



TURKEY

National Basin Management Strategy

Sector Note

Final Draft

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TURKEY

Support for Developing a National Basin Management¹ Strategy

Sector Note

1. Introduction

1. Turkey's impressive economic performance of the past decade² has been accompanied by social and environmental outcomes. In addition to increasing environmental pressures associated with growth in energy use, industry, transport, tourism, and agriculture, water management, soil erosion, and nature protection remain a long-term challenge. As part of pre-accession efforts of convergence with the EU Environmental Acquis, Turkey has put in place a range of regulatory and institutional reforms as well as prioritized investment programs in infrastructure, pollution mitigation, and afforestation. Some of these measures have also recently been reflected in the country's new climate change strategy.³

2. The latest assessments of Turkey's environmental performance by OECD⁴ and the European Commission⁵ find significant progress in afforestation (some 400 million seedlings planted by 2007), increased area under improved protected area management (currently 5.3% of the country's total land area), and increased public participation in conservation projects and management plans. At the same time, Turkey continues to face significant challenges from watershed degradation in the form of loss of important environmental services, including inter alia biodiversity, soil nutrients, and water quality and availability, with economic and social consequences, including:

- adverse on-site effects in terms of reduced crop and biomass yield which directly affect farmers and rural households; and

¹ The following broad definitions are used throughout this Sector Note: (i) *Watershed*. The key characteristics of a watershed that drive management approaches are the need for integrated land and water management, the causal link between upstream land and water use and downstream impacts, the typical nexus in upland areas between resource depletion and poverty, and the multiplicity of stakeholders; and (ii) *Watershed management* is the integrated use of land, vegetation, and water in a geographically discrete drainage area for the benefit of its residents, with the objective of protecting or conserving the hydrologic services the watershed provides and of reducing or avoiding negative downstream or groundwater impacts. Watershed management approaches need to be adapted to the local situation and alternatives may need to be considered (World Bank 2008)

² Turkey's GNI per capita for the period 2002-2008 reached US\$ 9,340, more than threefold that of the period 1990 (World Bank (2009)).

³ MoEF (2009).

⁴ "OECD (2008).

⁵ In its latest country progress report, the European Commission (2009) finds that: "No progress can be reported on **nature protection**. The continuing loss of habitats is a cause for concern. The list of potential Natura 2000 sites has not yet been compiled. Adoption of a framework law on nature protection and implementing legislation on birds and habitats has again been postponed. A national biodiversity strategy and action plan remains to be adopted. Legislation in policy areas linked to nature protection requires particular attention."

- externalities with significant downstream opportunity costs in the form of reduced water quality and availability, flood control management, and higher maintenance cost of water storage and conveyance infrastructure.

3. Through its State Planning Organization (SPO), the Government of Turkey has started to prepare a National Basin Management Strategy (NBMS) to inform its longer-term investment program in watershed rehabilitation and water management and ensure that such investments meet key objectives, including livelihood support and income generation, conservation and sustainability of natural resources, reduced vulnerability to climate change, and fiscal efficiency. The preparation of the strategy builds on a few General Directorate of Afforestation and Erosion Control (AGM)-led rehabilitation projects as well as a pilot watershed management project (including the ongoing World Bank-financed Anatolia Watershed Rehabilitation Project, and the EU-financed Capacity Development Assistance for Water Sector in Turkey - see details in Table 1), and the work by the General Directorate of Environmental Management (GDEM) on Watershed Protection Action Plans for Turkey's 25 river basins⁶.

4. The NBMS will be a critical component of a strong integrated natural resource management policy framework and strategy that prioritizes the needs of the country, is consistent with EU environmental and water management standards, and strengthens Turkey's sustainable development agenda. Such a comprehensive natural resource management strategy will be a key component of adapting to climate variability and change⁷, with potentially significant mitigation co-benefits in the form of reduced GHG emissions and provision carbon sinks⁸.

⁶ "Eleven basin plans are about to be completed within the framework of the "Basin Protection Action Plans Project", which is included in the 2010 Investment Program with Project ID "2009K050420". The objective of the project is to ensure that Basin Development Action Plans, which are executed pursuant to the provision "prepare protection and utilization plans for water resources, and carry out necessary studies to ensure integrated management of inland water resources and soil resources on an individual basin basis," in Article 9(k) of the Law No. 4856 on the Organization and Duties of Ministry of Environment and Forestry and which has been completed in the Akarçay, Ergene, Gediz and Van basins to date, are implemented in all basins. In this context, the subject draft document can be a source that needs to be evaluated by the Ministry of Environment and Forestry in the process of the preparation of Basin Protection Action Plans in Turkey." (SPO communication, 01/24/2011)

⁷ Climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. Climate variability refers to the variations (ups and downs) in climatic conditions on time scales ranging from months to millennia (includes droughts and floods) (IPCC 2007).

⁸ While agriculture contributes some 7% of total GHG emissions (about 20% from soils, and 75% from livestock production and manure management), net removals of green house gases from land use, land use change and forestry (LULUCF) amount to some 75 million tons of CO₂e (1997). More generally, as part of its strategy to accelerate pre-accession convergence with the EU Acquis and take advantage of significant amounts of EU grant financing, Turkey will need to align its strategy with Europe's 2020 vision of sustainable growth, driven by resource efficiency and a greener and more competitive economy. Such an approach, which the NBMS will contribute to, will help Turkey move towards low-carbon, energy secure and efficient economy, underpinned by social cohesion, while preventing environmental degradation, biodiversity loss and unsustainable use of resources.

5. A key focus of the NBMS will be to build on Turkey’s experience—in light of global practice— with prioritizing public investments in watershed rehabilitation and the costs and benefits of different interventions. The strategy will provide a platform for involving a broad range of stakeholders both within and outside of government in helping to articulate investment priorities, which should reflect, among other things, perspectives on soil conservation and management, problems of water access and use, priorities on nature conservation, and climate change adaptation and mitigation. Moreover, the NBMS would provide an opportunity to review roles and responsibilities of different agencies with the aim of improving inter-sectoral coordination, reducing transaction costs, and streamlining program planning, implementation and monitoring.

2. Objectives and Approach

6. A central priority of the new NBMS will be scaling up the rehabilitation of large watershed areas in order to reverse the long-term trend of environmental degradation, maintain and improve the productivity of land, water, and forest resources, and improve the welfare of the rural population, particularly in central and eastern parts of Turkey. This is neither costless nor easy. Therefore, before scaling up, the Government has decided to take stock and identify where and how to upscale watershed rehabilitation to combine with sound land use and water resources management, and to take into account the costs and benefits of various interventions and associated trade-offs. An additional objective of the NBMS is to guide watershed management to adapt effectively to climate variability and change. Furthermore, the Government envisages a strategy that and enjoys broad ownership by the main stakeholders.

7. While the overall goal behind Turkey’s State Planning Organization (SPO)’s initiative to develop a NBMS is to enhance the capacity of the Government to undertake watershed management investments, through improved spatial targeting and scale, cost effectiveness, and stakeholder ownership, the more specific objective of this Sector Note is to contribute to the preparation of the National Basin Management Strategy by: (i) providing an analytical summary of key sector issues, and government policies and institutions for basin management, with a particular focus on land use, water management, environmental policies, and climate variability and change; and (ii) reviewing international practice and lessons learned; and (iii) identifying priority areas where additional analysis and consultations are needed in order to develop policy options for sustainable basin management.

8. The NBMS will help the Government of Turkey identify priority investments and institutional arrangements—including regulatory, economic incentive, and participatory measures that would allow it to maximize the social and economic benefits of public investments and build capacity among key stakeholders—including local governments, communities, and the private sector as part of the process of building resilience of its rural economy and ensuring the sustainability of its natural resource base. Therefore, the process of developing the NBMS is as important as the recommendations that will result from it.

9. This Sector Note is a joint Government of Turkey-World Bank product. It is meant to be a background and scoping piece. It summarizes and expands on the results of the March 3, 2010 stakeholder workshop, through discussions with key natural resources management agencies involved in watershed management, and a desk review of existing analytical work, international experience, and project completion reports from the pilot investment phase. The Sector Note is divided into eight main sections. Following short sections covering introduction and objectives, section 3 reviews Turkey's natural resource base within a watershed management context, section 4 reviews issues related to natural resource degradation, section 5 presents an overview of governance of the sector, section 6 reviews Turkey's experience, followed by a review of international experience in section 7. Finally, section 8 last outlines a methodology for additional analytical work, and identifies the main sector policy and institutional issues to be addressed in details by the NBMS.

3. Natural Resource Base for Basin Management in Turkey

10. Turkey's climate is predominantly semi-arid (Figure 1). The country's 78 million ha land area supports three economically and environmentally important land uses, arable land predominantly--under rainfed agriculture, pasture, and forests (Figure 2), spanning diverse agro-climatic zones, including the temperate climate of the Black Sea region, the continental climate of the interior, the climate of the Eastern Anatolia Highlands, and the Mediterranean climate of the Aegean and Coastal Mediterranean regions. The country receives an average of 643 mm of rain annually, with a high spatial variability (220 mm to 2,500 mm) decreasing eastward. While the Black Sea coast receives the greatest amount of rainfall, the Aegean and Mediterranean coasts are characterized by cool, rainy winters and hot, moderately dry summers, and annual precipitation from 580 to 1,300 millimeters. The eastern part of that coast averages 1,400 millimeters annually and is the only region of Turkey that receives rainfall throughout the year. However, overall meteorological data shows that 96 percent of the country plants receive insufficient moisture during the growing period,⁹ and the combination of a diverse topography, poor soil quality in many areas, and varied climatic conditions add to the challenges faced by the farmers and decision makers alike.

