technologies which support the sustainable use of biological resources and the removal or minimizing of the adverse impacts of resource use on biological diversity

2.2.5. The development of methods for the prevention of the release into the nature of substances which are harmful to ecosystems, species and genetic resources or the release of those substances in amounts harmful to them, and the support of the attempts towards this

2.2.6. Taking measures to guarantee the sustainable harvesting and collection of the wild flora and fauna species and to minimize the adverse impacts of harvest on the other species, and the implementation of those measures

2.2.7. The development of programmes to encourage more effective involvement of the private sector in the efforts for the sustainable use of biological resources

2.2.8. The development and putting into practice of training and awareness programmes for policy-makers, land owners, runners, resource managers and other parties interested in the management, improvement and use of biological resources to provide them with the current information as well as the information on methods and technologies

2.2.9. Increasing knowledge level of public staff about Turkey's biological diversity and raising their awareness concerning species conservation, as well as the training of them about statistical data analysis and evaluation areas

Objective 2.3 To raise public awareness and sensitivity concerning the conservation and sustainable use of biological diversity

Strategic actions:

2.3.1. The inclusion of the subjects and texts on biological diversity conservation and the sustainable use of biological resources into the national education curricula

2.3.2. The evaluation and monitoring of the knowledge and awareness level of public about biological diversity conservation and the sustainable use of biological resources in order to be able to devise and target efficient education and awareness programmes

2.3.3. The enhancement of coordination and effectiveness of education and information programmes by strengthening the relationships among education institutions, governmental agencies, private land owners, non-governmental organizations and business and industrial sectors

2.3.4. The dissemination of the education materials urging those measures that can be taken to prevent or reduce the adverse impacts on ecosystem and biological resources

	Table 6.2.1. Time Schedule for Goal 2	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
2.1.1	The identification of any inharmoniousness between biological diversity related legislation and other regulatory measures to eradicate authority chaos and repetitions and to fill the gaps, and taking actions to harmonize them										
2.1.2	Reviewing important sector policies and programmes such as agriculture, water, energy, trade and initiating attempts to set up ecologic, economic, social and cultural objectives agreeing with each other										
2.1.3	Making arrangements to include the issues of biological diversity conservation and the sustainable use of natural resources into the selection and evaluation criteria of development projects										
2.1.4	The development and the implementation of appropriate socio-economic policies and incentives as a way of biological diversity conservation, the sustainable use of biological resources and the development of new sustainable use patterns for biological resources										
2.1.5	The examination of the effects of the recommended biological diversity conservation policies and programmes on economic actions and taking measures which will enhance their positive effects on the economy, on one hand, and will minimize their adverse effects on it, on the other hand										
2.1.6	The search, development and use of alternative management tools to urge the integration of the Biological Diversity Strategy and Action Plan with development plans and for the integration of social, cultural and economic targets with nature conservation targets and for the sustainable and rational use of water resources										
2.2.1	The examination and modeling of the benefits, functions and components of ecosystems										
2.2.2	Rising the knowledge about the species, the status of their populations, their genetic diversities and ecological relationships by way of scientific studies in order to develop an ecosystem-based planning and management										
2.2.3	Searching new and sustainable usage patterns for economic applications relevant with biological resources										
2.2.4	The development of methods and technologies which support the sustainable use of biological resources and the removal or minimizing of the adverse impacts of resource use on biological diversity										
2.2.5	The development of methods for the prevention of the release into the nature of substances which are harmful to ecosystems, species and genetic resources or the release of those substances in amounts harmful to them, and the support of the attempts towards this										
2.2.6.	Taking measures to guarantee the sustainable harvesting and collection of the wild flora and fauna species and to minimize the adverse impacts of harvest on the other species, and the implementation of those measures										
2.2.7.	The development of programmes to encourage more effective involvement of the private sector in the efforts for the sustainable use of biological resources										
2.2.8.	The development and putting into practice of training and awareness programmes for policy-makers, land owners, runners, resource managers and other parties interested in the management, improvement and use of biological resources to provide them with the current information as well as the information on methods and technologies										
2.2.9	Increasing knowledge level of public staff about Turkey's biological diversity and raising their awareness concerning species conservation, as well as the training of them about statistical data analysis and evaluation areas										
2.3.1.	The inclusion of the subjects and texts on biological diversity conservation and the sustainable use of biological resources into the national education curricula										
2.3.2.	The evaluation and monitoring of the knowledge and awareness level of public about biological diversity conservation and the sustainable use of biological resources in order to be able to devise and target efficient education and awareness programmes										
2.3.3.	The enhancement of coordination and effectiveness of education and information programmes by strengthening the relationships among education institutions, governmental agencies, private land owners, non-governmental organizations and business and industrial sectors										
2.3.4.	The dissemination of the education materials urging those measures that can be taken to prevent or reduce the adverse impacts on ecosystem and biological resources										

6.2.3 STRATEGIC OBJECTIVES FOR THE CONSERVATION AND USE OF GENETIC RESOURCES

GOAL 3: To identify, protect and benefit the components of genetic diversity, including the traditional knowledge, which have importance for Turkey

Objective 3.1 To identify, record, protect and manage the components of genetic diversity which have importance in terms of biological diversity, agriculture, food and economic value

Strategic actions:

3.1.1. The identification and recording of plant genetic diversity in particular the target species and local varieties specified in the National Plan on in-situ Conservation of Plant Genetic Diversity of Turkey and for the purposes of optimum protection and economic utilization of genetic resources

3.1.2. The putting into practice the required programmes for the in-situ conservation and management of herbaceous and ligneous plants' genetic diversity, taking also into account the National Plan on in-situ Conservation of Plant Genetic Diversity of Turkey

3.1.3. The ex-situ conservation and recording of herbaceous and ligneous plant genetic diversity and the establishment of a national botanic garden and seed and clone gene banks and maintaining the existing ones

3.1.4. The identification and recording of the genetic diversity of both the terrestrial and aquatic fauna species

3.1.5. The putting into practice programmes for the in-situ conservation and management of the terrestrial and aquatic fauna species which have importance in terms of biological diversity, agriculture, food and economic value

3.1.6. The establishment of gene banks for the terrestrial and aquatic fauna species which have importance in terms of biological diversity, agriculture, food and economic value

Objective 3.2 To control access to genetic resources and guarantee the sharing of the benefits arising out of the utilization of these resources with Turkey

Strategic actions:

3.2.1. Determination and putting into practice the measures to prevent any unauthorized and uncontrolled gathering and illegal export (bio-smuggling) of biological resources

3.2.2. Taking measures to prevent the unauthorized gathering of biological resources from the nature

3.2.3. The determination of and putting into practice the mechanisms for the collection, recording and protection of traditional knowledge, for the joint application of any innovation and practices related to traditional knowledge with owners of such information, and for the equitable sharing of the benefits from traditional knowledge

3.2.4. Searching and development of national tools by which the sharing of the benefits from the use of the genetic resources coming from foreign countries with the origin country as well of the benefits arising out of the utilization of the genetic resources going to foreign countries with Turkey is guaranteed, and the establishment of cooperation at the international level for this

	Table 6.2.3. Time Schedule for Goal 3	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
3.1.1.	The identification and recording of plant genetic diversity in particular the target species and local varieties specified in the National Plan on in-situ Conservation of Plant Genetic Diversity of Turkey and for the purposes of optimum protection and economic utilization of genetic resources										
3.1.2.	The putting into practice the required programmes for the in-situ conservation and management of herbaceous and ligneous plants' genetic diversity, taking also into account the National Plan on in-situ Conservation of Plant Genetic Diversity of Turkey										
3.1.3.	The ex-situ conservation and recording of herbaceous and ligneous plant genetic diversity and the establishment of a national botanic garden and seed and clone gene banks and maintaining the existing ones										
3.1.4.	The identification and recording of the genetic diversity of both the terrestrial and aquatic fauna species										
3.1.5.	The putting into practice programmes for the in-situ conservation and management of the terrestrial and aquatic fauna species which have importance in terms of biological diversity, agriculture, food and economic value										
3.1.6.	The establishment of gene banks for the terrestrial and aquatic fauna species which have importance in terms of biological diversity, agriculture, food and economic value										
3.2.1.	Determination and putting into practice the measures to prevent any unauthorized and uncontrolled gathering and illegal export (bio-smuggling) of biological resources										
3.2.2.	Taking measures to prevent the unauthorized gathering of biological resources from the nature										
3.2.3.	The determination of and putting into practice the mechanisms for the collection, recording and protection of traditional knowledge, for the joint application of any innovation and practices related to traditional knowledge with owners of such information, and for the equitable sharing of the benefits from traditional knowledge										
3.2.4.	Searching and development of national tools by which the sharing of the benefits from the use of the genetic resources coming from foreign countries with the origin country as well of the benefits arising out of the utilization of the genetic resources going to foreign countries with Turkey is guaranteed, and the establishment of cooperation at the international level for this										

6.3 ACTIONS REGARDING STRATEGIC OBJECTIVES SPECIFIC TO THEMATIC AREAS

6.3.1 Agricultural Biological diversity

GOAL 4: To identify, protect and monitor the components of biological diversity which have importance for agricultural biological diversity; to protect genetic resources which have actual and potential values for food and agriculture, and to ensure the sustainable use of such resources; and to ensure the fair and equitable sharing of the benefits arising out of the utilization of genetic resources

Objective 4.1 To identify, protect and monitor the biological diversity elements which have importance for agricultural biological diversity

Strategic actions:

4.1.1. The identification of both micro- and macro-organisms in soil biota

4.1.2. Devising a programme for the identification, monitoring, conservation, improvement and sustainable use of pollinator diversity in both agricultural and related ecosystems, and putting to work the programme

4.1.3. The identification of the threatened species and their distribution in agricultural ecosystems, and the scheduled monitoring of them

