COUNTRY REPORTS

THE STATE OF **TURKEY'S** BIODIVERSITY FOR FOOD AND AGRICULTURE

State of Biodiversity for Food and Agriculture in Turkey

Executive summary

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March 2016

Foreword

The diversity of life forms, so numerous that we have yet to identify most of them, is the greatest wonder of this planet. Biodiversity is important at all scales of the agricultural landscape. From billions of different soil microbes that help cycle nutrients and decompose organic matter, to wasps and bats that help reduce crop pests, to birds and insects that pollinate high value crops, biodiversity helps farmers successfully grow food and maintain sustainable farm landscapes.

Turkey's country report on the state of biological diversity for food and agriculture contributes to the preparation of FAO's report on the State of the World's Biodiversity for Food and Agriculture. Turkey will also continue to support the conservation of biological diversity and sustainable use of its components worldwide.

The Report will focus on the interactions between the different sectors (plant, animal, aquatic and forest) and on cross-sectoral matters and will use an ecosystem approach. It will specifically look at the contribution what biodiversity for food and agriculture as a whole makes to food security, livelihoods and environmental health as well as to the sustainability, resilience and adaptability of production systems.

CONTENT

1. Introduction to the country and to the role of biodiversity for food and agriculture

General overview of the country

The Republic of Turkey, which is located in an area where the Asian, European, and African continents come very close to each other, is surrounded by Georgia, Armenia, Azerbaijan, and Iran to the east, Bulgaria and Greece to the west and Syria and Iraq to the south. Turkey's coastlines, which encompass her on three sides with the Mediterranean Sea to the south, the Black Sea to the north and the Aegean Sea to the west, make the country not only a neighbor to the nearby regions, but to entire world as well (Figure 1.1).The area of the Republic of Turkey is 785.345 square kilometer. A total of 3% of the area is located in Thrace on the European continent. The remaining 97%, which is located on the Asian continent, is usually called "Anatolia". The population of Turkey is approximately 75.6 million of which 65.1% live in urban areas. Since the Syrian crisis began in 2011, Turkey - estimated to host over 2,7 million Syrians have maintained. These numbers mean that Turkey hosts a Syrian refugee population of 3.6 % of its population (http://www.orsam.org.tr).

Figure 1.1 Map of Turkey

Turkey is separated into seven large geographical regions by taking into consideration the factors such as climate, topography and natural plant cover: the Mediterranean Region, Aegean Region, Marmara Region, Black Sea Region, Central Anatolia Region, Eastern Anatolia Region and Southeastern Anatolia Region. There are very different types of ecosystems such as coastal and marine, agricultural, mountain, forests, steppes and wetlands (Figure 1.2). The mountain ranges in Turkey generally extend parallel to the coast to the north and to the south. The mountains to the north are the North Anatolia Mountains and to the south are the Taurus Mountains. These mountain ranges are separated from each other by large plains in the central sections of Anatolia. The mountain ranges are concentrated in the eastern sections of Turkey and form high peaks. In spite of Turkey being located in a moderate climate belt, due to the fact that the mountains are parallel to the coast and

diversification of the surface morphology, differences in climate are observed among the regions.