⁹ World Bank (2007)

Figure 1. Turkey's aridity assessment (DSI 2009)
[yellow= arid; green=humid]

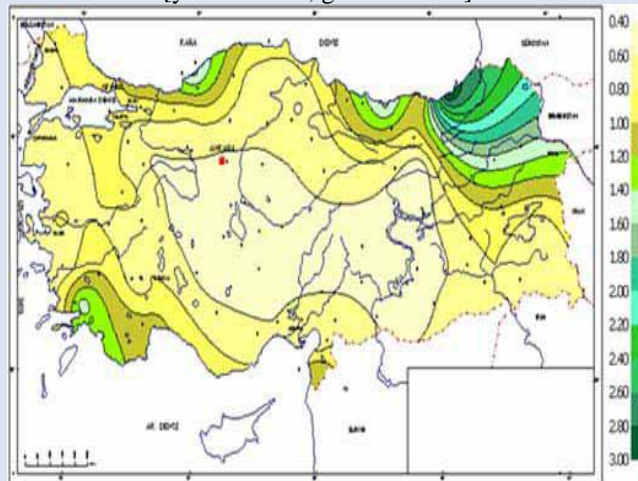
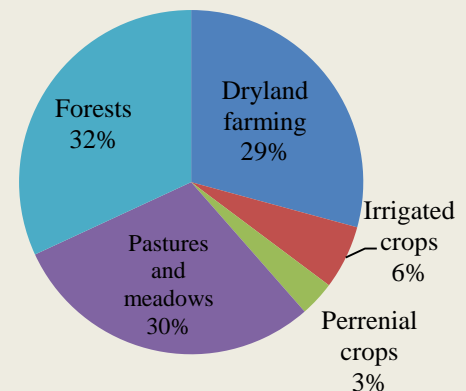


Figure 2. Land use in Turkey



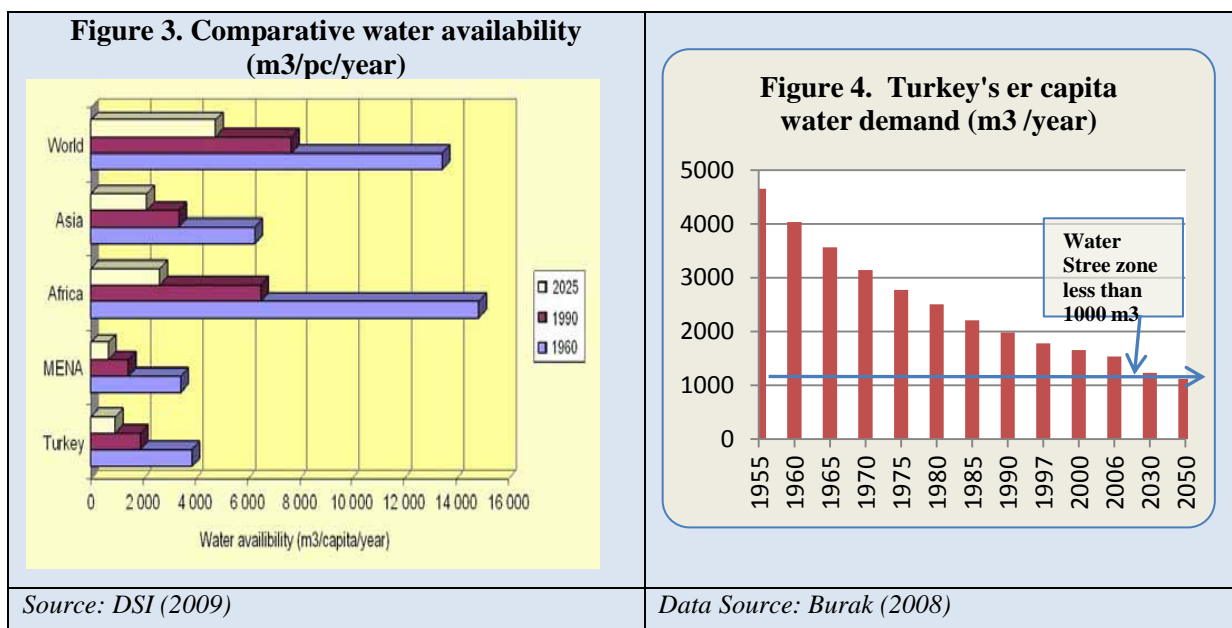
Water Resources

11. By international standards¹⁰, currently with a renewable water resource potential of 3,500 m³ per capita per year, Turkey is considered a “water stressed” country. However, taking into account the fact that only about 1,500-1,735 m³ per capita are technically and economically usable¹¹, by the time Turkey’s population reaches 100 million, water availability will drop to 1,000 m³ per capita, making Turkey a “water poor country” (Figure 3 & 4).

12. Turkey divides into 25 hydrologic basins (Figure 5) with a total average annual flow of 193 km³ almost a third of which is accounted for by the Euphrates (Firat) and the Tigris (Dicle) rivers, both of which have their sources in the eastern part of the country (DSI, 2007).

¹⁰ WWF (2006). Countries with less than 1,000 m³ of usable water per capita/year are classified as “water poor”, countries with less than 2,000 m³ as “water stressed” and countries with more than 8,000-10,000 m³ are “water rich”.

¹¹ Based on DSI (2010) estimates that water potential which is technically and economically available is only 112 billion m³.



13. Agriculture is the main water using sector in Turkey. Worldwide, around 70% of freshwater resources are used for irrigation, 22% for industry, and 8% for urban consumption. While in Europe, irrigation, industry and urban use 33%, 51% and 16% of water resources respectively, in Turkey, agriculture uses around 74% of water resources, followed by urban (15%) and industry (11%) (Table 1).

Table 1. Sectoral Use of Freshwater Resources (%)¹²

SECTOR	World	Developed Countries	Developing Countries	Least Developed Countries	Europe	Turkey
Agriculture	67-70	39	52	86	33	72 - 75
Industry	22- 23	46	38	7	51	10 - 12
Urban Use	8- 10	15	10	7	16	15- 16

Agriculture

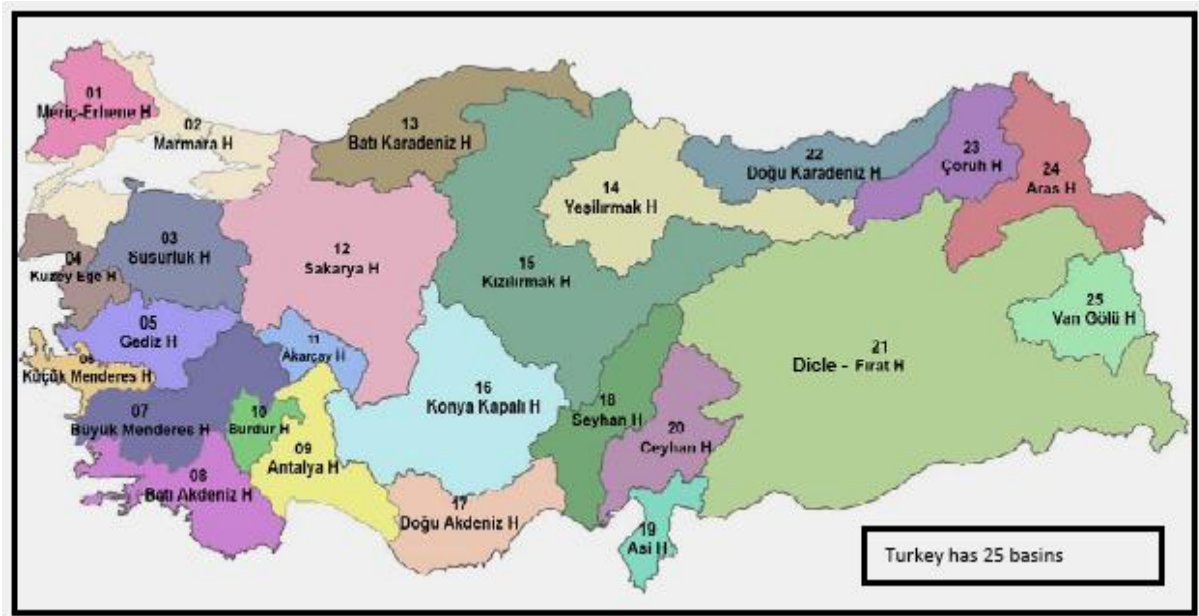
14. With 28 million hectares of arable land, Turkey's agricultural sector is of significant importance to the country's economy. Agriculture accounts for 9.2 percent of GNP and 27.3 percent of employment¹³. While employment in agriculture is still high, it has been declining during the last two decades with the resultant rural-urban migration. But over the last 25 years, agriculture grew at only about one-third the rate of overall GNP. Sector productivity is comparatively low because of a combination of factors, including agro-climatic conditions (e.g., aridity and limited

¹² Ministry of Environment and Forestry, 2005

¹³ Figures adapted for 2008 from Ninth Development Plan (2007-2013) ("While the share of agriculture in GDP, which was 14.1 per cent at the beginning of the 8th Plan period, declined to 10.3 percent in 2005, the share of agricultural employment in total employment decreased from 36 per cent in 2000 to 29.5 per cent in 2005").

rainfall), the persistence of traditional on-farm practices, and a policy environment including price distortions that have led to unsound agricultural practices, including overemphasis on the use of agrochemicals with serious effects on soil and water quality.

Figure 5. Turkey's River Basins



15. Generally, agricultural productivity differences across rural areas are a reflection of differences in resource endowments, the status of the natural resource base, and access to public infrastructure. Some 40 percent of Turkey's poor depend on agriculture, and poorer regions tend to derive a larger share of their income from agriculture and have significantly lower agricultural productivity. In addition, compared to lowlands, the incidence of poverty is higher in mountainous areas due to the precarious state of the natural resource base and limited opportunities for income diversification.

16. The consequent dependence on forests to provide goods and services for the rural poor is much greater than in other areas. In mountain villages, land for agriculture and pasture (a crucial determinant of income) is severely limited. On average, households in forest areas have access to 2.5 ha of land, which compares with the average for all rural households in Turkey of 6.4 ha. In addition, over half of villagers are completely dependent on wood for heating and cooking. The scarcity of good farming land in mountains and other forested areas leads communities to be dependent on mixed land uses, including grazing, making livestock management a much more important livelihood strategy in these areas than most other farming options.