4.1.4. The identification of indicator species for the monitoring of agricultural biological diversity

4.1.5. Relating agricultural biological diversity inventories with the other inventories from the areas connected with agricultural ecosystems and with soil, climate and such abiotic factors as them using the Geographical Information System, a method which allows fast analysis, and transferring those inventories to biological diversity information management system

4.1.6. Devising on-farm conservation programmes which will promote and facilitate the keeping of the wild flora and fauna species as well as local varieties and races by farmers, and putting to work those programmes

4.1.7. The identification and putting into practice of management applications, technologies and policies for the prevention or reduction of the adverse impacts of different sectors on agricultural biological diversity

Objective 4.2 To develop management applications and technologies as well as policies which support the positive impacts of agriculture on biological diversity, on one hand, and minimize its adverse impacts, on the other hand, and to increase yield from agricultural ecosystems and its capability to sustain as a source of livelihood

Strategic actions:

4.2.1. The development of methods and measures for the reduction of the impact of excessive and wrong agricultural inputs on the beneficial populations and for more effective agricultural input use, and the implementation of those methods and measures

4.2.2. The development of technologies for the conservation and sustainable use of agricultural biological diversity and/or the adaptation of the existing ones to the Country's conditions

4.2.3. The promotion of researches and education programmes for the raising of awareness and increasing the knowledge level about the goods and services of agricultural biological diversity and for the expansion of the sustainable agricultural practices which reduce soil erosion as well as water, soil and air pollution

4.2.4. The integration of the measures for the conservation of soil biological diversity, which plays an important role in maintaining agricultural ecosystems, with land and soil management practices

4.2.5. The promotion of the involvement of agricultural producers with the management plans which support biological diversity conservation and the sustainable use of biological resources

4.2.6. The maintenance, adjustment and improvement of economic incentives for the sustainable use of biological resources and the conservation of biological diversity

Objective 4.3. To prevent or minimize as far as possible any pressures on and threats to agricultural biological diversity which come from the genetically modified organisms (GMO's) and the alien species

Strategic actions:

4.3.1. The promotion of researches with a view to unveiling methods for and approaches to the determination of the possible adverse impacts of GMO's on biological diversity

4.3.2. Setting up a national biosafety information management and monitoring system, which will allow the follow-up and determination of any GMO's entry to Turkey

4.3.3. The enhancement of the required legal, institutional and technical capacity for the regulation, control and monitoring of the activities related with GMO's and products thereof

4.3.4. The development and promotion of researches for the determination of the effects

of alien species on the natural species and the methods for the prevention of such adverse effects

4.3.5. The collection of information about the invasive alien species which are introduced or most probably will enter to Turkey, and the monitoring of those species

Objective 4.4. To ensure conservation and sustainable use of genetic resources which have actual and potential values for food and agriculture; and to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources

Strategic actions:

4.4.1. The strengthening of technical, institutional and financial capacity, including human resources and infrastructure need, for the identification and recording of flora and fauna genetic resources

4.4.2. The establishment of land gene banks to support the ex-situ and in-situ conservation and sustainable use of flora and fauna genetic resources

4.4.3. The enhancement of the capacity of genetics laboratories to take fingerprints of flora and fauna genetic resources and recording of them, and building a national flora and fauna genetic resources database

4.4.4. Setting up and enforcement of the legal and institutional system to guarantee the sharing with Turkey of the benefits from the use of genetic resources provided by Turkey to other countries

4.4.5. The identification and operation of the mechanisms which will allow the collection, maintenance and use of traditional knowledge

4.4.6. The conservation of fauna, flora and microbiological genetic resources which play fundamental role in agriculture, by giving priority to the genetic materials under threat

Table 6.3.1.a Correlation of agricultural biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
4.1.1	Soil biota	↗				↗			
4.1.2	Pollinator diversity	↗	↗	↗		↗	↗	↗	↗
4.1.3	Endangered species	↗		↗		↗		↗	
4.1.4	Monitoring-indicator species	↗							
4.1.5	Data analysis	↗		↗	↗	↗	↗		
4.1.6	On-farm conservation		↗	↗		↗	↗	↗	↗
4.1.7	impacts on agricultural biological diversity			↗	↗	↗		↗	
4.2.1	Agricultural inputs			↗		↗	↗		
4.2.2	Development of technologies	↗		↗		↗	↗	↗	
4.2.3	Sustainable agricultural practices			↗		↗	↗		
4.2.4	Conservation of soil biological diversity			↗	↗	↗			
4.2.5	Involvement of agricultural producers in the management plans			↗		↗	↗		
4.2.6	Incentive measures			↗	↗	↗			
4.3.1	Researches on impacts of GMOs			↗	↗	↗		↗	
4.3.2	National biosafety information management and monitoring system	↗		↗		↗	↗	↗	
4.3.3	Legal, institutional and technical capacity with regard to biosafety			↗	↗	↗	↗	↗	
4.3.4	Methods on effects of alien species		↗	↗		↗		↗	
4.3.5	Monitoring og invasive alien species	↗	↗	↗					
4.4.1	Capacity for the identification and recording of genetic resources	↗	↗					↗	↗
4.4.2	Land gene banks		↗	↗				↗	
4.4.3	Genetics laboratories genetic resources database	↗	↗			↗		↗	↗
4.4.4	Benefit sharing		↗	↗				↗	↗
4.4.5	Traditional knowledge		↗	↗				↗	↗
4.4.6	Conservation of genetic resources	↗	↗					↗	↗

	Table 6.3.1.b Time Schedule for Agricultural Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
4.1.1	The identification of both micro- and macro-organisms in soil biota										
4.1.2	Devising a programme for the identification, monitoring, conservation, improvement and sustainable use of pollinator diversity in both agricultural and related ecosystems, and putting to work the programme										
4.1.3	The identification of the threatened species and their distribution in agricultural ecosystems, and the scheduled monitoring of them										
4.1.4	The identification of indicator species for the monitoring of agricultural biological diversity										
4.1.5	Relating agricultural biological diversity inventories with the other inventories from the areas connected with agricultural ecosystems and with soil, climate and such abiotic factors as them using the Geographical Information System, a method which allows fast analysis, and transferring those inventories to biological diversity information management system										
4.1.6	Devising on-farm conservation programmes which will promote and facilitate the keeping of the wild flora and fauna species as well as local varieties and races by farmers, and putting to work those programmes										
4.1.7	The identification and putting into practice of management applications, technologies and policies for the prevention or reduction of the adverse impacts of different sectors on agricultural biological diversity										
4.2.1	The development of methods and measures for the reduction of the impact of excessive and wrong agricultural inputs on the beneficial populations and for more effective agricultural input use, and the implementation of those methods and measures										
4.2.2	The development of technologies for the conservation and sustainable use of agricultural biological diversity and/or the adaptation of the existing ones to the Country's conditions										
4.2.3	The promotion of researches and education programmes for the raising of awareness and increasing the knowledge level about the goods and services of agricultural biological diversity and for the expansion of the sustainable agricultural practices which reduce soil erosion as well as water, soil and air pollution										
4.2.4	The integration of the measures for the conservation of soil biological diversity, which plays an important role in maintaining agricultural ecosystems, with land and soil management practices										
4.2.5	The promotion of the involvement of agricultural producers with the management plans which support biological diversity conservation and the sustainable use of biological resources										
4.2.6	The maintenance, adjustment and improvement of economic incentives for the sustainable use of biological resources and the conservation of biological diversity										
4.3.1	The promotion of researches with a view to unveiling methods for and approaches to the determination of the possible adverse impacts of GMO's on biological diversity										
4.3.2	Setting up a national biosafety information management and monitoring system, which will allow the follow-up and determination of any GMO's entry to Turkey										
4.3.3	The enhancement of the required legal, institutional and technical capacity for the regulation, control and monitoring of the activities related with GMO's and products thereof										
4.3.4	The development and promotion of researches for the determination of the effects of alien species on the natural species and the methods for the prevention of such adverse effects										
4.3.5	The collection of information about the invasive alien species which are introduced or most probably will enter to Turkey, and the monitoring of those species										
4.4.1	The strengthening of technical, institutional and financial capacity, including human resources and infrastructure need, for the identification and recording of flora and fauna genetic resources										
4.4.2	The establishment of land gene banks to support the ex-situ and in-situ conservation and sustainable use of flora and fauna genetic resources										
4.4.3	The enhancement of the capacity of genetics laboratories to take fingerprints of flora and fauna genetic resources and recording of them, and building a national flora and fauna genetic resources database										
4.4.4	Setting up and enforcement of the legal and institutional system to guarantee the sharing with Turkey of the benefits from the use of genetic resources provided by Turkey to other countries										
4.4.5	The identification and operation of the mechanisms which will allow the collection, maintenance and use of traditional knowledge										
4.4.6	The conservation of fauna, flora and microbiological genetic resources which play fundamental role in agriculture, by giving priority to the genetic materials under threat										

6.3.2. Steppe Biological Diversity

GOAL 5: To protect steppe biological diversity, to ensure the sustainable use of its components, as well as to ensure the fair and equitable sharing of the benefits from the utilization of genetic resources; and to combat against the loss of steppe biological diversity and the socio-economic results of that

Objective 5.1. To fill the information gaps concerning steppe biological diversity

Strategic actions:

5.1.1. The education of people specialized at taxonomy, ecology and genetic areas to be able to build up a steppe biological diversity inventory with the cooperation of education and research institutions, and the organization of those people so that a systematized work can be done

5.1.2. The identification of steppe areas and the special areas which have special importance for biological diversity and/or are especially under threat in steppes and the mapping of them using GIS

5.1.3. The identification of the state of the existing species in steppe ecosystems, the determination of the threats to the existing species and habitats, and the update of the red lists of the endangered species

Objective 5.2. To identify ecological, physical and social processes such as grazing, drought, desertification, aridity, salinity, flood, fires, tourism, agricultural transformation or abandonment which have adverse impacts on the biological diversity of steppe ecosystems and mainly on the ecosystem structure and function, and to take measures regarding the above