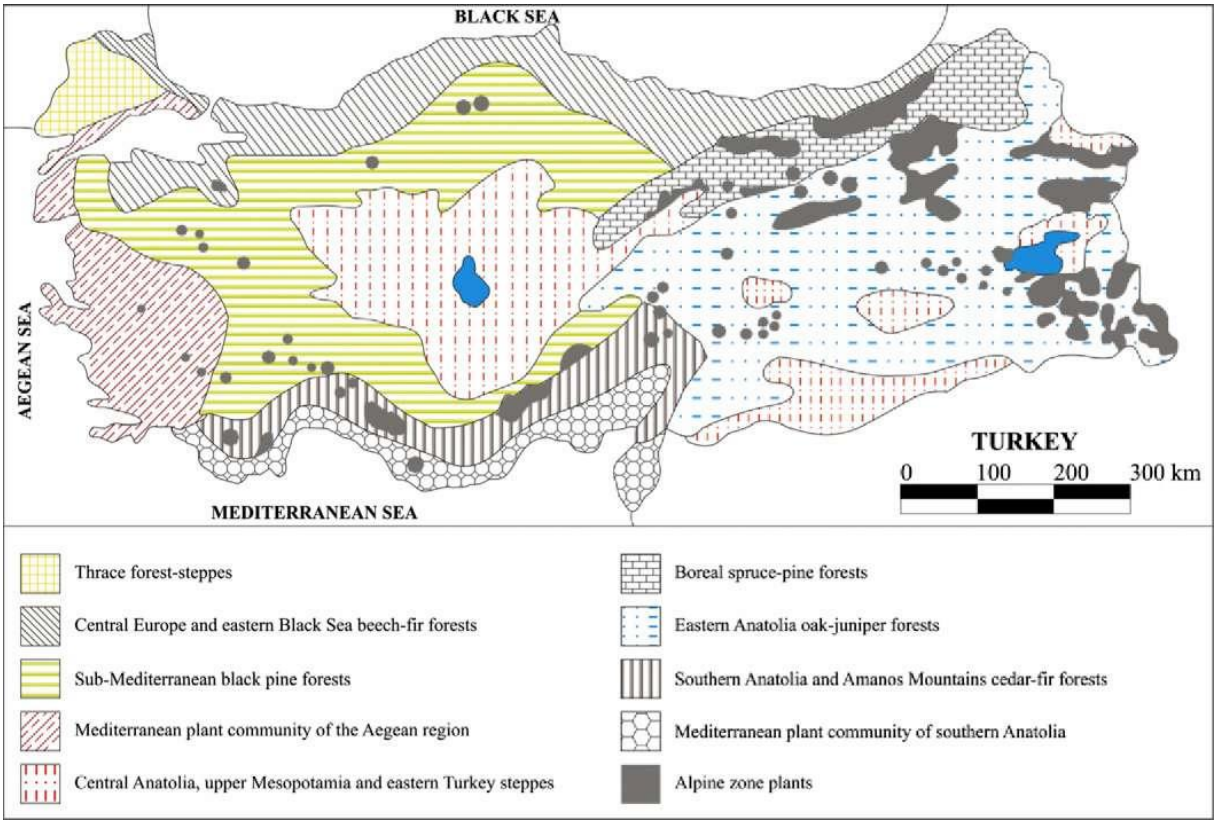

Figure1.2 Map of Turkey's original vegetation cover

The coastal regions have moderate maritime climate, while the internal regions surrounded by the mountains have a continental climate. The Mediterranean Region which is under the influence of the Mediterranean climate has hot and arid summers and mild and rainy winters. 35% of Turkey's total surface area is arable land. Forests cover 27% of the total surface area of which almost 50% are degraded. The Steppe areas which are considered as being the total of grassland, meadows and the marginal areas account for 27% of the total area. The remaining 11% of the total area is for settlements.

Climate

The climate of Turkey is semi-arid with some extremities in temperature (Figure 1.3). Climate and precipitation figures exhibit great variance throughout the country: in the higher interior Anatolian Plateau, winters are cold with late springs, while the surrounding coastal fringes enjoy the very mild-featured Mediterranean Climate. Average annual precipitation is 643 mm, ranging from 250 mm in the Central Anatolia, to over 2500 mm in the coastal area of north-eastern Black Sea. Approximately, 70% of the total precipitation falls during the period between October and April, and there is a little rainfall during summer months.

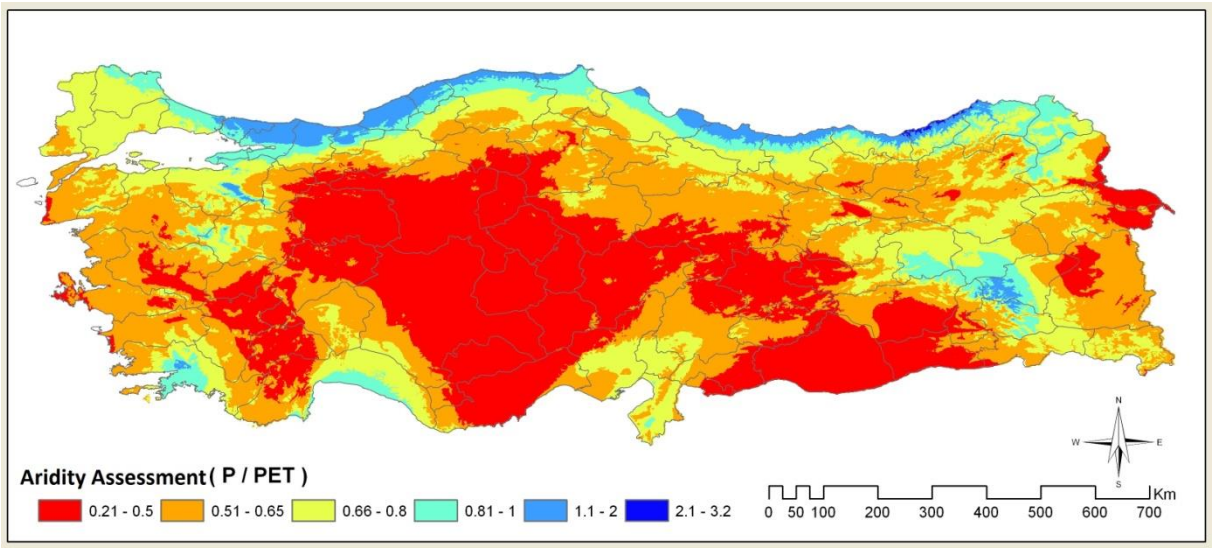

Figure 1.3 Aridity assessment of Turkey based on P/PET relation

Due to the variation in topography, three main climate zones are observed in the country, namely subtropics, temperate and boreal land/or highlands. Three types of rainfall are observed in Turkey: the convective rainfall in Central Anatolia during spring and summer months, the frontal rainfall in all regions, mainly in winter and spring months, and the orographic rainfall on the seaward slopes of the Black Sea and the Mediterranean Sea.