17. The Government started addressing these issues in the framework of an overall structural reform program¹⁴ which includes an ambitious program of irrigation expansion to mitigate the insufficient and uneven distribution of rainfall. While the

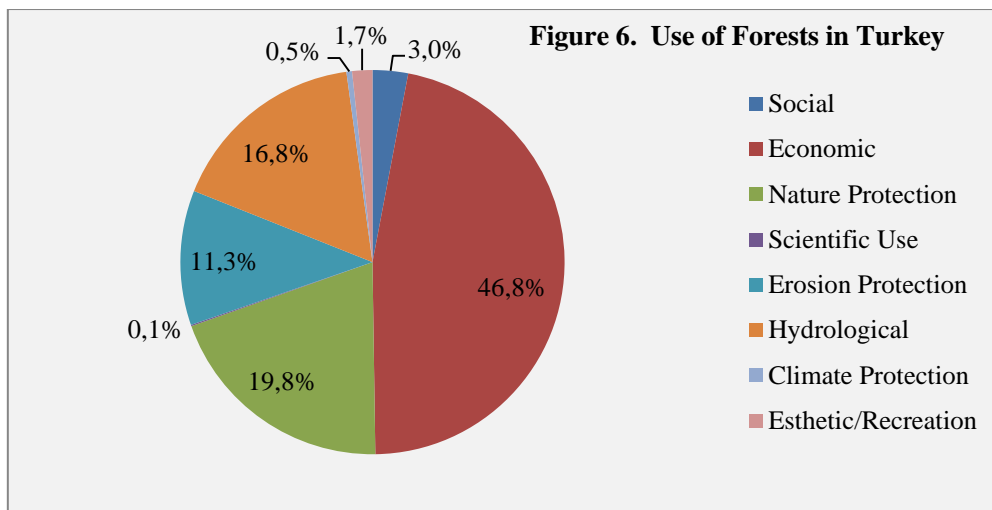
¹⁴ Supported by the IBRD Agricultural Reform Implementation Project (ARTP)

gross irrigated area increased 2.4 fold from 2.3 million ha in the 1970s to 5.4 million ha at the end of 2009 in 40 years, the General Directorate of State Hydraulic Works (DSI)¹⁵ estimates that overall about 8.5 million ha of land is economically viable for irrigation development, and that by 2009, 64 percent of this technically irrigable area has been opened for irrigation.¹⁶

18. This significant expansion of water resources for agriculture needs to be matched by both supply and demand side measures to improve resource use efficiency and maximize the economic life in infrastructure investments, including inter alia adequate resource pricing and cost recovery for at least operation and maintenance, efficient water use and conservation through utilization of modern technologies in the transfer, distribution and conveyance systems (e.g., replacing canal with pipe irrigation systems through new projects and rehabilitation of old networks), and conservation of upper basins to reduce sedimentation of dams, reservoirs, and irrigations canals. Furthermore, agricultural production planning must also be done by taking into account the limited water resources. Additionally, in the establishment of industrial zones and settlement areas under land use plan, a strategy considering the water resources must be adopted.

Forest Resources

19. Nestled between the Mediterranean and Central Asia, with 32 percent of its territory covered with forests, Turkey has one of the largest biologically rich and diverse forest estates in the region. Covering nearly 21,000,000 hectares, some unique features of Turkey's forests include the presence of Scots pine at 2,700m growing in a continental climate. About half of the forests are managed for timber, while the rest is broadly managed for conservation (Figure 6).



20. Control of the forests of Turkey passed into state management in the 1950s and this has allowed a careful management of the woodlands, both for timber

¹⁵ General Directorate of State Hydraulic Works, Presidency of Operation and Maintenance Department

¹⁶ Overall, 85% of irrigation is from surface waters--with about half through multi-purpose dams. In addition, while gravity-based canal irrigation is still the predominant technology, pressurized, sprinkler and drip irrigation systems are being introduced at a fast pace.

purposes and for tourism to develop. Under Turkey's program to increase the amount of wooded land, there was even an increase in the amount of forests of Turkey from the end of the 1970s. Efforts are carried on for sustainable management of forests, which are the main sources of environmental services such as water quality and temporal distribution, and wood production and biodiversity. While industrial and soil protection plantation constituted 10 per cent of the total forest area in 2000, this ratio increased to 12 per cent at the end of 2005. In addition, some forest areas were started to serve as urban forests in 52 provinces. However, approximately 9 per cent of the afforested areas during the 8th Plan period (2000-2006) were destroyed by fires and 17 per cent of those were excluded from the scope of the forest regime.

21. Despite the progress achieved, important problems in this area include the inability to complete the cadastral procedures and road infrastructure within the sector, limited number of national parks and similar protected areas, not enough attention given to the importance of non-wood products and services, inadequacy of forest maintenance activities and low levels of annual forestation to avoid erosion and ensure long-term wood supply and demand balance. In addition, problems such as lack of training focused on ecosystem approaches to forest management and lack of technical personnel and workers specialized in the relevant activities also constitute important bottlenecks in the utilization of the resource within a sustainable forest management approach and in increasing competitiveness of wood processing industries.

Biological Diversity and Ecosystem Services

22. At the crossroad of Europe, Asia, and Africa, and surrounded by three seas, Turkey is characterized by both climatic and ecosystem diversity. Its three main biogeographic areas (Europe-Siberia, Iran-Turan and Mediterranean) are home to three major types of ecosystems (mountains, steps and wetlands), resulting in a unique ecosystem and genetic diversity which are of critical importance to the country's food and agriculture production systems.

23. Moreover, while Turkey is a major migratory route and home for more than 400 species of birds, its seas and inland fresh water systems are biologically very rich and support a large variety of fish species. In addition, with 135 internationally important wetlands covering some 1.92 million ha area,¹⁷ the country includes some of the most important wetlands in the world, providing a variety of ecosystems services both within Turkey and regionally.

24. Over the past 20 years, Turkey has made steady progress in protecting its natural resource capital. However, despite a doubling of land under conservation, with 5.3 percent of the country's land area formally classified "protected areas," Turkey remains far behind its own 10 percent domestic target and the 16.6 percent average in OECD member countries.

¹⁷The Ramsar Convention on Wetlands of International Importance, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and sustainable use of wetlands and their resources.

25. With massive water infrastructure development over the years--including in water storage, flood prevention, irrigation development, water supply for industrial and household use, and energy production--Turkey has clearly leveraged its natural resource capital for economic growth and poverty reduction. At the same time, a lot of these investments have impacted the natural structure of many wetlands and therefore negatively impacted their biological diversity and the ecosystem services they provide. Within the last 40 years, nearly 1.3 million ha of wetland habitats have been destroyed and key ecosystem functions lost (e.g., Amik Lake, Avlan Lake, Suğla Lake, Kestel, Gavur, Yarma, Aynaz, Hotamış, Eşmekaya reed beds)¹⁸.

4. Degradation of the Natural Resource Base in Turkey

26. Natural resource degradation is driven by many institutional and socio economic factors (Box 1). Soil erosion in particular is a major issue in Turkey; it is a slow process that results from a combination of natural fragility, and lack of effective land management, driven mainly by policy and institutional factors related to deforestation, crop and livestock production, as well as management of water resources. In addition to onsite impacts which are reflected in loss of soil nutrients and lower yields (with direct impacts on farmers' incomes), soils degradation also results in offsite impacts from sedimentation of reservoirs and water bodies (and consequent economic impacts on water quality, fisheries resources, hydropower generation, flood management, and navigation).

27. Deforestation to meet increasing timber, fuel and fodder demands, together with overgrazing of rangeland, farming of steep slopes, and the lack of effective soil conservation practices on agricultural land have resulted in widespread degradation of land and water resources. Over 57 million ha of land in Turkey suffer from erosion, including: (i) 15.6 million ha (27.4%) moderately eroded, (ii) 28.3 million ha (49.6%) highly eroded, and (iii) 13.2 million ha (23%) severely eroded (General Directorate of Agricultural Research (2010)).

Box 1. Factors Driving Natural Resource Degradation

- *Market failure:* Where a lack of clear prices or values for natural resources, or poorly functioning markets and distorted relative prices can result in misallocation of resources, resource exploitation, and subsequent degradation.
- *Policy failure:* Where inappropriate government policies, or an absence of required policy, result in market distortions for natural resource use, aggravated market failures, and natural resource degradation.
- *Institutional failure:* Where a country lacks the necessary government structures, environmental legislation and regulations, or where a decline in traditional land use management processes occurs, resulting in natural resource degradation.
- *Implementation failure:* Where a country lacks the technical capacity and/or financial resources to properly implement and enforce sustainable development policies, programs, and legislation, resulting in natural resource degradation.
- *Population growth:* Where a country's population growth results in pressure on the land base in excess of its carrying capacity, resulting in natural resource degradation.
- *Poverty:* Where people struggling to survive tend to follow unsustainable short-term resource utilization practices in return for short-term consumption gains.

Source: World Bank 2008

28. Nowhere in Turkey is this phenomenon more acute than in the Anatolia region which in ancient times enjoyed a 72% forest cover, but was gradually reduced to barely 31 % (of which 35 % is defined as steppes). Over time, this process has resulted in significant impacts on the estuaries of the rivers Büyük Menderes and Küçük Menderes. In addition, because of the topography of Anatolian peninsula (elevation averaging 1132 m and 65% of the land with slopes higher than 12 %), it is estimated 65 million tons of soil from the river Kızılırmak and 108 million tons from the Euphrates are carried to the sea. Overall, every year 450-500 million tons of top soil goes to dams, lakes and sea (reducing the economic life of dams) (Reis et al. 2007).

29. Land degradation has significantly reduced the carrying capacity of rangeland and the fertility of agricultural land in the upper catchment areas and thus negatively affected farming households' ability to derive a livelihood in the upland regions, with resulting higher poverty rates in these areas. Reduced vegetative cover has led to marked reductions in soil moisture content thus subjecting agricultural lands to significantly higher vulnerability to drought. Land degradation has also led to unstable and increasingly torrential river flows with increased incidence of flooding and growing sedimentation problems. Landslides have also become a growing problem.

30. Turkey's response over the years—which has been reflected in a series of pilot watershed management projects--has focused mainly on supply side management through two main State Organizations (General Directorate of Reforestation and Erosion Control, Turkish State Hydraulics Works¹⁹) undertaking actions including soil erosion control measures, reforestation in the upper reaches of the catchments, and water management infrastructure, including river training structures, longitudinal structures along river banks, and dams on the main rivers.

Looming Threat of Climate Change

31. Climate change predictions²⁰ indicate that the Mediterranean Basin (which includes Turkey) will be severely impacted by higher temperature and lower rainfall, expected to result in increased water stress and more frequent and severe droughts, leading to water shortages, increase in forest fires, loss of biodiversity, and loss of income in agriculture and tourism²¹. Predictions also indicate that if temperature increases by 2 degrees from pre-industrial revolution level, the region will see more severe impacts including: some 30 percent decrease in rainfall; increased frequency of drought throughout the year; 10-15 percent decreased crop yields²² (especially rain fed summer crops such as bean, soybean and lentil); and even higher water stress²³ (Figure 7).