Strategic actions:

5.2.1. Building grazing systems based on researches on the carrying capacity of meadows, the rehabilitation of the degraded meadows, and the creation of additional fodder sources

5.2.2. The determination and implementation of economic measures that promote the sustainable use of steppe ecosystems

5.2.3. The collection of steppe biological diversity data and information of different sources and institutions together and then the transfer of them to biological diversity information management system, and devising management plans based on the analysis of the data obtained

5.2.4. The dissemination of research results by means of both printed and visual tools in such a way as to make them understandable and useable by decision-makers, users and other stakeholders

5.2.5. The development of mechanisms for cultivation, controlled production and harvesting of the species which are found in the natural flora and have a high economic value and which are either sensitive or endangered or under threat

5.2.6. The identification of the species that are at risk and whose populations have been decreased, and re-introduction of such species' populations in their own ecosystems

5.2.7. The determination of the species that are supposed to become extinct according to the different climate change scenarios including the rise in temperature, the change in precipitation pattern, and the preservation of the seeds of such species in gene banks

5.2.8. Development of facilitative definitions to determine steppe areas in cadastral surveys

5.2.9. Filling the regulatory gaps regarding the micro-organisms and the protected steppe areas

Objective 5.3. To establish mechanisms and frameworks in order to support the fair and equitable sharing of the benefits from the utilization of the genetic resources of steppe areas

Strategic actions:

5.3.1. The determination of the genetic diversity of the species that are found in steppe ecosystems and are of Turkish origin applying molecular methods, and keeping the records of those species

5.3.2. The identification of Turkey's microbiologic diversity, as well as the establishment of a national microbiologic culture collection centre and the use of it both industrially and scientifically

5.3.3. Promotion of the use of new methods in addition to the traditional ones in order to provide more data on the diversity of micro-organisms, their functional roles in ecosystems and potential economic use

Table 6.3.2.a Correlation of steppe biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
5.1.1	Human resources for inventory studies	↗						↗	
5.1.2	Important steppe areas		↗			↗			
5.1.3	Endangered species	↗	↗	↗		↗		↗	
5.2.1	Meadows and grazing			↗		↗			
5.2.2	Incentive measures			↗	↗	↗		↗	
5.2.3	Collection and analysis of the data	↗	↗			↗		↗	
5.2.4	Dissemination of research results	↗	↗	↗	↗	↗	↗	↗	
5.2.5	Species having economic value		↗	↗	↗	↗		↗	↗
5.2.6	Rehabilitation	↗	↗	↗		↗		↗	
5.2.7	*Ex-situ* conservation	↗		↗				↗	↗
5.2.8	Cadastral surveys		↗	↗	↗	↗		↗	
5.2.9	Regulatory gaps regarding the micro-organisms and the protected steppe areas		↗	↗	↗	↗		↗	
5.3.1	Determination and recording of genetic diversity	↗	↗					↗	↗
5.3.2	Microbiological diversity	↗		↗				↗	↗
5.3.3	Use of micro-organisms			↗				↗	↗

	Table 6.3.2.b Time Schedule for Steppe Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
5.1.1	The education of people specialized at taxonomy, ecology and genetic areas to be able to build up a steppe biological diversity inventory with the cooperation of education and research institutions, and the organization of those people so that a systematized work can be done										
5.1.2	The identification of steppe areas and the special areas which have special importance for biological diversity and/or are especially under threat in steppes and the mapping of them using GIS										
5.1.3	The identification of the state of the existing species in steppe ecosystems, the determination of the threats to the existing species and habitats, and the update of the red lists of the endangered species										
5.2.1	Building grazing systems based on researches on the carrying capacity of meadows, the rehabilitation of the degraded meadows, and the creation of additional fodder sources										
5.2.2	The determination and implementation of economic measures that promote the sustainable use of steppe ecosystems										
5.2.3	The collection of steppe biological diversity data and information of different sources and institutions together and then the transfer of them to biological diversity information management system, and devising management plans based on the analysis of the data obtained										
5.2.4	The dissemination of research results by means of both printed and visual tools in such a way as to make them understandable and useable by decision-makers, users and other stakeholders										
5.2.5	The development of mechanisms for cultivation, controlled production and harvesting of the species which are found in the natural flora and have a high economic value and which are either sensitive or endangered or under threat										
5.2.6	The identification of the species that are at risk and whose populations have been decreased, and re-introduction of such species' populations in their own ecosystems										
5.2.7	The determination of the species that are supposed to become extinct according to the different climate change scenarios including the rise in temperature, the change in precipitation pattern, and the preservation of the seeds of such species in gene banks										
5.2.8	Development of facilitative definitions to determine steppe areas in cadastral surveys										
5.2.9	Filling the regulatory gaps regarding the micro-organisms and the protected steppe areas										
5.3.1	The determination of the genetic diversity of the species that are found in steppe ecosystems and are of Turkish origin applying molecular methods, and keeping the records of those species										
5.3.2	The identification of Turkey's microbiologic diversity, as well as the establishment of a national microbiologic culture collection centre and the use of it both industrially and scientifically										
5.3.3	Promotion of the use of new methods in addition to the traditional ones in order to provide more data on the diversity of micro-organisms, their functional roles in ecosystems and potential economic use										

6.3.3. Forest Biological diversity

GOAL 6: To establish an effective monitoring, management and coordination system for the conservation of forest biological diversity and the sustainable use of its components

Objective 6.1. To develop and put into practice the monitoring programmes for better evaluation of the status and tendency of forest biological diversity

Strategic actions:

6.1.1. The update of the information on the species which are found in forest ecosystems and which are either sensitive or under threat or endangered, and the transfer of the information so updated to the central biological diversity information management system

6.1.2. The identification of forest ecosystems that are under pressure and the classification of them by the degree of threat to them

6.1.3. The monitoring of the ecosystems, species and populations that are under pressure in a programme integrating biotic and abiotic parameters

6.1.4. Making research results and the information obtained from the monitoring programme available to decision-makers, users and other stakeholders so that the status and tendencies of forest biological diversity can be better evaluated

Objective 6.2. To establish appropriate mechanisms for more effective conservation and sustainable use of forest biological diversity

Strategic actions:

6.2.1. The strengthening of the administrative and logistic infrastructure for the designation of new protected areas in forest ecosystems starting from the priority ecosystems and hot points, and for the finalization of the management plans of the existing protected areas and their effective management

6.2.2. The training of General Directorate of Forestry staff in the areas comprising ecosystem-based management, sustainable use, inventory methods, monitoring, data management, multi-disciplinary researches, the management of the protected areas, the environmental education, the environmental impact assessment, and emergency planning

6.2.3. The classification of forest growing areas by the way of mapping and determining forest yield, identifying ecological factors and designating forest growing units

6.2.4. The integration and implementation of forest management plans and application rules to support the sustainable use of forest ecosystems and the conservation of biological diversity

6.2.5. The promotion of the researches which demonstrate the ecological relationships between species and habitats in forest ecosystems to support the implementation of the programmes for the in-situ conservation of herbaceous and woody plants' genetic diversity

Table 6.3.3.a Correlation of forest biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
6.1.1	Information on the endangered species	↗	↗			↗	↗	↗	↗
6.1.2	Forest ecosystems that are under pressure	↗	↗	↗		↗		↗	
6.1.3	Monitoring	↗	↗	↗	↗	↗		↗	↗
6.1.4	Sharing of results of research and monitoring activities	↗	↗	↗	↗	↗	↗		
6.2.1	Protected areas	↗	↗					↗	
6.2.2	Training of General Directorate of Forestry staff	↗	↗	↗	↗	↗		↗	
6.2.3	Classification of forest growing areas			↗	↗	↗		↗	
6.2.4	Integration and implementation of forest management plans and application rules			↗	↗	↗		↗	
6.2.5	Researches which demonstrate the ecological relationships between species and habitats in forest ecosystems	↗	↗	↗		↗	↗	↗	

	Table 6.3.3.b Time Schedule for Forest Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
6.1.1	The update of the information on the species which are found in forest ecosystems and which are either sensitive or under threat or endangered, and the transfer of the information so updated to the central biological diversity information management system										
6.1.2	The identification of forest ecosystems that are under pressure and the classification of them by the degree of threat to them										
6.1.3	The monitoring of the ecosystems, species and populations that are under pressure in a programme integrating biotic and abiotic parameters										
6.1.4	Making research results and the information obtained from the monitoring programme available to decision-makers, users and other stakeholders so that the status and tendencies of forest biological diversity can be better evaluated										
6.2.1	The strengthening of the administrative and logistic infrastructure for the designation of new protected areas in forest ecosystems starting from the priority ecosystems and hot points, and for the finalization of the management plans of the existing protected areas and their effective management										
6.2.2	The training of General Directorate of Forestry staff in the areas comprising ecosystem-based management, sustainable use, inventory methods, monitoring, data management, multi-disciplinary researches, the management of the protected areas, the environmental education, the environmental impact assessment, and emergency planning										
6.2.3	The classification of forest growing areas by the way of mapping and determining forest yield, identifying ecological factors and designating forest growing units										
6.2.4	The integration and implementation of forest management plans and application rules to support the sustainable use of forest ecosystems and the conservation of biological diversity										
6.2.5	The promotion of the researches which demonstrate the ecological relationships between species and habitats in forest ecosystems to support the implementation of the programmes for the in-situ conservation of herbaceous and woody plants' genetic diversity										

6.3.4. Mountain Biological Diversity

GOAL 7: To establish an effective monitoring, management and coordination system for the conservation and sustainable use of mountain biological diversity, together with its different ecosystems, pursuing a holistic approach

Objective 7.1. To effectively implement biological and ecological inventories, monitoring programmes and classification systems

Strategic actions:

7.1.1. The identification of sensitive mountain ecosystems and the species that are under threat in those ecosystems

7.1.2. The identification and recording of the genetic resources that are found in mountain ecosystems and that have importance for genetic diversity

7.1.3. The identification of the indicator species which will be used for the monitoring of mountain ecosystems

7.1.4. The development of information and methods for the evaluation and monitoring of the state of mountain biological diversity and its tendencies

7.1.5. The mapping of biotopes and the use of GIS methods to establish an ecosystem-based planning and management of mountain ecosystems

Objective 7.2. To establish appropriate mechanisms for the conservation and sustainable use of sensitive mountain ecosystems

Strategic actions:

7.2.1. The identification of the adverse impacts of the key threats to mountain biological diversity like climate change and the determination of measures either to prevent or to mitigate such impacts

7.2.2. The development and implementation of appropriate socio-economic policies and incentives to support sustainable use of mountain ecosystems and of the biological resources of those ecosystems, in particular the high plateaus

7.2.3. The development and putting into practice of programmes to restore the degraded mountain ecosystems, to protect the natural dynamic processes, and to maintain biological diversity

7.2.4. The establishment of regulatory and institutional mechanism to protect mountain biological diversity and its different ecosystems pursuing a holistic approach

7.2.5. The identification of the population size of hunting animals, the determination of their habitats and devising management plans

Table 6.3.4.a Correlation of mountain biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
7.1.1	Identification of sensitive mountain ecosystems and the species	↗	↗	↗		↗			
7.1.2	Identification and recording of the genetic resources	↗	↗					↗	↗
7.1.3	Identification of the indicator species	↗	↗	↗					
7.1.4	Information and methods for the evaluation and monitoring	↗	↗	↗				↗	
7.1.5	Mapping of biotopes	↗	↗	↗	↗	↗	↗		
7.2.1	Climate change and other threats		↗	↗		↗		↗	
7.2.2	Socio-economic policies and incentives		↗	↗	↗	↗		↗	
7.2.3	Rehabilitation			↗	↗	↗	↗	↗	
7.2.4	Regulatory and institutional mechanism for conservation		↗	↗	↗	↗		↗	
7.2.5	Protection of hunting animals	↗	↗	↗	↗	↗		↗	

	Table 6.3.4.b Time Schedule for Mountain Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
7.1.1	The identification of sensitive mountain ecosystems and the species that are under threat in those ecosystems										
7.1.2	The identification and recording of the genetic resources that are found in mountain ecosystems and that have importance for genetic diversity										
7.1.3	The identification of the indicator species which will be used for the monitoring of mountain ecosystems										
7.1.4	The development of information and methods for the evaluation and monitoring of the state of mountain biological diversity and its tendencies										
7.1.5	The mapping of biotopes and the use of GIS methods to establish an ecosystem-based planning and management of mountain ecosystems										
7.2.1	The identification of the adverse impacts of the key threats to mountain biological diversity like climate change and the determination of measures either to prevent or to mitigate such impacts										
7.2.2	The development and implementation of appropriate socio-economic policies and incentives to support sustainable use of mountain ecosystems and of the biological resources of those ecosystems, in particular the high plateaus										
7.2.3	The development and putting into practice of programmes to restore the degraded mountain ecosystems, to protect the natural dynamic processes, and to maintain biological diversity										
7.2.4	The establishment of regulatory and institutional mechanism to protect mountain biological diversity and its different ecosystems pursuing a holistic approach										
7.2.5	The identification of the population size of hunting animals, the determination of their habitats and devising management plans										

6.3.5. Inland Waters Biological Diversity

GOAL 8: To develop and implement effective methods for the conservation of inland waters biological diversity, the maintenance of ecological functions of inland waters ecosystems, and the sustainable use of these ecosystems

Objective 8.1. To strength technical and institutional capacity for the conservation and sustainable use of inland waters biological diversity

Strategic actions:

8.1.1. The development and implementation of training and awareness programmes for policy-makers and target groups concerning the conservation and sustainable use of water resources and inland waters biological diversity

8.1.2. The determination and implementation of incentives for the establishment and operation of sewer system and wastewater treatment plants in the settlement areas close to the sensitive inland water ecosystems and for the expansion of the irrigation methods which ensure the sustainable use of water resources

8.1.3. The completion of the inventory data on inland waters biological diversity, the identification of indicator species, and devising a joint monitoring programme with favorable cost upon the analysis of the ecosystem monitoring methods

Objective 8.2. To take actions for the conservation and sustainability of inland waters biological diversity and reduce threats to it

Strategic actions:

8.2.1. The identification of the threats to species diversity and the endangered species in inland waters ecosystems, and taking measures either to prevent or to reduce those threats

8.2.2. The design of superstructures over rivers in such a way as not to block the migration of fishes

8.2.3. The development and implementation of integrated land and catchment/watershed/river basin management strategies

8.2.4. The identification of the reasons of unintentional introduction of alien species, and the submission of solution proposals

8.2.5. Setting up a national database which will help the identification of the introduction of any potential harmful alien species and allow the foreseeing of them in advance and promoting the efforts to allow access to the international databases in order to be able to devise methods for control and prevention

8.2.6. The elimination or lowering to an acceptable level of the adverse impacts of alien species introduced by fisheries harvest projects, fish farms, development programmes and the transfer of waters and species between basins

8.2.7. The reviewing of laws and regulations concerning the introduction of alien species in ecosystems

Table 6.3.5.a Correlation of inlan waters biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
8.1.1	Training and awareness programmes		↗	↗	↗	↗	↗		
8.1.2	Incentives for sustainable use		↗	↗	↗	↗	↗	↗	
8.1.3	Inventory, indicator species, joint monitoring programme	↗	↗	↗		↗		↗	
8.2.1	Measures either to prevent or to reduce threats		↗	↗		↗		↗	
8.2.2	Design of superstructures over rivers		↗	↗	↗	↗			
8.2.3	Integrated land and catchment/watershed/river basin management strategies			↗	↗	↗			
8.2.4	Identification and elimination of the reasons of unintentional introduction of alien species			↗	↗	↗		↗	
8.2.5	National database of alien species	↗		↗		↗		↗	
8.2.6	Elimination or lowering to an acceptable level of the adverse impacts of alien species			↗		↗		↗	
8.2.7	Laws and regulations concerning the introduction of alien species in ecosystems		↗	↗	↗	↗		↗	

	Table 6.3.5.b Time Schedule for Inland Waters Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
8.1.1	The development and implementation of training and awareness programmes for policy-makers and target groups concerning the conservation and sustainable use of water resources and inland waters biological diversity										
8.1.2	The determination and implementation of incentives for the establishment and operation of sewer system and wastewater treatment plants in the settlement areas close to the sensitive inland water ecosystems and for the expansion of the irrigation methods which ensure the sustainable use of water resources										
8.1.3	The completion of the inventory data on inland waters biological diversity, the identification of indicator species, and devising a joint monitoring programme with favorable cost upon the analysis of the ecosystem monitoring methods										
8.2.1	The identification of the threats to species diversity and the endangered species in inland waters ecosystems, and taking measures either to prevent or to reduce those threats										
8.2.2	The design of superstructures over rivers in such a way as not to block the migration of fishes										
8.2.3	The development and implementation of integrated land and catchment/watershed/river basin management strategies										
8.2.4	The identification of the reasons of unintentional introduction of alien species, and the submission of solution proposals										
8.2.5	Setting up a national database which will help the identification of the introduction of any potential harmful alien species and allow the foreseeing of them in advance and promoting the efforts to allow access to the international databases in order to be able to devise methods for control and prevention										
8.2.6	The elimination or lowering to an acceptable level of the adverse impacts of alien species introduced by fisheries harvest projects, fish farms, development programmes and the transfer of waters and species between basins										
8.2.7	The reviewing of laws and regulations concerning the introduction of alien species in ecosystems										

6.3.6. Coastal and Marine Biological Diversity

GOAL 9: To develop and implement effective methods for the conservation of coastal and marine biological diversity, the maintenance of ecological functions provided by coastal and marine ecosystems, and the sustainable use of these ecosystems

Objective 9.1. To strengthen necessary administrative, legal, institutional and technical capacity for the identification, monitoring, conservation and sustainable use of coastal and marine biological diversity

Strategic actions:

9.1.1. The employment of the sufficient number of experts who have appropriate qualifications in the areas of research, application, control, GIS, modeling, mapping and genetics in the institutions and organizations concerned with coastal and marine ecosystems

9.1.2. The promotion of research and development activities regarding the conservation and sustainable use of coastal and marine biological diversity

9.1.3. The determination and the implementation of incentive measures which promote the creation of new income-generating resources for those communities who might be affected from the conservation and sustainable use of coastal and marine biological diversity

9.1.4. The identification of the equipment needs of research vessels, remote sensing and GIS as well as genetics laboratories, and the establishment of the tools with which those needs can be met

9.1.5. The reviewing of the regulations and practices which affect the conservation and

sustainable use of coastal and marine biological diversity and establishing harmony between them and the conservation and sustainable use principles, and the introduction of regulations which will allow the devising of coastal master plans

Objective 9.2. To fill the information gaps concerning coastal and marine biological diversity, to identify and put under conservation the areas and species which have importance for biological diversity and are under threat, and to develop and implement monitoring programmes

Strategic actions:

9.2.1. The identification of biological diversity in Turkey's islands and the conservation of the areas which have importance for biological diversity and are under threat

9.2.2. The preparation of a list of the endangered species in Turkey's seas, the transfer of the list to the database, as well as the preparation and implementation of conservation plans

9.2.3. The demonstration of sea grass distribution in Turkey's seas, the mapping of them using GIS, and devising a conservation action plan

9.2.4. The identification of the environmental indicators to monitor and evaluate coastal and marine biological diversity, and the monitoring of them setting up a monitoring programme

9.2.5. The identification and the conservation of the genetic diversity of the living things in Turkey's seas and coastal areas