The average annual temperature varies between 15°C and 20°C on the coastal zones, falls to 4°C and 18°C in the inland areas. The mean temperature for the 1970-2015 climatic periods is about 13.8°C. A temperature rise within the range of 2.8 to 5.5 °C over different regions of Turkey is expected by 2070s based on the predictions of the regional climate model (RCM) (Onder et al., 2009). Within the framework of the models, the temperatures will be increasing at about 2°C in winters and 2 or 3°C in summers. The rainfall will be decreasing by 5-15% during the summer seasons. The soil moisture will also be decreasing by 15-25%. (Turkey Water Report 2009)

Biodiversity

Turkey consists of three different biogeographic regions, each with its own endemic species and natural ecosystems. These are the Caucasian mountain forests with the temperate deciduous forest including alpine meadows, Central and Eastern Anatolian Steppe Grassland, and the Mediterranean vegetation in Aegean and Mediterranean regions. The steppe ecosystems are of crucial importance because they are the sources of wild species of plants and animals. Wild species and the genetic variation within them make substantial contributions to the development of agriculture, medicine, and the food industry.

Turkey has a very rich flora and fauna with more than 11.000 species of plants, 162 species of mammals, 460 species of birds, 716 species of fish and 141 species of reptiles (Anonymous, 2013). The flora and fauna cover approximately 9.500 vascular plants, 4.000 lower plants, 60 to 80.000 invertebrates and 1.400 vertebrates (Guner et al., 2012). Out of 9.500 vascular plant species, approximately one-third are endemics and three-quarters of all plant species existing in Europe exist in Turkey. In spite of this rich endemism, some of these species are facing serious threats. According to the IUCN 2001 red list assessment, about 600 of total endemic species are in the category of ‘Critically Endangered –CR’ and about 700 species in the

category of 'Endangered –EN'. Turkey has 5 micro-gene centers where more than 100 species display a broad variation. It is the origin or diversity center of many important cultivated plants and other plant species. Some of the cultivated plant species are *Triticum, Hordeum, Secale, Avena, Linum, Allium, Cicer, Lens, Pisum, Medicago* and *Vicia*. 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*. The total number of cereal varieties developed through the use of local and imported breeds and recorded during the last thirty years in Turkey are 256, of which 95 are wheat varieties, 91 corn, 22 barley, 22 rice, 16 sweet sorghum, 11oat and 2 rye. The richness of variety is also noticeable in fruit production. According to the national plant variety list (2014), the number of fruit and vine registered varieties in 51 species is 1277. Although Turkey's area is 0.1 % of the total world area, 2.4 % of the plant and 2.9 % of the fish and mammal species of the world, are found in Turkey (Anonymous, 2013). Considering the fact that 12.000 species of plants and 500 species of birds occur in Europe, the magnitude and importance of biodiversity of Turkey becomes very clear. In addition, two of the three major flyways for millions of migratory birds, which move between the Western Palearctic and Africa each year, pass through Turkey.

The Taurus Mountains in Mediterranean region, which includes the world's largestremaining Cypress (*Cupressussempervirens*) and Lebanon Cedar (*Cedruslibani*) forests bear very high endemism ratio. Two of the globally threatened species in Europe, black vulture and imperial eagle breed in Turkish forests. Many fresh and cold water sources in our forests harbour native species of trout and provide excellent opportunities for recreational fishing activities Together with the dam lakes, wetlands of Turkey covers an area of 1.851.000 hectares and provides food, habitat, and shelter for large number of water birds and other aquatic species. There are around 3.000 wetlands, of which 135 have international significance. Turkey's wetlands are important for many breeding species of water birds, including a significant proportion of the global populations of some species. Dalmatian pelican (*Pelecanuscrispus*), a globally threatened bird species, breeds in Manyas Lake. Approximately 70% ofthe world population of another globally threatened species, White-headed duck (*Oxyuraleucocephala*) winters in Turkish wetlands particularly at Burdur Lake. Tuz Lake is the most important incubation site of flamingos (*Phoenicopterusruber*) with more than 10000 nests. Turkey's Mediterranean and Aegean coasts provide refuge for the endangered Mediterranean Monk Seal (*Monachusmonachus*), and for the sea turtles (*Carettacaretta*and*Cheloniamydas*).