¹⁹ Gürer, I., Current Level of Water Erosion Problem and Sediment Control Measures In Turkey, *Gazi University, Faculty of Engineering and Architecture, Department of Civil Eng. Ankara, (2002)*

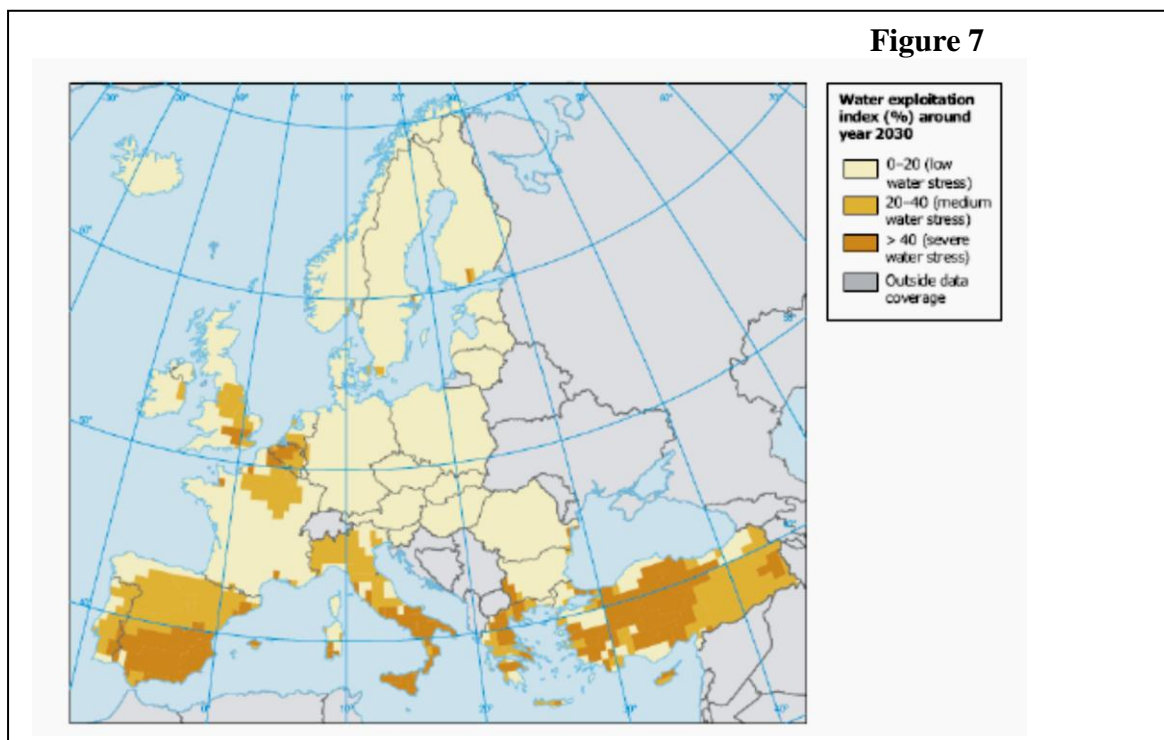
²⁰ Over the past 25 years, precipitation in the Mediterranean Basin fell by 20%. By 2025 it is estimated that the average temperatures in Mediterranean Basin will increase by 0.70-1.60C (IPCC 2007).

²¹ Ministry of Agriculture and Rural Affairs declared that the cost of droughts in 2008 for the agricultural sector amount to 1.5-2 billion € approximately, with 435,000 farmers being affected severely by the droughts.

²² In a meta study, Cline (2007) summarizes predicted impacts on agriculture from climate change for all regions of the world

²³ For example, research carried out in Spain showed that even 1 degree increase will cause 5-14% decrease in water availability.

32. In addition, climate change will negatively impact natural resources and the functioning of many ecosystems. Drought can lead to the loss of whole freshwater ecosystems. Reduced precipitation leads to lower water levels in rivers, reservoirs and aquifers. In times of dry spells, this provokes a higher concentration of toxics and pollution in surface water which impairs water quality. Warming of water bodies is a further consequence which in turn produces changes in the water layers and thus in the whole ecosystem, negatively affecting species performance, particularly those living downstream of dams in an already disturbed ecosystem.



33. Climate change may also exacerbate land degradation processes. More intense rainfall promotes soil erosion²⁴. Increasing temperatures increase evapo-transpiration rates that reduce soil moisture, and in conjunction with shifting rainfall patterns, will affect vegetation patterns and the growing period for crops. Prolonged dry spells and erratic climatic conditions may lead to short-term coping strategies such as deforestation and overgrazing. Land-use changes and land degradation also contribute to greenhouse gas emissions and affect local climatic conditions. While Turkey's net emissions from land use, and land-use change are relatively small because of its massive afforestation program, where land-use changes reduce above-ground organic carbon, soil carbon also usually declines. This decline in organic matter has adverse effects on several physical, chemical, and biological soil properties, which impact land productivity, biodiversity, and ecological functions. Land cover changes can also

²⁴ The erosion intensity of rainfall in Turkey was the subject of intensive research on data going back to the 50s, and led to the development of "Isoerodent Maps," which indicated the "Erosive Potential" of variable precipitation levels (Ankara Rural Services Research Institute (1999) and UNCCD (2006)).

lead to changes in local climatic conditions due to different surface reflectivity and water transpiration.

34. Watershed management is being recognized globally as a very important “no regret” approach for adapting to climate change. In addition to its direct socio-economic and conservation benefits, watershed management provides a link between potential climate change impacts on the hydrologic regime (supply effect) and the various uses of the resource (demand effect), thus helping planners and decision-makers identify changes that may be required to “climate-proof” existing investments, as well as adjust plans for future ones. Already some research in Turkey points to the importance and potential economic costs and benefits of such an approach (see Box 2 for a case study in the Seyhan river basin).

Box 2. Potential Climate Change Impacts on Water Resources in Turkey’s Seyhan River Basin (SRB)

The Seyhan River drains an area of 21,700 km² in southern Turkey between the Taurus Mountains and the Mediterranean Sea. Some 44 percent of its annual flow is captured in two main reservoirs (Seyhan and Catalan) which are used mainly for irrigation (60 percent) and domestic water supply (4 percent).

A climate change modeling system (linking climate projections to river basin hydrology) was used to assess the impact on water resources in the SRB by 2020. The main findings include:

- Average annual temperature predicted to increase by 2.3°C.
- Average annual precipitation predicted to decrease by 160mm.
- Predicted decrease in precipitation will translate in decreased inflow with the peak monthly inflow occurring earlier than at present (change in timing).
- The effects of global warming and the increased demand for water will be leaving little room for future investments, and may jeopardize investments currently under in upper basin (e.g., the Lower Seyhan Irrigation Project)

Source: Fujihara et al. (2007)

5. Governance of Basin Management

35. In Turkey, Development Plans provide the overall framework, principles, and priorities for the implementation of the country’s medium and long-term economic, technical, environmental, social and cultural policies.²⁵ SPO is the institution in charge of the preparation and coordination of the Five-Year development Plans, while a number of agencies are in charge of implementation. In this context, watershed management is at the confluence of strategies and actions (Box 3) of many government agencies and organizations (Box 4 and Annex-Table B and Table C), and

²⁵ SHW (2009).

is influenced by Turkey's obligations under international conventions and agreements.²⁶

36. Watershed management policies and activities are centrally planned in Turkey. National public institutions/agencies are in charge of planning, development, management, maintenance, and monitoring and evaluation of programs related to land use and water resources. Local governments are typically involved during the implementation phase²⁷ and non-governmental organizations are also indirectly involved in many activities.

37. While the recent consolidation of the main natural resource management functions (water, forestry, conservation and erosion control, and environmental management) under the Ministry of Environment and Forestry provides a significant opportunity for improving efficiency, many challenges remain including in terms of: clarity of legal and policy mandate; institutional coordination and collaboration; institutional capacity; financial resources; participatory approaches; data and information systems, and monitoring and evaluation. Several agencies play central role in watershed management in Turkey:

- a) *The Directorate General of Afforestation and Erosion Control (AGM)* is the main agency in charge of watershed rehabilitation programs. Its main focus is on soil erosion control through forest and vegetative cover management in upper watersheds, and with links to water management (through the protection of dams and reduction of flood damages), to rural development (through community natural resource management and livelihood programs), and to forestry (through afforestation programs and reduction of wood demand by local communities).
- b) *The General Directorate of Forestry (GDF)* is the agency in charge of all forest management in Turkey with the main focus on timber production (covering about half of the 20 million ha of forests) and conservation management (for hydrologic, erosion control, and nature protection purposes). In addition, ORKOY, GDF's Rural Affairs arm, plays an important role in watershed management through integration of the socio-economic dimensions and provision of services to upland communities.
- c) *The General Directorate of Nature Conservation and Natural Parks (GDNC&NP)* is in charge of biodiversity conservation (nature and wildlife) and therefore plays a key role in the ensuring that ecological services from watersheds contribute to the welfare of both the local population as well as downstream users.
- d) *The State Hydraulic Works General Directorate (DSI)* is the main agency responsible for the development and management of overall water and soil resources in Turkey. Within the scope of development and management, dams, water and drinking water need of settlement areas under municipal organization, hydroelectric power plants, planning, design, building and operation of water

²⁶ The main/relevant agreements/conventions are: the UN Convention on Biological Diversity; the UN Convention to Combat Desertification; the UN Framework Convention on Climate Change; the Ramsar Convention (wetlands); and the European Landscape Convention.

²⁷ Village drinking water facilities, small irrigations and soil conservation delegated to local governments following closing of General Directorate of Village Affairs in 2005.

works including irrigation and flood control facilities and allocation of water resources to institutions with different purposes are dealt with. Within the scope of upper watershed activities, structural measures for riverbed rehabilitation in upper basins of creeks and afforestation to prevent erosion and sedimentation in dam basins are realized as well. Additionally, through its regional directorates and field organization, DSI is also in charge of data collection for mapping, hydrometric measurements, water quality, agricultural economy, land classification, drainage, and hydro-geology.

- e) *The General Directorate of Environmental Management (GDEM)*. Because of its statutory duties,²⁸ GDEM plays a major role in the integrated management of water resources at watershed level since its duties include: determining and implementing targets and principles of pollution management in order to protect and conserve ground and surface water, as well as sea and soil resources; preparing and implementing protection and utilization plans for continental water and land resources at watershed level; and regulating the quality of the country's water resources. Moreover, as part of the EU process, GDEM is responsible for the coordination of the water quality directives and the alignment with the EU Water framework Directive. One of its most important duties in this regard is the preparation of 25 Watershed Conservation Action Plans which will serve as the basis for the preparation of River Basin Management Plans, through a process involving all the stakeholders (expected to be completed after 2014). Therefore, by building on the work of GDEM, the preparation of the NBMS would enhance Turkey's Negotiation Position Document on the EU Water framework Directive.
- f) *The Ministry of Agriculture and Rural Affairs (MARA)*. In addition to its function of ensuring adequate supply of food and fiber production for the nation, MARA is the main agency responsible for research regarding the protection and improvement of the resource base of watersheds, including soil, water, plants and genetic materials, animals, and fisheries resources and products. Moreover, MARA is also tasked with controlling wastewater discharges into fish production areas, and for monitoring nitrate levels in freshwater and groundwater resources.