9.2.6. The identification of the areas which have importance for biological diversity so that marine and coastal protected areas are designated

9.2.7. The development of regional cooperation tools with a view to protecting and utilizing in a sustainable manner marine ecosystems and living resources beyond national jurisdiction, and the establishment of joint regional rules and criteria for the designation of the protected areas in the international seas and for the management of them

Objective 9.3. To combat against the threats to coastal and marine biological diversity

Strategic actions:

9.3.1. Development and implementation of appropriate policy tools and strategies for an integrated marine and coastal area management

9.3.2. The identification of the sensitive areas and the threats to them, and taking protection measures in marine and coastal areas

9.3.3. The identification and monitoring of the impacts of climate change in Turkey's seas using remote sensing methods

9.3.4. The restocking of the species at risk in coastal and marine ecosystems by means of aquaculture

9.3.5. The examination of the impacts of alien species on marine biological diversity and taking measures to prevent any adverse impacts

9.3.6. The promotion of the use of appropriate fishing gears and techniques and the implementation of training programmes which will allow the elimination or lowering to an acceptable level of the adverse impacts of fishery on populations, species, habitats and ecosystems

Table 6.3.6.a Correlation of coastal and marine biological diversity actions with common objectives

		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2
		inventory-monitoring	protected areas	sustainable use	sectoral integration	planning and management	public awareness	genetic diversity	access and benefit sharing
9.1.1	Employment of the sufficient number of experts	↗	↗	↗	↗	↗	↗	↗	
9.1.2	Research and development activities		↗	↗		↗		↗	
9.1.3	Incentive measures		↗	↗	↗	↗		↗	
9.1.4	Equipment needs	↗	↗	↗		↗		↗	
9.1.5	Coastal master plans		↗	↗	↗	↗		↗	
9.2.1	Biological diversity of islands	↗	↗	↗	↗			↗	
9.2.2	Conservation of species	↗	↗				↗	↗	
9.2.3	Sea grasses	↗	↗	↗		↗		↗	
9.2.4	Environmental indicators and monitoring	↗	↗	↗				↗	
9.2.5	Genetic diversity	↗	↗			↗		↗	↗
9.2.6	Coastal and Marine protected areas	↗	↗	↗				↗	
9.2.7	Conservation of marine ecosystems and living resources beyond national jurisdiction		↗					↗	↗
9.3.1	Integrated marine and coastal area management		↗	↗	↗	↗		↗	
9.3.2	Protection measures for sensitive areas		↗	↗				↗	
9.3.3	Impacts of climate change	↗	↗	↗		↗	↗	↗	
9.3.4	Restocking of the species		↗	↗				↗	
9.3.5	Alien species		↗	↗		↗		↗	
9.3.6	Sustainable fisheries			↗	↗	↗	↗	↗	

	Table 6.3.6.b Time Schedule for Coastal and Marine Biological Diversity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
9.1.1	The employment of the sufficient number of experts who have appropriate qualifications in the areas of research, application, control, GIS, modeling, mapping and genetics in the institutions and organizations concerned with coastal and marine ecosystems										
9.1.2	The promotion of research and development activities regarding the conservation and sustainable use of coastal and marine biological diversity										
9.1.3	The determination and the implementation of incentive measures which promote the creation of new income-generating resources for those communities who might be affected from the conservation and sustainable use of coastal and marine biological diversity										
9.1.4	The identification of the equipment needs of research vessels, remote sensing and GIS as well as genetics laboratories, and the establishment of the tools with which those needs can be met										
9.1.5	The reviewing of the regulations and practices which affect the conservation and sustainable use of coastal and marine biological diversity and establishing harmony between them and the conservation and sustainable use principles, and the introduction of regulations which will allow the devising of coastal master plans										
9.2.1	The identification of biological diversity in Turkey's islands and the conservation of the areas which have importance for biological diversity and are under threat										
9.2.2	The preparation of a list of the endangered species in Turkey's seas, the transfer of the list to the database, as well as the preparation and implementation of conservation plans										
9.2.3	The demonstration of sea grass distribution in Turkey's seas, the mapping of them using GIS, and devising a conservation action plan										
9.2.4	The identification of the environmental indicators to monitor and evaluate coastal and marine biological diversity, and the monitoring of them setting up a monitoring programme										
9.2.5	The identification and the conservation of the genetic diversity of the living things in Turkey's seas and coastal areas										
9.2.6	The identification of the areas which have importance for biological diversity so that marine and coastal protected areas are designated										
9.2.7	The development of regional cooperation tools with a view to protecting and utilizing in a sustainable manner marine ecosystems and living resources beyond national jurisdiction, and the establishment of joint regional rules and criteria for the designation of the protected areas in the international seas and for the management of them										
9.3.1	Development and implementation of appropriate policy tools and strategies for an integrated marine and coastal area management										
9.3.2	The identification of the sensitive areas and the threats to them, and taking protection measures in marine and coastal areas										
9.3.3	The identification and monitoring of the impacts of climate change in Turkey's seas using remote sensing methods										
9.3.4	The restocking of the species at risk in coastal and marine ecosystems by means of aquaculture										
9.3.5	The examination of the impacts of alien species on marine biological diversity and taking measures to prevent any adverse impacts										
9.3.6	The promotion of the use of appropriate fishing gears and techniques and the implementation of training programmes which will allow the elimination or lowering to an acceptable level of the adverse impacts of fishery on populations, species, habitats and ecosystems										

6.4. OBJECTIVES AND ACTIONS FOR THE ESTABLISHMENT OF THE CAPACITY AND MECHANISMS NEEDED FOR THE IMPLEMENTATION OF THE STRATEGY

GOAL 10: To establish a mechanism for the implementation of the Biological Diversity Strategy and Action Plan and the follow-up of implementation and reporting

Objective 10.1 To establish coordination among the relevant institutions as regards the conservation and sustainable use of biological diversity

Strategic actions:

10.1.1. The formation of a coordination committee for the establishment of relations and coordination between the implementation processes of the National Biological Diversity Strategy, sector strategies or the other related national initiatives like national plans

10.1.2. The formation of an technical committee, which consist of the representatives from the concerned institutions and organizations, for the planning and carrying out of the activities related to the implementation, monitoring and evaluation of NBSAP

10.1.3. The formation of working groups on thematic and cross-cutting issues, in an effort to support the studies of the technical committee

10.1.4. Recruiting the sufficient number of qualified technical staff including biologists, agricultural engineers, forestry engineers, fisheries engineers, landscaping architectures and staff from other fields needed in both the central and provincial administrations of the related Ministries in order to be able to do researches and undertake implementation, monitoring, control and conduct land surveys for the purposes of achieving the NBSAP's targets

10.1.5. The enhancement of human resources and technical equipment for the development of methods and technologies which support the sustainable use of biological resources and the removal or minimizing of the adverse impacts of resource use on biological diversity

10.1.6. Taking measures to strengthen the coordination and cooperation among universities, governmental agencies and institutions, gene banks, museums, zoos, aquariums, botanic gardens, non-governmental organizations, private sector organizations and other organizations

10.1.7. For the purposes of the establishment of relations among biological diversity databases and the sharing of research and monitoring results so that they can be implemented by decision-makers, users and other stakeholders, the establishment and maintenance of a central biological diversity information management system which will allow the faster analysis and dissemination of both biological and biophysical data and in which qualified staff will be employed in the areas of information management systems, GIS, modelling, mapping and database

10.1.8. Taking appropriate actions to enable the transfer of the results, data and information from the activities and projects which are either financed by the government or are implemented under the guarantee of the government to the Central Biological Diversity Information Management System

10.1.9. Taking appropriate measures, including the education of people in the areas of the environmental law, international conventions and international politics on the environment, with a view to assuring effective involvement with the processes of the development and implementation of an international policy on the biological diversity-related issues

Objective 10.2. To achieve the integrity and sustainability of financial structure for the identification, conservation and sustainable use of biological diversity

Strategic actions:

10.2.1. Devising NBSAP implementation plans and the determination of the required budgetary resources to the process

10.2.2. Based on the implementation plans and the their budgets, the provision of the financial resources needed for the implementation of NBSAP

10.2.3. With regard to budgetary needs of all the concerned institutions and organizations for the activities and projects related to the identification, conservation and sustainable use of biological diversity, taking measures to be able to pursue an approach, which will be agreeing with the NBSAP priorities and the implementation plans and will be holistic, and the provision of information to the domestic resource suppliers on the existence and applicability of NBSAP

10.2.4. Taking measures to be able to pursue an approach, which will be agreeing with the NBSAP priorities and the implementation plans and will be holistic, to the intended activities and projects for the identification, conservation and sustainable use of biological diversity on foreign grants or loans, and to enable the project owners to provide information to those responsible for NBSAP