The wetlands of Turkey are more important than any other country in the region, in enabling migratory birds to make the long journeys by providing them food, habitats, and shelter. Two of the three major flyways for millions of migratory birds, which move between the Western Palearctic and Africa each year, pass through Turkey. More than 200 000 birds of prey enter the route from the Eastern Black Sea region then fly up the River Çoruh and spread out over the wetlands throughout eastern Anatolia. This migration through Turkey is the greatest migration of birds of prey in the West Palearctic Region. The Bosphorus migration route enters Turkey in Thrace from the west of the Black Sea and passes over the Bosphorus to Anatolia from northwest to south. By this route, more than 250.000 storks pass over to Anatolia in groups of 200-700 birds, making for one of the most spectacular bird-movements in the world. Since the country predominantly semi-arid, Turkish wetlands are of crucial importance for many of these migrants. Both the climate and topography have played an important role in maintaining astonishing biodiversity in Turkey.

Agriculture

Turkey's main ecological regions from the agricultural point of view are Mediterranean, Aegean, Black Sea Coastal Regions, Thrace and Marmara, Central Anatolia, Southeastern Anatolia, Eastern Anatolia and the Transition Regions (Northwestern Transition, Western Transition, Northeastern Transition, Eastern Transition, and 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 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. The total amount of arable land and land under permanent crops is about 23 million hectares. The main farming systems are dry and irrigated farming. Irrigable land is 13.6 million hectares arable land. Since the water derivation is not possible through the basins, the only 8.5 million hectares of land can be irrigated economically. The total irrigated area is about 5.2 million hectares. In any given year, about two-thirds of arable land is under crops, and one third is fallow. Little uncultivated arable land remains. The average holding is not more than four or five hectares (10–12 acres) (Republic of Turkey Ministry of Development Report, 2014). Dry grain farming—in which half the land must lie fallow each year— offers little more than a subsistence standard of living (http://www.turkstat.gov.tr/UstMenu.do?metod=kategorist).

Grasslands and meadows constitute about 14.6 million hectares. 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, show forms of transition to the steppe character as rainfall decreases. As a result of higher rainfall and better soil conditions, 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.

CHANGE OF GRASSLAND AREA

Regions	1970 Rural Services*		1991 Agricultural Censuses*		2001 TURSAT Censuses*		1998-2014*		Hay Yield (Kg/ha)
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	
Aegean	1.027.900	1,32	615.900	0,79	802.879	1,03	388.846	0,46	600
Marmara	463.600	0,59	564.100	0,72	552.662	0,71	280.619	0,35	600
Mediterranean	1.002.400	1,29	434.300	0,56	659.334	0,85	501.765	0,66	500
Central Anatolia	5.884.200	7,54	3.890.300	4,99	4.570.182	5,86	3.726.055	4,32	450
Black sea	1.993.100	2,56	1.556.000	1,99	1.533.605	1,97	1.073.371	1,36	1.000
Eastern Anatolia	9.162.100	11,75	4.573.400	5,86	5.485.449	7,03	3.824.257	4,32	900
South Eastern Anatolia	2.165.100	2,78	743.600	0,95	1.012.576	1,30	553.256	0,68	450
TOTAL	**21.698.400**		**12.377.600**		**14.616.687**		**10.348.169**		

* Turkey's surface area was calculated as 78,000,000 ha.
(Source: www.tarim.gov.tr)

One of the most important problems in Turkish agriculture is about size of parcels and their holdings. The size of parcels is usually too small. This small size may not so important problem for the Mediterranean side of Turkey, because the climatic conditions provide excellent conditions for green house production that can be operated feasibly even in small lands.

The rate of agricultural population in total population is getting less as a result of economic development and urbanization. The ratio of agricultural population (villages and towns) was 22,7 % in 2012, 8,7% in 2013, 8,2 % in 2014 (Turkish Statistical Institute, 2014). In terms of employment capacity, agriculture is the main sector. According to 2014 statistics, economically active population (15 years old and over) working in agriculture, forestry and fishing is 5.470.000.

According to the results of the Crop Production Survey (http://www.turkstat.gov.tr/), wheat and barley are the most grown crops with the rates 39.62% and 14.0% of the total arable lands respectively. In terms of sown field area, ratios of the other important crops are sunflower with 3.4%, maize with 3.4%, cotton (raw) with 2.1% and sugar beet with 1.3%. These crops areas constitute 63.8% of the total sown field area. Wheat production takes the first place within cereals production with the rate 32.0%. When distribution of production gained by total cereals area is examined, it can be seen that wheat production with rate 34.5%, barley production with rate 12.2% and maize production with rate 9.8% compose of 56.5% of the total cereals production.