Box. 3. Main Sector Strategies/Plans with Relevance to Basin Management

<ul style="list-style-type: none"> • Ninth Development Plan (2007-2013) • Afforestation & Erosion Control Rehabilitation Action Plan • Forest Sector Strategy • Drinking Water Sector Master Plan (2010 - 2014) • Strategic Plan of General Directorate of 	<ul style="list-style-type: none"> • National Biodiversity Strategy and Action Plan • National Climate Change Strategy Document • National Environmental Action Plan • Agriculture Sector Strategy • National Rural Development Strategy • National Action Plan to
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²⁸ As per the Law on Organization and Functions of the Ministry of Environment and Forest No. 4856 (2008)

State Hydraulic Works <ul style="list-style-type: none"> • Master Plans of Watersheds (DSİ) • Watershed Conservation Action Plans in 25 basins (GDEM) 	Combat Desertification
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The Importance of the EU Water Framework Directive²⁹

38. The Water Framework Directive (WFD) of European Union (EU) is one of the most comprehensive water policy documents of the EU. Its aim is to improve surface, coastal, transitional and groundwater quality to a “Good Ecological Status” in member states. Many water policy actions were designed by the European Commission to help the nations’ waters reach good ecological status. Turkey--which has the status of accession country to the EU--has to adopt this comprehensive policy, as well as other EU directives directly relevant to watershed management.

Box 4. Main Agencies Involved in Basin Management	
<p><i>Direct Involvement</i></p> <ul style="list-style-type: none"> • Ministry of Environment and Forestry <ul style="list-style-type: none"> ○ Afforestation and Erosion Control ○ State Hydraulic Works ○ Forest-Rural Affairs ○ Nature Protection and National Parks ○ Environmental Management • Ministry of Agriculture and Rural Affairs • Municipalities • Water and Sewage Administration 	<p><i>Indirect Involvement:</i></p> <ul style="list-style-type: none"> • State Planning Organisation (SPO) • Ministry of Energy and Natural Resources (MENR) • Ministry of Public Works and Settlements • Ministry of Health • Ministry of Interior • Ministry of Tourism • State Meteorological Institute

39. The WFD recognizes that the best model for a single system of water management is management by river basin--the natural geographical and hydrological unit--instead of administrative or political boundaries. The Directive promotes integrated river basin management (IRBM)³⁰ as the most efficient way to achieve sustainable water use. This, in turn, requires coordinated planning for using land and water resources within the entire basin covering all surface, coastal and ground waters as well as land-use activities.

40. The WFD requires a detailed, long-term and iterative planning process and the setting up of adequate administrative arrangements including the designation of competent river basin authorities. The success of achieving the ambitious

²⁹ EU (2000)

³⁰ The Integrated River Basin Management can be defined as a "process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximize the economic and social benefits derived from water resources in an equitable manner while preserving and, where necessary, restoring freshwater ecosystems." (Global Water Partnership, 2000).

environmental objectives in an effective way and whether they will be achieved at all, depends to a large extent on the establishment of a competent authority able to oversee a river basin district and equipped with sufficient competencies and capacities to integrate different policies, including land use planning, navigation, fishing, tourism and agriculture.

41. Turkey has begun the process of alignment with the WFD³¹ but faces various challenges related to its implementation, including the requirement to fund a massive national program of water supply and sanitation, covering not only cities and towns, but also rural areas, and aimed not only at achieving public health outcomes, but also ensuring ecological sustainability. In addition, as the WFD includes important recommendations with respect to trans-boundary waters, Turkey will need to review its policies and management plans in this area.

6. Watershed Management/Rehabilitation Practice in Turkey

42. Following the massive investments in the 1980s to develop land and water resources (Box 5), the need to integrate sustainable natural resource management as part of the country's rural development strategy was clearly identified in the Government's National Environmental Action Plan (NEAP - 1998), which identified the need to introduce improved agricultural practices to reduce soil degradation and ground and water pollution from agriculture. Since then, the Government has undertaken a number of initiatives to rehabilitate degraded areas and to promote environmentally friendly agricultural practices. Early on, the widespread adoption of these practices was limited due to lack of funds for expansion and promotion, lack of coordination among various Government agencies involved in the rural sector and an approach that traditionally relies too much on central command and control rather than on participation by affected communities.

43. The Turkish rural economy has been characterized by a high incidence of poverty, particularly in upland areas. The consequent growing pressures on forests and pasture have reduced vegetative cover and diminished soil fertility and the carrying capacity of rangeland. This has contributed to reductions in infiltration rates and to increases in peak river flows, flooding, and sedimentation problems. Beginning in the late 1980s, Turkey tested an integrated and participatory approach to watershed management in a number of micro-watersheds, and from 2004 expanded the approach to three major river basins (Eastern Anatolia, Kizilirmak, Yesilirmak). Policy is now based on a community-driven approach to natural resource management, integrating forestry, soil and water conservation, and crop and livestock production.

44. Overall, Turkey's watershed management policy developed in a pragmatic and iterative fashion, starting with engineering-dominated approaches (in the 1970s and 1980s) which were succeeded by more participatory approaches involving local

³¹ Turkey's Environmental Strategy Document indicates that Watershed Conservation Action Plans will be turned into River basin Management Plans in order to fulfill the requirements of the WFD. In support of the EU Process, and breaking with a 50-year practice, DSI has recently declared (SHW 2009) that it would adopt an Integrated River Basin Management in Turkey's 25 river basins.

governments and communities, and the introduction of technology packages targeting income-generating sustainable land and water use practices. In addition, Turkey has built on local and regional experience to formulate policies specifically targeted at community based watershed management in poor upland areas (a summary of pertinent information and data on the main watershed management projects starting in 1990 is provided in Annex-Table A). These projects all deal directly with watershed rehabilitation, but many others—not covered in this Table—are designed at river basin (mainly water development investments by DSI) or territorial level (for regional socio-economic development). Box 5 describes the Southern Anatolian Project known as GAP which is of interest here not only because of its scope and size, but more importantly because it represents a different approach (from the micro-watershed approach) to sustainable resource management and a real opportunity to test whether a holistic basin level, economically driven model, can yield sustainable development outcomes (a detailed impact analysis would prove quite useful in this regard).

45. Under the World Bank supported Eastern Anatolia Watershed Rehabilitation Project (EAWP – 1993-2001) the Government introduced a more holistic and participatory approach to natural resource management on a watershed basis in eleven provinces, with positive effects on the status of natural resources as well as household incomes. A key feature of the project was interagency coordination of activities at micro-catchment level--involving the Ministry of Environment and Forestry (MOEF), the Ministry of Agriculture and Rural Affairs (MARA) and the abrogated/abolished General Directorate of Rural Services (KHGM). This resulted in positive outcomes, including increase in rural incomes and reduction of natural resource degradation, and allowed Government to use the lessons learnt to introduce further innovation and to expand the program to other parts of the country. Some of the new features, which were introduced in the second generation of World Bank-supported projects (the Anatolia Watershed Rehabilitation Project (2004-2012) focused on water quality and river basin planning.

46. At the same time and in order to improve the institutional effectiveness and coordination, and to more closely align the institutional framework with the key EU directives (Nitrate and Water Framework Directives) an institutional reorganization was undertaken, involving (a) KHGM was abolished with the headquarters merged to MARA, field organization to metropolitan municipalities in the provinces of Istanbul and Kocaeli and to Special Provincial Administrations in the other provinces, (b) merging the Ministry of Environment and the Ministry of Forestry to create the Ministry of Environment and Forestry (MOEF), (c) turning DSI into an affiliated institution of MOEF, and restructuring the “environmental directorates” into Provincial Directorates of Environment and Forestry.”

47. The government shares the cost of a mutually reinforcing package of resource use productivity enhancing and conservation measures. This policy has driven institutional change, particularly the coordination and integration of the activities of different government departments at the micro-watershed level and the development of watershed-based forest resource management plans. Implementation of the Eastern Anatolia Project was the first time that different departments and bureaus, such as soil and water conservation, agriculture, livestock and animal husbandry, environment, and forestry, made joint efforts in planning and implementing integrated watershed

development works. Overall, the program helped build institutional development that not only within the implementing agencies, but also at the local level (involving community leaders and farmers).

Box 5. Integrated Development at Basin Level: GAP Project

The Southeastern Anatolia Project (GAP) - started in 1980 - is a very important multi-purpose integrated development project, aimed at achieving local economic and social development, initially through farming with extensive irrigation systems and electricity generation, and later expanded to cover agriculture, industry, transportation, urban and rural infrastructure, health care, education, housing and tourism. It is one of the biggest investments of the last century involving 13 major projects undertaken by DSI, extends over surface area of 75,000 square kilometers, and covers the lower parts of the Euphrates and Tigris Rivers as well as nine provinces with a total population of 6.7 million.

With an estimated cost of 32 billion dollars, the GAP involves a total of 21 major dams and 19 HEP generating stations, as well as irrigation networks to irrigate 1.7 million hectares of land. The centerpiece is the Atatürk Dam, which was completed at the beginning of the 1990s, with a total storage capacity of 48.7 billion m³, and an installed electricity generating capacity of 2,400 MW

The design of the program was premised on the fact that the sustainable development of the region's soil and water resources will provide a basis for agricultural development, with substantial diversification in production output and increase in productivity, which, in turn, will stimulate the growth of agro-related industries, and the rapid increase in incomes and standard of living of the local population.

Within the framework of 2008 – 2012 Action Plan major allocations were made to Gap accelerating the ongoing efforts.

48. However, an area that continues to be challenging is monitoring and evaluation of impacts of watershed rehabilitation investments (Box 6 summarized the findings at the completion of World Bank-financed Eastern Anatolia Project).

Box 6. Monitoring and Evaluation of Impacts: The Eastern Anatolia Project

At the time of completion in 2001, the project measured neither off-site externalities nor local erosion and sedimentation impacts of project interventions. At the local level, there was some anecdotal evidence of a favorable impact on sedimentation of small dams close to the treatment areas and of reduced localized village flash flooding in large rainfall events. Thus, many of the treatment impacts remain unknown. The government project team argued that changes may have occurred within the project area, but that the time scale for these impacts to be felt in the major reservoirs lower in the lower watershed would be very long—between 10 and 100 years or more. Another argument made by the project team was that it was difficult to evaluate and separate outside influences from the treatment effect. The impact, for instance, of one of the project objectives—reduction in livestock pressure on grazing land—was hard to monitor, given the overall shrinking of the livestock sector in the area.