	Table 6.5. Time Schedule for Goal 10	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
10.1.1.	The formation of a coordination committee for the establishment of relations and coordination between the implementation processes of the National Biological Diversity Strategy, sector strategies or the other related national initiatives like national plans										
10.1.2.	The formation of an technical committee, which consist of the representatives from the concerned institutions and organizations, for the planning and carrying out of the activities related to the implementation, monitoring and evaluation of NBSAP										
10.1.3.	The formation of working groups on thematic and cross-cutting issues, in an effort to support the studies of the technical committee										
10.1.4.	Recruiting the sufficient number of qualified technical staff including biologists, agricultural engineers, forestry engineers, fisheries engineers, landscaping architectures and staff from other fields needed in both the central and provincial administrations of the related Ministries in order to be able to do researches and undertake implementation, monitoring, control and conduct land surveys for the purposes of achieving the NBSAP's targets										
10.1.5.	The enhancement of human resources and technical equipment for the development of methods and technologies which support the sustainable use of biological resources and the removal or minimizing of the adverse impacts of resource use on biological diversity										
10.1.6.	Taking measures to strengthen the coordination and cooperation among universities, governmental agencies and institutions, gene banks, museums, zoos, aquariums, botanic gardens, non-governmental organizations, private sector organizations and other organizations										
10.1.7.	For the purposes of the establishment of relations among biological diversity databases and the sharing of research and monitoring results so that they can be implemented by decision-makers, users and other stakeholders, the establishment and maintenance of a central biological diversity information management system which will allow the faster analysis and dissemination of both biological and biophysical data and in which qualified staff will be employed in the areas of information management systems, GIS, modelling, mapping and database										
10.1.8.	Taking appropriate actions to enable the transfer of the results, data and information from the activities and projects which are either financed by the government or are implemented under the guarantee of the government to the Central Biological Diversity Information Management System										
10.1.9.	Taking appropriate measures, including the education of people in the areas of the environmental law, international conventions and international politics on the environment, with a view to assuring effective involvement with the processes of the development and implementation of an international policy on the biological diversity-related issues										
10.2.1.	Devising NBSAP implementation plans and the determination of the required budgetary resources to the process										
10.2.2.	Based on the implementation plans and the their budgets, the provision of the financial resources needed for the implementation of NBSAP .										
10.2.3	With regard to budgetary needs of all the concerned institutions and organizations for the activities and projects related to the identification, conservation and sustainable use of biological diversity, taking measures to be able to pursue an approach, which will be agreeing with the NBSAP priorities and the implementation plans and will be holistic, and the provision of information to the domestic resource suppliers on the existence and applicability of UBSEP										
10.2.4.	Taking measures to be able to pursue an approach, which will be agreeing with the NBSAP priorities and the implementation plans and will be holistic, to the intended activities and projects for the identification, conservation and sustainable use of biological diversity on foreign grants or loans, and to enable the project owners to provide information to those responsible for NBSAP										

7. IMPLEMENTATION MECHANISM

What laid behind the NBSAP objectives and actions had mainly been the aims to identify Turkey's biological diversity, protect and monitor it, ensure the sustainable use and economic benefits of it. To serve these aims, although several institutions have taken actions since the promulgation of the Turkish Republic, it has become apparent that the countries need to put greater focus on the environmental activities and investments with the increasing environmental problems beginning from the 80's in the world. In Turkey, too, there have been several projects and activities of both governmental agencies and non-governmental organizations in line with this tendency. However, those activities and projects have poor links due to the fact that the biological diversity activities are not planned at the macro level and that a permanent employment system is not in place. Further, due to the same reasons, the activities cannot be prioritized considering the country's needs, as well as no satisfactory sharing of the project outcomes with correct methods can be achieved and therefore projects and the related activities mostly cannot serve the basic goals and the results obtained cannot be used. The implementation of NBSAP depends primarily on dealing with such issues and the optimum use of the existing institutional and technical capacities and making those investments which have strategic importance. Thus, the Goal 10 objectives and actions in section 6.4 of NBSAP have a key role to attaining the remaining goals and objectives. An institutional mechanism is recommended in section 7.1 with a view to helping to find a solution to the coordination problem and employing the existing capacity of institutions efficiently and for achieving the NBSAP goals. Section 7.2 deals with the capacity needs that should be met to attain the priority and strategic objectives of NBSAP.

7.1. INSTITUTIONAL RESPONSIBILITIES AND ORGANIZATON

The issue of the conservation and sustainable use of biological diversity, because of its scope, comprises actions which involve several institutions and organizations. Therefore, coordination has critical importance for the implementation of NBSAP and the Convention. Table 7.1 gives a grouping of the institutions and organizations which will involve with the implementation mechanism or with which coordination will be established. According to this, they are grouped as "implementing institution/organization", "the institution/organization that devises plans and policies at the macro level", and "the institution/organization that has a relation due to its field of activity". The governmental agencies and institutions as well as non-governmental organizations, the chambers of profession, cooperatives, the unions of farmers, etc. with environmental focus are the interest groups which will be involved with the implementation process of NBSAP.

Table 7.1. The institutions related to biological diversity

Implementing Institutions	*Institutions developing macro level plans and programmes*	*Institutions relevant due to their activities*
Ministry of Environment and Forestry	*Ministry of Foreign Affairs*	*Ministry of Energy and Natural Resources*
Ministry of Agriculture and Rural Affairs	*Ministry of National Defense*	*Ministry of Transport*
Ministry of Culture and Tourism	*Ministry of Finance*	*Ministry of Public Works and Housing*
Ministry of Interior (Turkish Coast Guard Command and Gendarme General Command)	*Primeministry State Personnel Directorate*	*Ministry of Industry and Trade*
Ministry of National Education	*Undersecretariat of State Planning Organisation*	
Undersecretariat of Maritime Affairs	*Undersecretariat of Treasury*	
Undersecretariat of Custom	*Undersecretariat of Foreign Trade*	
Turkish Patent Institute	*The Higher Education Committee*	
Universities		

It is important that all the concerned governmental agencies and institutions collaborate in the process with coordination to achieve the NBSAP targets at the national level. In this concept, it is foreseen that a Biological diversity Coordination Committee will be set up. This committee will establish coordination among institutions as required by Goal 10 of the Strategy and for the following purposes:

- the development of policies for the conservation of biological diversity, the sustainable use of biological resources, and the use of biological diversity components with methods and at a level agreeing with the component's own renewal capacity considering the needs of the future generations;
- devising national plans and programmes for the identification of genetic diversity elements, including conventional information, and for the conservation and use of them;
- the follow-up of both national and international processes with regard to the implementation of NBSAP;
- ensuring coordination and the distribution of responsibilities among governmental agencies and institutions in the process of the implementation of NBSAP and in the follow-up and reporting of implementation;
- the development of appropriate local and foreign policies on biological diversity, considering the country's conditions;
- the formation of an Executive Committee for the implementation of NBSAP;
- the approval of the plans submitted by the Executive Committee;

Below is the foreseen composition of the Coordination Committee for Biological diversity:

The Minister for Environment and Forestry, the chair;

- Undersecretary for the Ministry of Foreign Affairs
- State Planning Organisation Undersecretary
- Undersecretary for Maritime Affairs
- Undersecretary for the Ministry of Agriculture and Rural Affairs
- Undersecretary for the Ministry of Environment and Forestry
- Undersecretary for Customs
- Undersecretary for the Ministry of Interior
- Head of Higher Education Board

It is envisaged that an Technical Committee and sub-working groups will be set up for an integrated work of Committee and for a healthy coordination. It is intended that the Technical Committee for Biological diversity will be composed of the Heads of the related departments of the governmental agencies and institutions listed below:

- The Ministry of Environment and Forestry
    - The Directorate General of Nature Conservation and National Parks
    - The Head of Environmental Protection Agency for Special Areas
    - The Directorate General of State Hydraulic Works
    - The Directorate General of Forestry
- The Ministry of Agriculture and Rural Affairs
    - The Directorate General of Agricultural Researches
    - The Directorate General of Protection and Control

- The Ministry of Culture and Tourism
  - The Directorate General of Investments and Enterprises
  - The Directorate General of Cultural Assets and Museums
- The Undersecretariat of State Planning Organisation
- Coast Guard Command
- The General Command of Gendarmerie
- The Undersecretariat of Maritime Affairs
- The Undersecretariat of Customs
- The Scientific and Technical Research Council of Turkey (TÜBİTAK)

The Technical Committee will steer the works of working groups with regard to the implementation of the Biological diversity Convention and make pre-evaluations on the matters to be decided by the Coordination Committee.

Working groups will be formed by the decision of the Technical Committee to deal with the thematic and cross-cutting issues needed. It is suggested that working groups should be composed of the experts from those institutions and organizations, including non-governmental organizations, which are interested in the issue at hand. Below is a list of the thematic and cross-cutting issues (joint issues for all ecosystems) which should be addressed within the scope of the NBSAP and the Convention on Biological Diversity. The Technical Committee will form working groups to deal with one or more of these issues, as required.

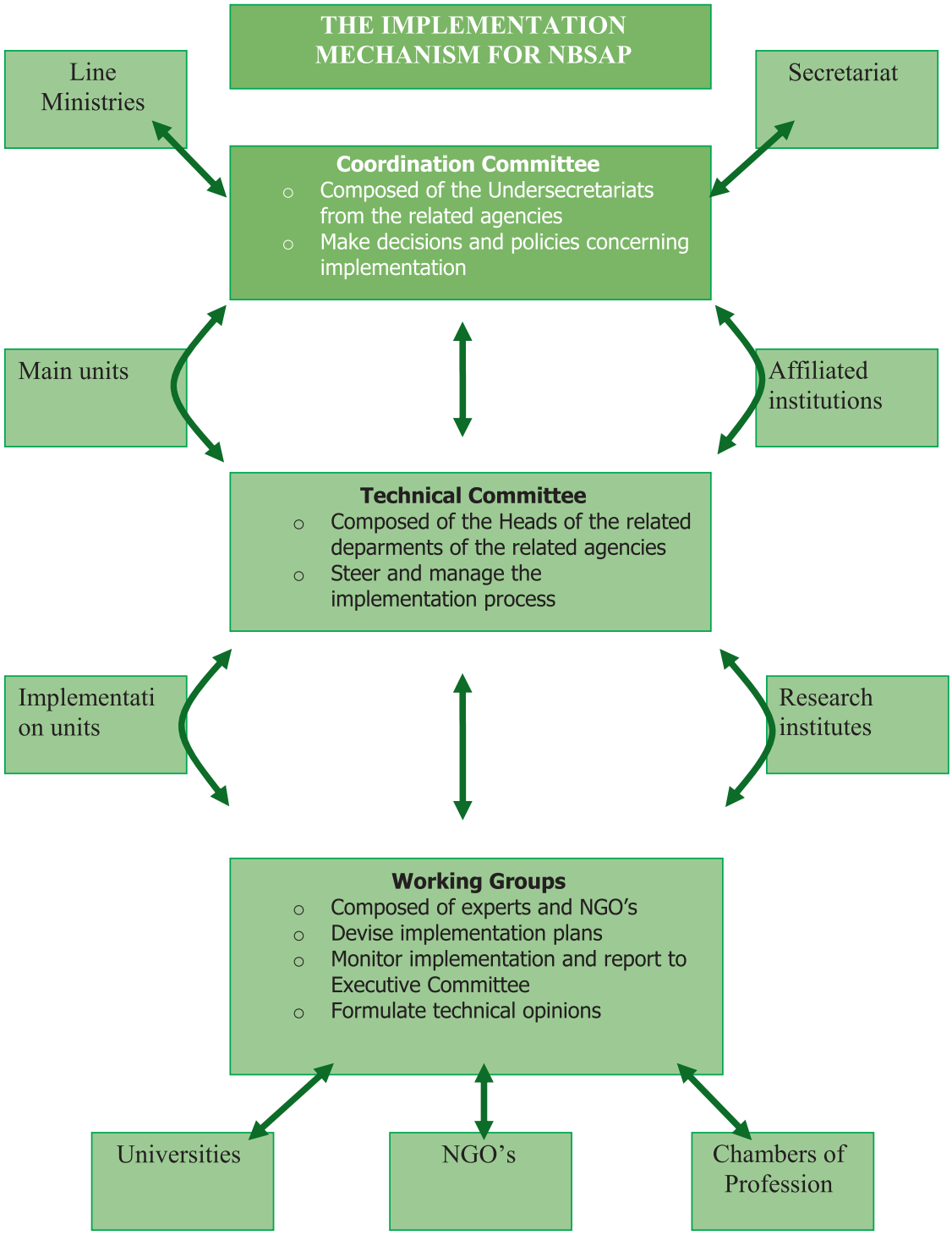
Thematic issues:

- Agricultural Biological diversity
- Coastal and Marine Biological diversity
- İnland waters Biological diversity
- Mountain Biological diversity
- Forest Biological diversity
- Steppe Biological diversity

Cross-Cutting Issues:

- Access to genetic resources and benefit-sharing
- Alien species
- Protected Areas
- Incentives
- Climate Change and Biological diversity
- Tourism and Biological diversity
- Monitoring and Indicators
- Environmental Impact Assessment
- Responsibility and Compensation
- Education and Awareness-raising
- Technology transfer
- Conventional Information

This is the diagram of the mechanism foreseen for the implementation of NBSAP.


THE IMPLEMENTATION MECHANISM FOR NBSAP
Line Ministries
Secretariat
Coordination Committee
Composed of the Undersecretariats from the related agencies
Make decisions and policies concerning implementation
Main units
Affiliated institutions
Technical Committee
Composed of the Heads of the related deparments of the related agencies
Steer and manage the implementation process
Implementation units
Research institutes
Working Groups
Composed of experts and NGO's
Devise implementation plans
Monitor implementation and report to Executive Committee
Formulate technical opinions
Universities
NGO's
Chambers of Profession

7.2. CAPACITY NEEDS

It is foreseen that the capacity needs for the implementation of NBSAP should be determined upon the identification of the current situation and needs under implementation plans. However, based on a general evaluation within the framework of the NBSAP's priority objectives, it is seen that there are both the cost-requiring infrastructural needs and administrative and institutional needs for better use of the existing capacity.

The cost-requiring infrastructural needs appear mainly in the areas of the protection of genetic diversity, the recording of it, the management of the protected areas, and the research and conservation of marine biological diversity.

For the identification of genetic diversity, the recording of it, and the ex-situ conservation of it, a gene bank has been planned to be built in Ankara to increase the capacity of the existing gene banks of the MARA. The required budgetary allocation has been made for the gene bank. With this, it is assumed that, if a national botanic garden where the registered species are protected is established, the identification, protection and recording of genetic diversity will become systematized and can be conducted regularly as well as the objectives under Goals 3 and 4 of NBSAP will become attainable for the great part.

Although Objective 1.3 and Objective 4.3 actions of NBSAP are related with the issue of bio security, the National Bio security Framework, which was devised under the coordination of the MARA, shows the legal and institutional system that should be built up in Turkey. Genetic diversity, priority issue in NBSAP, requires the urgent set up of a bio security system for the risk assessment, risk management as well as control of GMO's, which can pose risk on genetic diversity. Both the identification and recording of genetic diversity and the bio security system require similar techniques and technologies to be put to work, and hence the biotechnology infrastructure will provide capacity to achieve most of NBSAP objectives when it is strengthened.

The insufficient number of staff members in the protected areas and the lack of equipment support for the area management appear to be the main challenges to the protected area management. It is assumed, if the above needs are met, that the Goal 1 objectives of NBSAP and the objectives for the designation and management of protected areas that come under other goals of NBSAP will become attainable.

The research and conservation of marine biological diversity is a costlier process and marine biological diversity has not received investments at the desired level when compared to the terrestrial ecosystems. Except for few research vessels of universities, there is no equipment to employ in marine biological diversity researches. Although the Maritime Undersecretariat has started mapping ecologically-sensitive areas and building their inventories, there is a need to provide technical equipment to one of the existing institutions to be able to achieve goal 9 of NBSAP.

Information management system is the top requirement from administrative and institutional aspects if the existing capacity is to be used more efficiently. The central information management system is supposed to be a link between the existing databases of different institutions and the tools like GIS. The scattered biological diversity information and data of different institutions lead to repetitive processes and resource wastage. The objectives of NBSAP concerning the identification and monitoring of biological diversity can be achieved if only the system becomes operational. The MEF has the infrastructure for the system, but there is a need to establish links and information flow between the related institutions and universities. It is assumed that the data transfer to the database "nuhungemisi-biyolojik çeşitlilik veri tabanı" (noah's ark-biological diversity database) of the MEF and to "bcs.gov.tr", the website of the Biological diversity Convention allowing national information exchange, and the appointment of the available information management system staff to the operation of the system take place.

Human Resources is another key capacity need element in the implementation of NBSAP. The achievement of NBSAP objectives depend on the appropriate and permanent employment of the available qualified staff members according to their specialization, and on the improvement of both economic and social situations of researchers and the employment of higher number and better qualified people in the implementation process.

Since NBSAP contains the basic goal and objectives of the nature conservation section of the National Environmental Strategy (NES), a strategy devised in the EU alignment process, the capacity needs dealt with here will serve for the implementation of NES, as well.

8. SUCCESS CRITERIA AND THE OUTCOMES EXPECTED IN THE FIRST FIVE YEARS

There will arise a need to review of the implementation process and, if necessary, the update of it in the five years following the approval of NBSAP and the start of the implementation. Below, you will find the success criteria to be used in the evaluation process and the outcomes expected in the first five years, based on the Chapter 6 objectives of NBSAP. However, the achievement of those outcomes will depend to a great extent on the set up of the institutional mechanism and the satisfaction of capacity needs described in Chapter 7.

8.1. Success Criteria

1. Policies aiming the reduction of adverse impacts on biological diversity
2. Protection measures
3. Indicators
4. The national inventory plan at the macro level
5. General and specific protection measures
6. Monitoring system
7. Knowledge and awareness level of people
8. Effectively protected area management
9. Effective financial resource management
10. Inter-organizational cooperation and cooperation mechanism
11. Central and effective information management system
12. Awareness concerning the protection of genetic resources
13. Keeping the records of genetic resources
14. The integration of NBSAP into development plans
15. The sustainable and rational use of water sources
16. Protected Areas
17. Inventories
18. Rehabilitation programmes
19. Ecosystem-based management and planning
20. Social and economic incentives
21. Qualified personnel at governmental agencies
22. Research and development studies

8.2. OUTCOMES EXPECTED IN THE FIRST FIVE YEARS

Cooperation

1. The Coordination Committee for Biological diversity, the Technical Committee, and working groups are set up.

2. Appropriate actions to enable the transfer of the results, data and information from the activities and projects which are either financed by the government or are implemented under the guarantee of the government to the Central Biological diversity Information Management System are taken.

3. Both administrative and financial measures to ensure effective involvement with the processes of the development of an international biological diversity policy and of the implementation of it are taken.

4. NBSAP implementation plans are devised, with the budgetary allocations completed.

5. For the financial resource allocation to biological diversity issues, measures for a holistic approach, which is agreeing with NBSAP priorities and implementation plans, are taken.

Administrative, Institutional and Technical Capacity

1. The necessary regulations for the employment of implementation staff and the education of qualified people are made and minimum 3 technical persons in the local administration are appointed to NBSAP implementation.

2. The mechanism, which will allow data transfer to the central biological diversity information management system, is set up and minimum 5 specialized persons are appointed to operate the system.

3. The sufficient number of experts who have appropriate qualifications in the areas of research, application, control, GIS, modelling, mapping and genetic are recruited in the institutions and organisations concerned with coastal and marine ecosystems.

4. Human resources and technical equipment for the development of methods and technologies which support the sustainable use of biological resources and the removal or minimising of the adverse impacts of resource use on biological diversity are enhanced.

5. For identification and classification, capacity needs, including human resources need in the areas of taxonomy and ecology, are determined and the actions to meet those needs are taken.

6. The equipment needs of research vessels, remote monitoring and GIS as well as genetic laboratories are identified and the tools with which those needs can be met are established.

7. The management plans of the existing protected areas are devised and the necessary administrative and logistical infrastructure for their effective management is strengthened.

8. The Draft Bio security Law is enacted and the necessary institutional and technical capacity needs for its implementation are satisfied.

9. Technical, institutional and financial capacity, including human resources and infrastructure need, for the identification of flora and fauna genetic resources and recording of them are strengthened.

10. The capacity of genetic laboratories is enhanced for taking the fingerprints of both flora and fauna genetic resources and for recording of them.