Turkey is pursuing the policy of modernization of agriculture with more irrigated lands and greater transition to privatization in the sector. To ensure the food security, development of well-adjusted production techniques with climatic change is necessary. So, for the food security Turkey has taken preventive measures on natural resources (water, soil and biodiversity etc.) conservation and sustainability. In this concept, Turkey has made important policy and legislative progress including the risk management under the coverage of European Union Harmonization Programs. Agricultural risk management system with public-private sector partnership also exists since 2005. More and more companies that were originally active in other areas are investing in agriculture. The main areas of investment are farm modernization, organic farming, food safety, etc. Moreover, we see more new farms being equipped with modern farm machinery, tools, etc. Mechanization is getting increasingly popular all over Turkey, especially in the western parts of Turkey, where farmers are wealthier and farms sizes are larger.

Rivers in Turkey have generally irregular regimes. The average annual precipitation, evaporation, and surface run off varies with respect to time and geography. In this context, agricultural groundwater management is very important and critical issue for the country. From year to year, operational rights of these irrigation networks are being transferred to irrigation organizations. There are several organizations responsible for development, management and conservation of groundwater resources. General Directorate of State Hydraulic Works (DSI), as a water authority, is the main organization responsible for development, management and conservation of groundwater resources. The responsibilities of SPA include supplying potable water to the rural communities (especially villages) by drilling well, designing irrigation projects to individual farmer irrigations, on-farm development and construction of irrigation channel for irrigation cooperatives. Foundation of irrigation

cooperatives and education of the farmers are performed by Ministry of Food, Agriculture and Livestock (MFAL). Groundwater irrigation schemes have an important role in rural area. It leads to increasing of income so migration to big cities is prevented through groundwater irrigation schemes. At the all types of irrigations, open canal systems were used mostly but recently with a view to saving water and increasing irrigated area per unit water, modern irrigation systems such as sprinkler and drip irrigation have been applied in Turkey (Fayrap and Sargin, 2015).
Approximately 94% of the total area is irrigated by using surface irrigation methods such as furrow, border, and wild flooding. The remaining part is irrigated with pressurized irrigation methods, i.e sprinklers and drips. An area of about 200,000 ha is equipped with sprinkler irrigation systems consisting of portable pipes, which are widely used among farmers in Turkey. In DSI irrigation projects, an area of more than 80,000 ha. has been irrigated by sprinkler irrigation (mainly for sugar beet, cereals, clover, sunflower, melon, and vegetables) (http://en.dsi.gov.tr/hizmet-alanlari/tarim).

1.2 Production systems in the country

Biodiversity for food and agriculture includes the biological diversity present in or of importance to agricultural, pastoral, forest and aquatic production systems.The nutritional and livelihood benefits of diverse production systems are one way of achieving food security. The use of biodiversity for food and agriculture varies among sectors and production systems in Turkey. Table 1.1 shows which of the production systems defined in the Guidelines for the preparation of the Country Reports are relevant for Turkey. In total, thirty two main production systems are distinguished:

Table 1.1 Production systems present in the country.

Sector	Code	Production system names	Present (Y/N)
Livestock	L1	Livestock grassland-based systems: Tropics	N
	L2	Livestock grassland-based systems: Subtropics	Y
	L3	Livestock grassland-based systems: Temperate	Y
	L4	Livestock grassland-based systems: Boreal and / or highlands	Y
	L5	Livestock landless systems: Tropics	N
	L6	Livestock landless systems: Subtropics	Y
	L7	Livestock landless systems: Temperate	Y
	L8	Livestock landless systems: Boreal and / or highlands	Y
Forests	F1	Naturally regenerated Forests: Tropics	N
	F2	Naturally regenerated Forests: Subtropics	Y
	F3	Naturally regenerated Forests: Temperate	Y
	F4	Naturally regenerated Forests: Boreal and / or highlands	Y
	F5	Planted forests: Tropics	N
	F6	Planted forests: Subtropics	Y
	F7	Planted forests: Temperate	Y
	F8	Planted forests: Boreal and / or highlands	Y
Aquaculture and Fisheries	A1	Self-recruiting capture -recruiting capture fisheries: Tropics	N
	A2	Self-recruiting capture fisheries: Subtropics	Y
	A3	Self-recruiting capture fisheries: Temperate	Y
	A4	Self-recruiting capture fisheries: Boreal and / or highlands	N
	A5	Culture –based fisheries: Tropics	N
	A6	Culture –based fisheries: Subtropics	Y