Source: World Bank (2008)

7. International Experience with Watershed Management³²

49. The first generation of watershed management projects in developing countries in the 1970s and 1980s applied a soil and water planning approach to watersheds, which emphasized engineering works aimed at specific on-site and downstream physical outcomes. Less attention was paid to the needs of upstream populations or to their ownership of program actions. As a result, investments were high cost and not always well justified, and the assets and benefits created often had a limited life. By the end of the 1980s, the failure of these “engineering” solutions led to a rethinking of the whole approach. From the 1990s, watershed management programs in developing countries typically targeted livelihood improvements and poverty reduction objectives in addition to resource conservation. Projects aimed at these two targets typically adopted integrated farming systems and participatory and demand driven approaches implemented at the decentralized level. On the other hand, in developed countries there was always a gradual but more systematic attention to incorporating watershed management as part of resource planning at the basin level, with water resource management typically driving the process (Tables 2 & 3 highlight some the key features and good practice of WM in the case of both developing and developed countries).

50. National policies and institutions developed pragmatically by trial-and-error. In several countries, including Brazil, China, India, Tunisia, and Turkey, success in testing participatory approaches has led to adoption of broader policies for community-based watershed management. In other countries, including Madagascar, Morocco, and Yemen, doubts about program performance and cost have delayed the adoption of national policies. The following section focuses on four main areas where institutions for watershed management play a crucial role in the success and scaling potential of different country approaches.

Table 2 - Watershed Management: Good Practice Cases from Developing Countries	
Integrate sub-basin and micro-watershed planning and operations	<ul style="list-style-type: none"> • Loess Plateau: China • Eastern Nile: Egypt, Ethiopia, Sudan • Integrated basin modeling: Amazon, Zambezi
Combine conservation, intensified resource use and livelihood objectives	<ul style="list-style-type: none"> • Loess Plateau: China • Lakhdar rural development: Morocco • Northwest Mountains: Tunisia • Anatolia Watershed Rehabilitation: Turkey • Karnataka Watershed Management: India
Use participatory approaches	<ul style="list-style-type: none"> • Karnataka Watershed Management: India • Northwest Mountains: Tunisia • Anatolia Watershed Rehabilitation: Turkey
Applied, demand-driven research	<ul style="list-style-type: none"> • Northwest Mountains: Tunisia • Karnataka Watershed Management: India • Land Management I: Brazil
Monitoring and evaluation	<ul style="list-style-type: none"> • Loess Plateau: China • Karnataka Watershed Management: India

³² This section is drawn largely from the World Bank’s recent global assessment report: “Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up.” (2008).

Hydrologic-modeling/assessment	<ul style="list-style-type: none"> • Integrated basin modeling: Amazon, Zambezi • Lake Colcibolca: Nicaragua
Integrating climate change issues	<ul style="list-style-type: none"> • Himachal Pradesh Watershed: India • Agro-biodiversity and Climate Change

Participatory Approaches

51. Participatory approaches and community watershed management plans have been widely used, with varying success, to reconcile the overlay of human activity on naturally defined watersheds. In general, these participatory approaches were employed to establish micro-watershed management plans. The participatory processes succeeded where there were common purposes that could interest all or most of the population, as in the India Hills Project and the Brazil Land Management I, and where the participatory process was flexible and provided for capacity building and genuine empowerment, for example, in Turkey, and where there were income and livelihoods incentives. Where communities could see the economic benefits and were empowered, they were willing to invest in long-term conservation. Participation does not, however, guarantee specific outcomes, and it is not a neutral concept: it involves shifts in decision making power between the state and local communities, and also between different segments of the local community.

The Role of Public Institutions

52. The integrated and participatory watershed management approach adopted in recent years has driven new institutional arrangements amongst public agencies and with local communities. Successful operations typically created a decentralized delivery structure that could effectively partner local communities. In best-practice examples, the institutional framework is focused on the local level, with clear arrangements for integration within permanent agencies and for interagency collaboration, as seen in the Turkey Eastern Anatolia Project. Government commitment to the program and simplicity and clarity on responsibilities are also important factors in success: the interface between local government, technical agencies, and community organizations needs to be carefully defined and managed, and capacity building at all levels is essential. Local level participatory approaches require decentralization or “deconcentration” of technical functions, and thought needs to be given to how this can reinforce—rather than conflict with—broader processes to decentralize responsibilities for local development.

Table 3 - Watershed Management: Good Practice Cases from Developed Countries	
Chesapeake Bay: USA	<ul style="list-style-type: none"> • Span: 64,000 square miles, 17 million people, 7 states • Main issue: Nitrogen and phosphorus pollution from agriculture and urban areas • Multi-state agreement for watershed management • Integrated basin level planning and modeling • Annual monitoring and State of the Bay Report • Results: improvements in water quality, and

	some fish stocks
Kokemaenjoki River Catchment: Finland	<ul style="list-style-type: none"> • Span: 27,000 km² (4th largest catchment in the country) • Main issue: high population growth leading to conflict and environmental impacts • Multi-criteria, multi-stakeholder planning and scenario building resulted in identifies hot spots for more focused attention
Jeziorsko Reservoir: Poland	<ul style="list-style-type: none"> • Flood control cities in Sieradz Basin • Reservoir critical for regional economy (42% agricultural land) • Main issue: agro-chemical runoff and pollution • Developed river basin management plan and actions • Strong public consultation/involvement • Results: 30 percent reduction in pollution load in reservoir
Seine Normandie Basin: France	<ul style="list-style-type: none"> • Span: 97,000 km² (17.5 million people, and 80% urban, including the Paris area) • Main issue: water quality and ecological health of the system (fish species, wetlands) • Integrated water resources management at basin level • Participatory approach to finance and monitor water investments in the Basin • Uses “consumer pays” and “polluter pays” financing instruments • Results : on the way to reaching “good ecological status” of the basin by 2015 as per the EU WFD

The Policy and Legal Framework

53. Watershed management works best when there is a supportive policy and legal framework, particularly (a) policies that facilitate decentralized and participatory development, (b) institutional arrangements that allow and encourage public agencies at all levels to work together, and (c) an approach to access to natural resources that reflects local legislation and tenure practices and problems. Land tenure and common pool resources are a particular challenge for watershed management, and there needs to be a clear understanding of the policy and legal framework and local practices and of how a project can work within this framework to promote investment. For example, lack of such an understanding in the Turkey Eastern Anatolia Project led to failure of the pasture improvement component.

Watershed Management and Poverty Reduction

54. Although poverty reduction is usually an objective of watershed management programs, empirical evidence of poverty reduction impacts is weak. Most projects reviewed included poverty reduction among their objectives, but there was little evidence of any ex ante analysis of poverty that would have helped to improve project design, and actual impacts were rarely measured. The poor may even be at risk from

programs: for example, landless people dependent on common natural resources for their livelihood may suffer from conservation interventions, such as rangeland closure, as observed in upper watersheds in India.

55. However, targeting only the poor has proved difficult, as efficient watershed management has to be inclusive of all stakeholders in the watershed. In good practice examples, poverty concerns are introduced through the participatory process, the role of stakeholders is analyzed within a watershed, and. Institutional mechanisms and the stakeholder communication process are designed to include the poor. In these cases, investment programs also include income-generating activities that benefit the poor. When management issues arise in the larger watershed, programs may be able to strengthen the voice of upstream communities so that they—and the poor within them—do not bear the cost of providing environmental services to downstream users. Basin committees that empower stakeholders through participatory processes are one possible approach to helping better target the poor. Considering the importance of water management policy in relation to agriculture and poverty reduction in Turkey, the effectiveness of participatory approaches and methods used thus far will need to be re-evaluated.

Scale of Intervention

56. Starting with a watershed management program and objectives at the scale of the larger watershed, then targeting key areas within the watershed and working with communities in micro-watersheds to agree on packages that both improve livelihoods and contribute to conservation objectives at the local and the larger watershed scale. This is essentially the approach being adopted in the China Loess II Project (Box 7).

57. Watershed management programs generally adopt the micro-watershed as the basic management unit, since this allows the integration of land, water, and infrastructure development and the inclusion of all stakeholders in a participatory process. The micro-watershed has proved a flexible and practical unit for project implementation and has reduced costs. However, the definition of a micro-watershed needs to be adapted to the social, administrative, and physical context.

58. The micro-watershed approach also raises some difficulties when it comes to scaling up³³. Working at the micro-watershed scale does not necessarily aggregate up or capture upstream-downstream interactions. A multitude of upstream interventions would only have a significant impact downstream if prioritized and planned within the larger watershed context and with understanding of the spatial and hydrological links between the perceived externalities and their causal factors (for example, land and water use).

³³ In the context of Turkey, DSI (2010) indicates that while the micro-watershed approach is appropriate for groundwater management, a basin approach is required for surface water management. For example, Merzifon, Turhal, Carsamba and Erbaa Plains in Yesihrmak River basin carry ground water but are not hydrologically connected.

Box 7. The China Loess Plateau Watershed Rehabilitation Program

The Loess Plateau covers an area of some 640,000 km² in the upper and middle parts of the drainage basin of the Yellow River. The objective of the project is to help achieve sustainable development in the Loess Plateau by increasing agricultural production and incomes, and improving ecological conditions in tributary watersheds of the Yellow River, in particular by reducing sediment overload in the river.

The program area contains about 1,100 micro-watersheds with areas ranging from 1,000 ha to 3,000 ha. Counties and micro-watersheds were selected for inclusion in the project based on a variety of criteria, including severity of soil erosion, poverty level, experience with soil and water conservation works, development potential and repayment capacity, leadership and commitment at the local government level, and proximity to science and research organizations involved in soil and water conservation. The approach combined top-down and bottom-up processes. The areas facing the greatest difficulties were identified first. Then, sustainable local development plans were developed with the communities. Throughout the life of the project, extensive use is being made of maps, both to monitor progress in micro-watersheds and to get an overview of impacts over the whole basin.