Research and Development support

1. The researches which bring forth ecological relations in ecosystems at the species and genetic diversity levels are promoted.

2. Research and development actions regarding the conservation and sustainable use of coastal and marine biological diversity are promoted.

3. Researches aiming to identify both the new and sustainable use ways of biological resources on ecosystem basis are being conducted for economic practices.

4. Research and development support for the development of methods for the prevention of the release into the nature of substances which are harmful to ecosystems, species and genetic resources or the release of those substances in amounts harmful to them is provided.

5. Research and development support for the identification of the impacts of alien species on the natural ones and for the prevention of the adverse impacts is provided.

6. Research and development support is provided with a view to unveiling methods for and approaches to the determination of the possible adverse impacts of GMO's on biological diversity

Inventory - monitoring

1. Macro-level planning for an interrelated and coordinated inventory building for biological diversity and the implementation of the plan is concluded.

2. Biological diversity inventory methods and technologies which are reliable and economic are established.

3. An inventory programme for the completion of inventories, data and collections, which are related with the invertebrates (insects, in particular), micro organisms, fungi, soil biota and pollinators, is introduced.

4. Biological diversity indicators which are expressive, scientifically justifiable, practical and ecosystem-based are developed.

5. A biological diversity monitoring programme is devised and implemented on the basis of all ecosystems.

6. A system for the periodical update of red lists relating to Turkey's species which are either endangered or under threat is set up.

7. The species under threat in agricultural ecosystems and their occurrence are identified.

8. The state of the existing species in steppe ecosystems is identified, the threats to the existing species and habitats are determined, and the red lists of the endangered species in those habitats are updated.

9. The information on the species which are found in forest ecosystems and which are either sensitive or under threat or endangered is updated and it is transferred to the biological diversity centre information management system.

10. Sensitive mountain biological diversity and the species that are under threat in mountain ecosystems are identified.

11. The biological diversity of Turkey's islands and the important areas that are under threat are identified.

12. The list of the endangered species in Turkey's seas is created and added to the database.

13. The areas where eelgrasses occur in Turkey's seas are identified and mapped using GIS.

Conservation

1. The candidate protected areas in the relatively less-represented ecosystems including mountain, steppe, coastal and marine in the existing protected areas are designated.

2. The legal gaps in the designation and management of the protected areas containing steppe and coastal and marine ecosystems are filled.

3. A regulatory and institutional mechanism to protect mountain biological diversity and its different ecosystems pursuing a holistic approach is established.

4. Management and monitoring programmes are devised, taking the activities of human origin in the close proximity to the existing protected areas into account.

5. Regular training programmes for public staff who will involve with the management process of the protected areas are introduced.

6. The programmes which will promote and facilitate the keeping of the wild flora and fauna species as well as local varieties and races by farmers are devised and they are put to work.

7. Steppe areas and the special areas which have special importance for biological diversity and/or are especially under threat in steppes are identified and mapped using GIS.

8. The species which are found in the natural flora and have a high economic value and which are either sensitive or endangered or under threat are cultivated and the controlled cultivation and gathering tools are developed.

9. The knowledge level of public staff about Turkey's biological diversity is increased and their awareness concerning species protection is raised, and they are given training in statistical data analysis and evaluation areas.

10. The population size of hunting animals and their habitats are identified and management plans are devised.

11. The areas which have importance for biological diversity are identified so that marine and coastal protected areas are designated.

12. Regional cooperation tools with a view to protecting and utilizing in a sustainable manner marine ecosystems and living resources in foreign waters are created and joint regional rules and criteria for the designation of the protected areas in the international seas and for the management of them are established.

13. The initiatives for the restocking of the species at risk in coastal and marine ecosystems by means of aquaculture are reviewed and the species not included in the process are identified.

The prevention of pressures on and threats to biological diversity

1. Special protection measures for the conservation and sustainability of the species and ecosystems at risk are taken within the framework of the available data.

2. The pressures on forest ecosystems are identified and the inventory building process is started for the classification of threats.

3. The threats to species diversity and the endangered species in inland waters ecosystems are identified and measures either to prevent or to reduce those threats are taken.

4. The sensitive marine and coastal areas are determined and the threats to those areas are identified as well as conservation measures are taken.

5. A guide for the identification and prevention of the total environmental changes caused by the human-originated impacts on ecosystems, species and genetic diversity is prepared.

6. The appropriate techniques and technologies for the rehabilitation programmes are determined and put to work.

7. The laws and regulations concerning the entry of alien species in ecosystems in inland waters are reviewed.

8. The information about the alien species which are entering or most probably will enter Turkey is collected and a national database of these species is set up.

9. The reasons of unintentional carrying of alien species in inland waters are identified and the solution proposals are submitted.

10. The impacts of alien species on marine biological diversity are examined and measures to prevent any adverse impacts are implemented.

11. The appropriate legal and institutional measures for the identification of the alien species that are entering or most probably will enter Turkey, the prevention of the invasive alien species from entering Turkey, the determination of any possible adverse impacts of them on biological diversity and the removal and control of those impacts are taken and implemented.

12. A national bio security information management and monitoring system, which will allow the follow-up and determination of any GMO's entry to Turkey, is set up.

13. Plans to prevent the environmental disasters and to take urgent measures in situations in which great risks to biological diversity might occur are devised.

14. The impacts of climate change on biological diversity are identified, those impacts are monitored, and measures to protect the most affected ecosystems and species are taken.

Sectoral integration

1. The legal, administrative and institutional regulations and practices affecting the conservation and use of biological diversity are reviewed and measures to establish harmony between ecological, economic, social and cultural objectives are taken.

2. Appropriate socio-economic policies and incentives are developed and implemented.

3. Management applications, technologies and policies for the prevention or reduction of the adverse impacts of different sectors on agricultural biological diversity are identified and put to work.

4. Financial assistance for the sustainable use of biological resources and the conservation of biological diversity in agricultural areas is developed and provided.

5. Economic measures that urge the sustainable use of steppe ecosystems are taken and implemented.

6. Appropriate socio-economic policies and incentives to support mountain ecosystems and in particular the uplands and the sustainable use of the biological resources of those ecosystems are developed and implemented.

7. Incentives for the establishment and operation of sewer system and wastewater treatment

plants in the settlement areas close to the sensitive inland waters bodies and for the expansion of the irrigation methods which ensure the sustainable use of water sources are determined and implemented.

8. Measures which urge the creation of new income-generating resources for those communities who might be affected from the conservation and sustainable use of coastal and marine biological diversity are taken and implemented.

9. Measures that urge the use of the appropriate fishing gears and techniques which will allow the elimination or lowering to an acceptable level of the adverse impacts of fishery on populations, species, habitats and ecosystems are taken and implemented and the interest groups are trained.

10. Information is provided to policy-makers and the other target groups concerning the conservation and sustainable use of inland waters biological diversity.

11. Alternative management mechanisms are developed for the integration of the social, cultural and economic targets with the nature conservation targets and for the sustainable and rational use of water sources.

Ecosystem-based planning and management

1. Measures to guarantee the collection of the wild flora and fauna species and the sustainable harvesting of them and to minimise the adverse impacts of harvest on the other species are taken and implemented.

2. Programmes which urge more effective involvement of the private sector with the sustainable use of biological resources are developed.

3. Grazing systems based on the bearing capacity of meadows are determined and the programmes for the rehabilitation of the degraded meadows and the generation of additional fodder sources are implemented.

4. General Directorate of Forestry staff are trained in the areas comprising ecosystem-based management, sustainable use, inventory methods, monitoring, data management, multi-disciplinary researches, the management of the protected areas, the environmental education, the environmental impact assessment, and emergency planning.

5. The classification of forest growing areas in at least 10 Regional Directorates of Forestry by way of identifying ecological factors, designating forest growing units, the mapping of them and determining forest yield is concluded.

6. Forest management plans and application rules to support the sustainable use of forest ecosystems and the conservation of biological diversity are integrated and implemented.

7. The biotope maps of minimum 10 areas selected among the unique sensitive mountain ecosystems are created.

8. Superstructures over rivers are designed in such a way as not to block the migration of fish.

9. The integrated terrestrial and water collection/ discharge and river basin management strategies are developed.

10. The regulations and practices which affect the conservation and sustainable use of coastal and marine biological diversity are reviewed and harmony between them and the conservation and sustainable use principles is established, and the regulations which will allow the devising of coastal master plans are introduced.

11. Appropriate policy tools and strategies for an integrated marine and coastal area management are devised and implemented.

Increasing the knowledge and awareness level of people

1. The subjects and texts on biological diversity conservation and the sustainable use of biological resources are included in the national education curricula.

2. Education and information programmes are coordinated.

3. Research results are disseminated by means of both printed and visual tools in such a way as to make them understandable and useable by decision-makers, users and other stakeholders.

The identification, recording, conservation and management of genetic diversity elements

1. A system which allows the recording of plant genetic diversity is developed.

2. Programmes for the in-situ conservation and management of herbaceous and ligneous plant genetic diversity are implemented.

3. A National Botanic Garden and a gene bank are established for the ex-situ conservation of herbaceous and ligneous genetic diversity and for the recording of the same.

4. A system which allows the identification of the genetic diversity of both the terrestrial and aquatic fauna species and the recording of the same is developed.

5. Programmes for both in-situ and ex-situ conservation and management of both the terrestrial and aquatic fauna species are devised.

Access and benefit-sharing

1. Measures to prevent any unauthorised and uncontrolled gathering and export (bio-smuggling) of biological resources are taken and implemented.

2. Mechanisms for the collection, recording and protection of traditional knowledge, for the application of any innovation and practices to conventional information receiving assistance from the people from the area, and for the equitable sharing of the benefits from that process are determined and put to work.

3. The national tools by which the sharing of the benefits from the use of the genetic resources coming from foreign countries with the origin country as well of the benefits from the genetic resources going to foreign countries with Turkey is guaranteed are determined and put to work.

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