	A7	Culture –based fisheries: Temperate	Y
	A8	Culture –based fisheries: Boreal and / or highlands	N
	A9	Fed aquaculture: Tropics	N
	A10	Fed aquaculture: Subtropics	Y
	A11	Fed aquaculture: Temperate	Y
	A12	Fed aquaculture: Boreal and / or highlands	N
	A13	Non-fed aquaculture: Tropics	N
	A14	Non-fed aquaculture: Subtropics	Y
	A15	Non-fed aquaculture: Temperate	Y
	A16	Non-fed aquaculture: Boreal and / or highlands	N
Crop	C1	Irrigated crops (rice) : Tropics	N
	C2	Irrigated crops (rice) : Subtropics	Y
	C3	Irrigated crops (rice) : Temperate	Y
	C4	Irrigated crops (rice) : Boreal and / or highlands	Y
	C5	Irrigated crops (other) : Tropics	N
	C6	Irrigated crops (other) : Subtropics	Y
	C7	Irrigated crops (other) : Temperate	Y
	C8	Irrigated crops (other) : Boreal and / or highlands	Y
	C9	Rainfed crops : Tropics	N
	C10	Rainfed crops : Subtropics	Y
	C11	Rainfed crops : Temperate	Y
	C12	Rainfed crops : Boreal and / or highlands	Y
Mixed	M1	Mixed systems (Livestock, crop, forest and / or aquatic and fisheries): Tropics	N
	M2	Mixed systems (Livestock, crop, forest and / or aquatic and fisheries): Subtropics	Y
	M3	Mixed systems (Livestock, crop, forest and / or aquatic and fisheries): Temperate	Y
	M4	Mixed systems (Livestock, crop, forest and / or aquatic and fisheries): Boreal and / or highlands	Y
	O1	Other (Greenhouse horticulture)	Y

2. Status, trends and drivers of change

2.1 Effects of drivers of change on associated biodiversity

Turkey has agricultural, forest, mountain, steppe, wetland, coastal and marine ecosystems and different forms and combinations of these ecosystems. The biodiversity Turkey represents is indicative of a delicate and natural balance in the environment. Recently, however, the rapidly developing industry, agricultural mechanization, and rapid population growth are becoming real threats to the natural balance of these ecosystems and to their sustainable management. Rapid population increase in the last century created more demand for food and for agricultural areas. Transformation of wilderness areas into agricultural land, industrialization, agricultural mechanization, excessive use of pesticides in agriculture, and unregulated excessive hunting had a negative impact on wildlife habitats. For these reasons, the magnitude of degradation in wildlife habitats have reached to dangerous levels and, thus, the populations of many plant and animal species were lost or endangered.

Threats to forest and mountain biological diversity and their causes identified in Turkey' s UN Convention on Biological Diversity Fifth National Report (Republic of Turkey Ministry of Forestry And Water Affairs, 2014) as excessive use of forests in mountain ecosystems without considering their carrying capacity both at ecosystem and species levels (hunting, grazing, lumbering, visitors, in-forest constructional activities, etc.), 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 carrying 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 off flora and fauna samples. The threats to coastal and marine biological diversity can be listed as the entry of foreign species, over fishing, illegal fishing, pollution, the destruction of habitats, tourism activities, and interventions with the water regime.

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. More detailed information on effects of drivers of change on associated biodiversity is presented in Turkey's biodiversity for food and agriculture country report.

2.2. Biological diversity and valuing ecosystem services

An important step for ensuring conservation-use balance is to assess the value of biodiversity and ecosystem services. Calculating the value of ecosystem services and incorporating their value into the markets through a well-working, credible system can increase investments on nature conservation. In Turkey, as well as worldwide, impact on ecosystem services must be taken into account in cost-benefit analyses used to help make decisions on land use policies and construction permissions. Thereby, value of ecosystem services that currently do not have a market value can be taken into account; excessive damage on natural systems and ecosystem services can be prevented. In this sense, a new system is needed where costs of impacts on water supply, carbon capture and other ecosystem damage are incorporated into the product prices. The system in question will be the first step for additional financing of biodiversity conservation and it will transform into a driving force for conserving and restoring natural resources. There are current debates on how agricultural areas should be allocated for food, animal feed and fuel and whether these lands are sufficient for the global demand. Moreover, areas needed for protecting biodiversity and sustaining ecosystem services should be prioritized in line with population increase. Effective land use planning for limited land size and efficiency must be completed and implemented.