Soil and water conservation measures had a significant impact on the incomes of local people. They also brought significant environmental benefits to downstream areas—a “win-win-win” outcome. Terracing of loess soils resulted in the doubling of crop yields with only slightly higher input costs. This led to an almost immediate increase in incomes. In some of the drier areas, where terracing was combined with irrigation, very high yields were secured, since soils and climate conditions make the Loess Plateau one of the most fertile areas in the world. The new terraces and access roads gave farmers the opportunity to grow a wider range of crops. In particular, temperate fruit and nut trees grew very well, which had a significant impact on agricultural incomes, although the benefits took longer to accrue. Parallel improvements in farming practices and technology resulted in labor saving in crop production and improved labor productivity overall. As a result, stakeholders could take up new employment and income opportunities, both on-farm and off-farm. Employment of women and female labor productivity particularly benefited from new on-farm opportunities.

Project measures reduced risks and income variability for farmers and increased average incomes. Terracing improved water retention in situ, which lowered the variability of yields significantly. This was proven during years of severe drought experienced during project implementation. In years with average rainfall, grain yields on terraces reached two to three times those on slopelands. The diversification of production also helped reduce the variability of income. Livestock and trees provided a buffer in difficult times. Irrigation, although a small part of the project, also protected against drought.

A combination of rangeland improvement and improved animal husbandry increased the productivity of livestock systems. An enforced grazing ban was successfully adopted. The areas under treatment showed a dramatic increase in vegetative cover even in drought-affected areas. Despite the droughts, natural shrubs, grasses, and trees reestablished themselves on steep slopes that had previously been grazed bare. The erosion control benefits from these measures were substantial. Livestock productivity and incomes rose sharply as farmers moved to more intensive production system. Farmers invested in animal sheds and pen construction, fodder processing equipment, and animals suitable for pen feeding.

The project also recorded significant environmental benefits to the downstream areas. Sediment inflow to the Yellow River and its tributaries was reduced with several benefits: (a) irrigation systems and downstream reservoirs suffered less from sedimentation, (b) river channels were more stable and maintenance costs were reduced, and (c) the rise of the riverbed in the Yellow River was slowed and the cost of raising the flood embankments could be deferred.

Source: World Bank (2008) (Boxes 12 & 16)

59. This underscores the importance of the fact that integration of watershed management activities beyond the micro-watershed requires higher level technical planning. In good practice approaches, planning includes an institutional mechanism where stakeholders have a voice and are able to agree on measures from the micro-watershed scale upward that can achieve both local and larger scale objectives. The approach also needs to deal with institutional challenges of interagency collaboration and local-regional level coordination. In the case of Turkey, this requires strong collaboration between AGM, CYGM, DSI, MARA, and related agencies including Electrical Power Resources Survey Administration (E.I.E.)

Economics of Watershed Management

60. Profitability is fundamental for engaging stakeholders in conservation, yet watershed management interventions may not in themselves be profitable for stakeholders. Establishing accurate estimates of costs and benefits, both at the farm level and beyond, has proved difficult. Often technical choices have been made without due consideration of financial profitability—or of economic value to society. Yet financial and economic analysis can help design investment packages that achieve both livelihoods and broader conservation objectives. In addition to some measurement difficulties (both conceptual and practical), one of the main problems has been designing an M&E systems at the outset which can produce the information needed.

61. One of the main attributes of watershed management is the potential to improve the natural resource impacts downstream—“externalities”—resulting from land and water interactions. Watershed management interventions in themselves may also have unintended negative consequences downstream. International experience shows that, improving downstream impacts was often an objective, but the relationship between upstream investments and downstream impacts was rarely clarified and monitored. Traditional project economic analysis rarely values environmental benefits of watershed management programs. Clearly, accounting for externalities is essential to show the real costs and benefits of watershed management interventions and to provide their economic justification.

62. An added difficulty relates to the fact that farmers and resource users are not willing to pay for conservation measures unless they are profitable, which underscores the need for designing incentive structures that are optimal both from a private and a social point of view. Innovative approaches, including payment for environmental services (PES), which attempt to move toward market-based cost sharing solutions, have been piloted in several countries, and are increasingly gaining global acceptance³⁴.

³⁴ Some well known examples include: (i) Costa Rica (since 1997 providing payments to more than 4,400 farmers and forest owners for reforestation, forest conservation, and sustainable forest management activities); and (ii) the USA (Conservation Reserve Program providing technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource issues on their lands. Producers enroll in CRP and plant long-term, resource-conserving covers to improve water quality, control soil erosion and enhance habitats for waterfowl and wildlife. In return, USDA provides producers with annual rental payments. CRP contract duration is from 10 to 15 years. Since its inception, the program has enrolled 31 million acres of highly erodible land. In 2009 alone, \$1.7 billion were paid for new contracts.

63. Upstream-downstream linkages are certainly complex and the information required to understand the interactions has until recently proved difficult and costly to collect. Yet the availability of sophisticated modeling systems at the basin level coupled with more affordable monitoring tools allows for better understanding of watershed properties, functions, and management impacts.

8. Key Sector Issues to Be Addressed by Turkey's NBMS

64. On the basis of the results of the March 3, 2010 stakeholders workshop (AGM, 2010), and the review of issues and experience in both Turkey and internationally, an effective NBMS can be built around three key elements: (i) economically based selection of investments; (ii) unified and coordinated institutional arrangements; and (iii) a financing plan for the investments, including from internal public and private sources, as well as external sources. In addition, the NBMS will tackle several issues, including:

- a) Prepare future multi-year national development plans and programs to scale up watershed rehabilitation and management, with the involvement of key stakeholders (including government agencies, local government, local communities, private sector, and NGOs).
- b) Undertake an institutional review of key agencies and stakeholders that play a role in watershed management. The focus will be on reducing institutional fragmentation and overlap, and developing and putting in place coordinated and integrated institutional arrangements for watershed management.
- c) Determine factors that hinder effective monitoring and evaluation, and develop options to shift to an integrated ecosystem-based approach with effective coordination among agencies responsible for land, biodiversity and water resources. In addition, determine the information requirements and related instrumentation needs in order to systematically collect data on the cost and impacts of all future soil and water conservation interventions.
- d) Prepare an inventory and assessment/quantification of the interventions and investment programs in watershed rehabilitation and management, in order to ascertain the nature of technologies used and their costs. This will need to include farm and household budgets to be able to better understand willingness to pay and affordability of interventions at micro-watershed level.
- e) Prepare an inventory and assessment/quantification of the impact of unsustainable use of natural resources, from overgrazing, loss of forest cover, poor farming practices, and population pressure, and which usually translate into soil erosion and sedimentation with impacts on productivity, water quality, loss of biodiversity, and other downstream impacts (on irrigation systems, drinking water supplies, flood management and reservoir capacity reduction). This is an important piece of analytical work that would help estimate the potential benefits of conservation measures.
- f) Develop a technically sound and politically acceptable definition of what constitutes a "watershed" and its relation to larger basin and sub-basin

planning frameworks. This would help significantly improve the understanding and agreement among key stakeholders of the scale of interventions (basin/sub-basin/watershed/micro-watershed), the role of hydrology, and the upstream and downstream land and water interactions.

- g) Further clarify role of local institutions and participatory processes and involvement of beneficiaries and affected communities, including consideration of issues related to the resettlement of communities affected by dam and/or irrigation projects. The current participatory approach relies heavily on strong financial incentives, and needs to be compared and tested against other approaches.
- h) Identification of data needs, analytical tools (e.g., remote sensing and GIS), and information systems to support an effective monitoring and evaluation system to be shared by relevant institutions.
- i) Review the use of economic and financial instruments to ensure cost effectiveness of investments, fiscal efficiency, livelihood benefits and poverty reduction, natural resource conservation, and post-project/program sustainability. It will be important for this review to explore the untapped potential from resource pricing, cross compliance, and payment for ecological services.
- j) Develop and begin implementing a methodology for accounting explicitly for climate variability and change in the design of future watershed management programs. This will help improve decision makers' understanding of the contribution of watershed management to both adaptation options and mitigation benefits (carbon sequestration).
- k) Develop criteria for prioritizing interventions/investment, given the need to satisfy multiple objectives (including natural resource rehabilitation and conservation, employment and income generation, and cost effectiveness and fiscal impact), and spatially target interventions.
- l) Develop a spatial framework for planning and targeting interventions/investments (e.g., micro-catchments versus river basin), taking into account the ecological, agro-climatic and socio-economic diversity that exists across Turkey.

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ANNEX

Table A. Watershed Management Projects (1990- Present)

Project Title & Short Name	Eastern Anatolia Watershed Rehabilitation Project (DASHP)	Anatolian Watershed Rehabilitation Project (ASHP)	Çoruh Basin Watershed Project	EU Twinning Project B. Menderes River Basin	Southeastern Anatolia Project (GAP)	1) Gediz River Project 2)Gediz R & Pollution Control River Basin Control Project 3)Gediz River Basin Waste Water and Solid Waste Management Master Plan Project
Major Source of Finance	IBRD	IBRD GEF	JICA	TR-EU Financial Cooperation Program - 2006 programming	Turkish Government	1)-2) Turkish Government 3) Grant from Spanish Government
Project Partners	MoF (former) MARA	MoEF MARA	MoEF MARA	MoEF (DSİ and GDEM)	General Directorate of DSİ GAP Regional Development Administration and all central and regional relevant agencies	
Project Duration	1993-2001	2005-2011 (7 years)	Not started	2008 December – 2010 February	1980-on going	3)2005-14 months
Project Area/ Province	Elazığ, Malatya, Adıyaman (planned) Implementation: 11 provinces	Samsun, Tokat, Sivas, Kayseri, Corum, Amasya (6 province)	Erzurum, Artvin, Bayburt (3 province)	As pilot basin it was implemented in Büyük Menderes River Basin and as fast scan basins in Sakarya, Yeşilırmak, Akarçay and Antalya Basins	The project area includes the watersheds of the lower Euphrates and Tigris rivers and the upper Mesopotamian plains (9 provinces).	