3. The state of use of biodiversity for food and agriculture

The use of biodiversity for food and agriculture varies among sectors and production systems. Plant genetic resources for agricultural development are crucial for sustainable production, providing the biological basis for food security and supporting the livelihoods of people. These resources are the plant breeder's most important raw material and the farmer's most essential input for improving the quality and productivity of crops. The contribution of genetic resources in agriculture has shaped the development of humanity through the past 10,000 years. Turkey is one of the most significant countries in the world in terms of biodiversity and animal genetic resources. Archaeological findings show that sheep, cattle and goat were domesticated in Anatolia or close to this area (Fertile Crescent). The rich genetic diversity of Anatolia results from the accumulated and blended genetic diversity of farm animals belongs to different cultures that lived and ruled in different times. Various environmental conditions that Anatolia's wide geography holds the different needs and preference of livestock breeders also contribute to diversity of farm animal genetic resources. The rich genetic diversity of Anatolia results from the accumulated and blended genetic diversity of farm animals belongs to different cultures that lived and ruled in different times. Various environmental conditions that Anatolia's wide geography holds the different needs and preference of livestock breeders also contribute to diversity of farm animal genetic resources. Breeding studies, unconscious cross breeding, importation of exotic breeds and AI implementations especially in cattle resulted in decrease or loss of diversity on animal genetic resources. Moreover, some of the breeds have been lost without characterization and recording (The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture, 2013). The less direct aspects of the relationship between conservation of access to genetic resources relate to the concept of sustainable use that has become the basis of much conservation policy and discourse in recent years. Turkey is a major agricultural producer. With respect to its climate and land nature, Turkey is suitable for the production of various products. Turkey, while performing the agricultural development project to assure its own food security, also contributes to the achievement of food security in her region and eventually, to the global food security by being the exporter in major commodities such as vegetables, fruits and nuts.

Turkey will continue to support the development of international systems for conservation and use of plant genetic resources as being part to International Treaty for Plant Genetic Resources for Food and Agriculture. For short term country developments, the role of plant genetic resources in economic development (e.g. new products and new crops and niche production and markets) and the contribution regarding agricultural sustainability (e.g. organic farming or ecological farming) are considered to be the most important issues.

4. State of interventions on conservation and use of biodiversity for food and agriculture

Since 1960s the conservation of plant diversity is become extensively government policy. The conservation programs in Turkey can be evaluated as programs concerning forest trees, herbaceous and woody relatives of crop plants, and pasture species. Although the some of the agricultural policy affect the plant diversity the conservation of plant diversity is an important strategy in Turkey. A regulationon "Collection and Utilization of Plant Genetic Resources" was issued in 1992 to regulate the principles of conservation of plant diversity exist in Turkey, and organize the responsibilities and activities on conservation and utilization of plant diversity. The "National Plan on *In sit*u Conservation of Genetic Diversity of Turkey"

published in 1998, covers all actions in systematic plan to protect *in situ* the plant genetic diversity in their natural habitat and in their agro-ecosystems. This is a plan which incorporates the agricultural policies set the relevant policy objectives, specimen priorities protection, management and public awareness activities. The Regulation and the national plan are incorporation with "National Biodiversity Strategy Action Plan" as its components. Various institutions, ministries and organizations have undertaken duties and responsibilities for conserving the biological diversity. The protection of forests against any possible threats is under the security of Turkish laws and regulations, since the ownership and the rights of utilization of forest resources belong to the state in Turkey, but it is difficult to say that the government regulations for sustainable use and conservation of wild, economic and aromatic plant species which occur mostly in forest and other government lands are sufficient. Nevertheless, various programs with different purposes and in different status such as the National Parks, Nature Conversation Areas, Nature Parks, Natural Monuments, Seed Stands, Gene Conservation Forests and Gene Management Zones have been all established and managed by institutions within The Ministry of Forest and Water Affairs (MFA). More detailed information on State of interventions on conservation and use of biodiversity for food and agriculture is presented in Turkey's sectoral country reports on plant, animal and forest genetic resources.

5. Future agenda's

5.1. Drawing up a national biodiversity action plan

The Strategy prescribes actions proposed to build on existing infrastructure and activities, which will contribute to the achievement of the conservation of biodiversity and sustainable use of biological resources as required by the Biodiversity Convention. The priority action plan calls for a range of projects, which begin the integrated implementation of the Strategy for Turkey. Actions outlined for immediate pursuit are as follows:

1. Arrangements regarding legal and institutional problems, for the conservation of biodiversity.
2. Establishment of protected areas and preparation of management plans for fauna and flora species especially for endemic and endangered ones.
3. Provide training to all levels of the society on conservation concepts, principles and sustainable use of natural resources.
4. Promote environmental public awareness through involvement of all stakeholders (agencies, NGOs, media).

The Turkish Biodiversity Strategy and Action plan has been developed and is presented here as a guide to implementing the Biodiversity Convention in concert with other obligations and addressing the difficult issues posed by the loss of biodiversity. The implementation of the strategy will be handled altogether with members of the public and stakeholders, and will pursue the strategic directions according to its policies, plans, priorities and fiscal capabilities.

5.2. Increasing the production and consumption of organic food and good agricultural practices

The national program experiences that farmers are excited about sharing their knowledge and wish this disseminated. Governmental incentives with the aim to promote organic farming and traditional farming of agricultural ecosystem are also considered to be a part of the national policies recognizing traditional knowledge and to preserve local varieties/land race Organic farming and organic products are getting more and more popular in Turkey in parallel with the growing importance and popularity of organic products in Europe. In addition to this, Turkey has a great advantage in the sense that there are still available lands in Turkey without any pollution which is perfect for organic production. Organic production of some vegetable and fruit varieties has been grown since it started in 1985. In 2002, around 90 different kinds of agricultural products were organically produced in Turkey. Due to growing demand from EU countries, great majority of the current production is exported to the EU. With a law approved by the Parliament in December 2004, there are more strict regulations on production and labeling of organic products.

Good Agricultural Practices has grown rapidly throughout Turkey in recent years as a result of increasing consumer interest in healthy food and environmental concerns. The use of land in this operation helps to conserve the environment and promotes the sustainable use of natural resources. Turkey is a typical case among developing countries of the establishment of good agricultural practices based on export potential. In this context, Environmentally Based Agricultural Land Protection Project (ÇATAK) have been carried out on the sustainability of renewable natural resources, appropriate soil cultivation techniques, generalization of irrigation and similar cultural measures, decreasing the negative effects of agriculture by taking necessary measures, prevention of erosion, good agricultural practices and organic agriculture and raising awareness of local people. The project disseminated to 27 provinces and up to now for 37,7 thousand hectares 40 million TL paid as support to 12.933 farmers (Structural Changes and Reforms On Turkish Agriculture, 2003-2013)

5.3 Bringing national laws and regulations in line with international commitments

The Turkish Constitution, Laws and Regulations and international conventions in the field of nature conservation (i.e., NEAP, Paris, Ramsar, Bern, CITES, UNFCCD etc.) provide the legal framework for seeking the strategy for continuity of biodiversity in Turkey. In order to secure sustainable development, there is need to determine national objectives and policies related to environment along with all other plans and policies. An initiative began in early 1995 to prepare a "National Environmental Action Plan (NEAP)" under the co-ordination of Republic of Turkey Ministry of Development of Turkey and Ankara Office of the World Bank. Nineteen different study groups each including several experts from universities, ministries, research organizations, NGOs and the private sector were formed. One of these study groups worked on the "Biodiversity Action Plan for Turkey". Due to the broad coverage of this subject, this particular study group was further divided into three sub-groups (on forest, wetlands and steppe ecosystems) and two additional studies were completed on legal and institutional arrangements for biodiversity conservation and the role of NGOs in biodiversity conservation. It is the result of this overall process, which has been combined to develop this strategy and action plan for the conservation and sustainable use of biodiversity in Turkey.

The Strategy implies the important role of Turkey, which is working in cooperation with other countries, towards the implementation of the Convention. The responsibility for conserving biodiversity and ensuring the sustainable use of biological resources is a shared responsibility among various governmental institutions, and across various sectors.

The Strategy provides a framework for action at all levels that will enhance the ability to ensure the productivity, diversity and integrity of the natural systems and, the ability to ensure sustainable development.

6. Conclusions and recommendations

Turkey has been undergoing major economic changes in the 1990s, marked by rapid overall economic growth and structural changes such as privatization of State enterprises, price liberalization, integration in the European and global economy. However, the share of the informal sector in the Turkish economy remains high. Turkey's population has reached 75.6 million and remains one of the fastest growing in the OECD. Major migrations from rural areas to urban, industrial and tourist areas continue. Since the Syrian crisis began in 2011, Turkey - estimated to host over a Syrian refugee population of 3.6 % of its population (http://www.orsam.org.tr). Syrians will stay in Turkey for an extended period of time, and some might spend their whole life in Turkey. If Syrian refugees are to become permanent and a reality for Turkey, measures that will minimize the negative consequences and maximize the benefits need to be introduced.

Turkey now confronts the challenge of ensuring that economic growth is associated with environmental and social progress, namely sustainable development. During the 1990s, it has experienced increasing environmental pressures, reflecting rapid sectoral growth in energy, industry, transport and tourism. A number of institutional and legislative elements of environmental reform have been put in place. A national environmental plan, remarkable in many ways, was adopted in 1998 as part of the national development planning effort. Although current emissions and discharges per capita remain low compared to OECD per capita averages, much of the necessary environmental infrastructure must still be created in urban and industrial areas. The road towards environmental convergence with other OECD countries will be a long one, and will require strengthened environmental efforts from central government, municipalities and the private sector, as environment has had a relatively low priority in Turkey.

The challenge is therefore to:

i) implement environmental policies and strengthen environmental infrastructure;
ii) better integrate environmental concerns in economic decisions; and
iii) meet the country's international environmental commitments.