Project Title & Short Name	Eastern Anatolia Watershed Rehabilitation Project (DASHRP)	Anatolian Watershed Rehabilitation Project (ASHRP)	Çoruh Basin Watershed Project	EU Twinning Project B. Menderes River Basin	Southeastern Anatolia Project (GAP)	1) Gediz River Project 2)Gediz R & Pollution Control River Basin Control Project 3)Gediz River Basin Waste Water and Solid Waste Management Master Plan Project
Number of Villages			242 villages 55.000 person	8 provinces (Afyon – 5 subprov., Uşak – 6 subprov., Denizli – 15 subprov., Aydın – 15 subprov., Muğla – 2 subprov, Isparta, Burdur, İzmir)		
Total area of coverage	Planned (P): 250,000ha, Implementation (I) 160,000ha	202,000ha	16 Micro Basin 604.300 ha	24,873 km ²	Today corresponding to approx % 10 of Turkey's total population 74,000 square kilometers.	
Number of micro-basins	P: 54 Micro Basin I: 87 Micro Basin	28			The water development program of the GAP includes 13 large sub-projects altogether, 7 of which are on the Euphrates river Lower Euphrates -which is the largest and the most comprehensive project including the Atatürk Dam and the Sanliurfa Tunnels together with five more sub-projects within this framework- Karakaya,	

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					Euphrates, Suruç-Baziki, Kahta-Adiyaman, Gaziantep, Gaziantep-Araban) and 6 on the Tigris (Dicle, Kralkizi – Batman under operation, Batman-Silvan, Garzan, Ilisu, Cizre in the program).	
Average micro-Basin area	P: 4,630ha I: 1,840ha/ Micro Basin	7,210ha/ Micro Basin				
Overall Objectives	At upper basins sustainable pastureland, forest & farming; prevent soil loss & destruction & erosion, diminish sedimentation in reservoirs, income generation & poverty eradication)	Implementation of sustainable natural resource management at 28 micro-basins in Anatolia and Black sea		The aim of the project titled "Capacity Development for Water Sector in Turkey" is to assist Turkey in EU accession about water management for full implementation of water and environment legislation. The focus of the Project	The project is envisaged to expand the irrigated area by adding 1.82 m ha to the current 5.42 m ha of irrigated area & aims to achieve economic and social development through the optimum utilization of these resources along the principle of sustainability.	Project # 1) definition of pollution sources in the basin, its impact to ground/underground and agricultural irrigation waters identification of pollution load caused by Borium mineral preparation of pollution maps of the basin

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				is Directive 2000/60/EC dated 23 October 2000 and sister directives as well as Urban Waste Water Treatment Directive of 91/271/EEC dated 21 May 1991 and Dangerous Substances Directive of 76/464/EEC dated 4 May 1976.		identification of pollution prevention measures. Socio-economic, technical and environmental surveys. In the basin, to prepare future integrated plans, identification of domestic and industrial based pollution
Project Components	Basin rehabilitation And management Applicable research In-situ gene preservation	Rehabilitation of destroyed natural resources Income generating activities Policy Strengthening in line w. EU standards		In the first component, legal and institutional analysis of Water Framework Directive, Urban Waste Water Treatment Directive and Dangerous Substances Directive will be	* to raise the income levels in GAP region by improving the economic structure in order to narrow the income disparity between the region and the other regions, * to increase the productivity & employment in rural areas, to enhance the assimilative capacity of larger cities in the region,	To establish proper management infrastructure; to identify problems and solution where local governments has insufficient resources, for better implementation of alternative solution

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		<p>Awareness</p> <p>Capacity Building</p> <p>Replication strategy</p> <p>Project Management</p>		<p>done. At the end of the component, a detailed legal gap analysis including the options to implement these Directives in Turkey, institutions and analysis of the institutional capacity, identification of options to strengthen the existing system and description of the training needs was realized.</p> <p>The second component aims to develop a roadmap for the preparation of implementation plans at national</p>	<p>* to contribute to the national objective sustained economic growth, export promotion, and social stability by efficient utilization of the region's sources .</p> <p>280,000 ha of land is under irrigation, the construction of three major dams on the Euphrates completed.</p>	<p>Gediz Basin Provinces Environmental Protection Union has been established (based in Manisa).</p>

Project Title & Short Name	Eastern Anatolia Watershed Rehabilitation Project (DASHP)	Anatolian Watershed Rehabilitation Project (ASHP)	Çoruh Basin Watershed Project	EU Twinning Project B. Menderes River Basin	Southeastern Anatolia Project (GAP)	1) Gediz River Project 2) Gediz R & Pollution Control River Basin Control Project 3) Gediz River Basin Waste Water and Solid Waste Management Master Plan Project
				<p>level. At the end of the component, a detailed implementation plan including the estimated costs of compliance and intermediary steps of compliance with Water Framework Directive and Dangerous Substances Directive was drafted.</p> <p>For the implementation, in addition to guides and manuals, a report on cost saving in water services and financial modeling systems to be used in water pricing</p>		

Project Title & Short Name	Eastern Anatolia Watershed Rehabilitation Project (DASHP)	Anatolian Watershed Rehabilitation Project (ASHP)	Çoruh Basin Watershed Project	EU Twinning Project B. Menderes River Basin	Southeastern Anatolia Project (GAP)	1) Gediz River Project 2) Gediz R & Pollution Control River Basin Control Project 3) Gediz River Basin Waste Water and Solid Waste Management Master Plan Project
				<p>through economic analysis of water use in accordance with the principle of “pollutant pays” was prepared.</p> <p>The third component is focusing on the implementation of the principles of these three directives in the pilot basin of Büyük Menderes. The two important outcomes of the component are Draft River Basin Management Plan in accordance with Water Framework Directive and Draft Pollution Abatement</p>		

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				<p>Program in accordance with Dangerous Substances Directive. Other outcomes are TORs to be identified for a real time operational River Basin Information Management System and investment needs for monitoring and laboratory infrastructure in future as well as working on major elements of Urban Waste Water Treatment Directive such as identification of sensitive areas, definition of</p>		

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				<p>technological treatment needs and collection areas for urban waste water under the light of geographical and socio economic facts. The experiences derived from the pilot area have contributed to the preparation of National Implementation Plan for these three directives. The fourth component aims to establish a communication strategy for the implementation of the project. At the end of the component, a</p>		

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				comprehensive communication strategy including the internal and external aspects during the project and after the completion of the project was developed.		
Costs	USD \$ 78.3 M (final cost) USD \$ 47.97M (spent credit)	US \$ 44.91M (total) National \$ 41.15M, Foreign \$ 3.76M USD \$ 20M(credit) USD \$ 7M (grant)		2 MEUR (Fully EU Funds)	Although the estimated cost of any kind of investment to be made in GAP region is 32 billion USD the total of DSI investments in this amount will be 18 billion USD. Until now totally 20 billion USD was disbursed.	

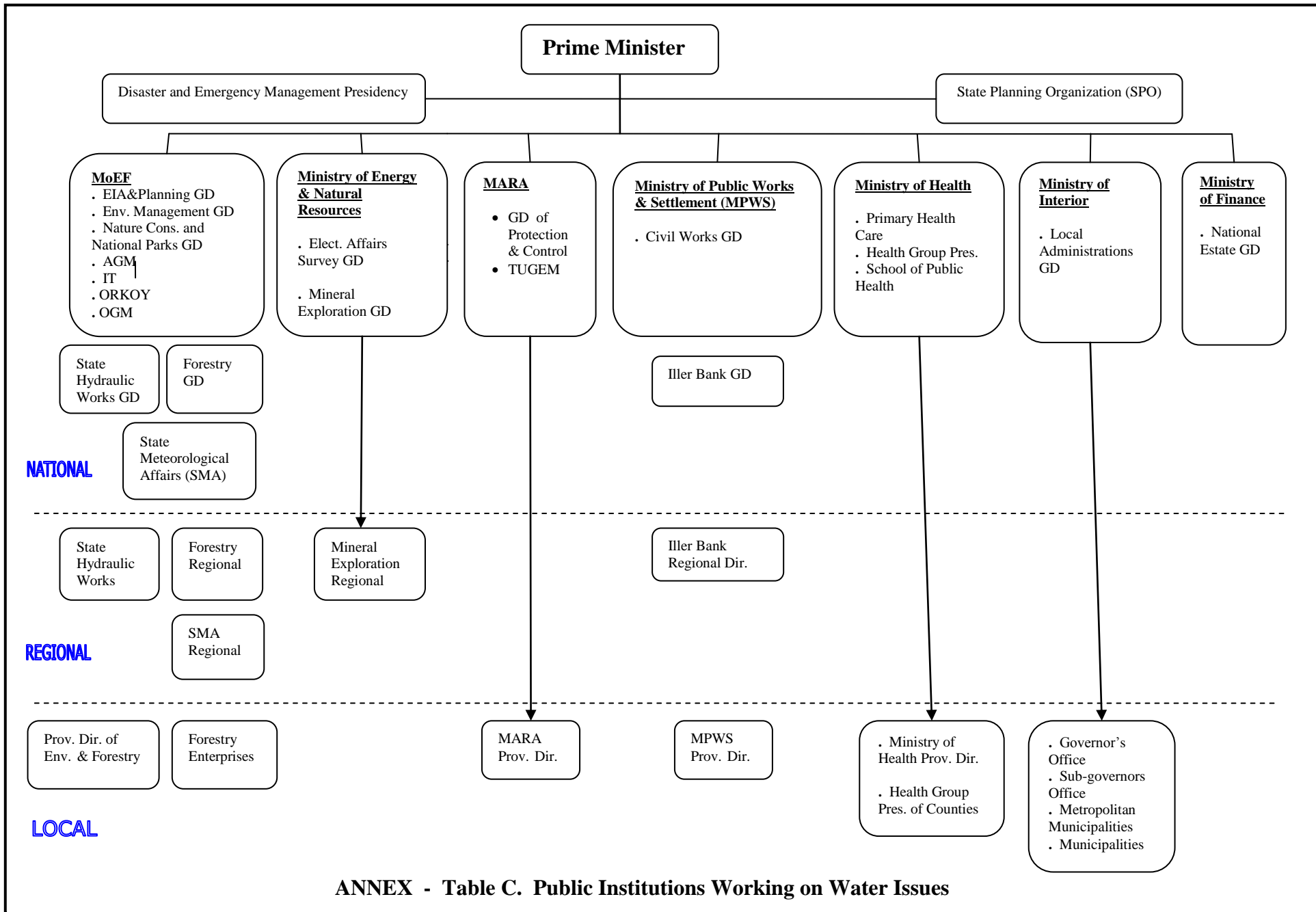
Table B. Institutions with Watershed Management Responsibilities

Name of the Institution	Major Authorities	Relevant Major Legislation
Ministry of Environment & Forestry	<p>Established as Under secretariat of Environment attached to the Prime Ministry in 1978 and was elevated to Ministry status in 1991. Designated as the main responsible body for environmental management and charged with coordinating all national and international activities concerning water resources. Its organizational structure provides for Provincial Environment and Forest Directorates authorized to decide on water related issue.</p> <ul style="list-style-type: none"> • Prevention of pollution of water resources, • Establishing environmental standards, permissions • Monitoring, • Environmental Impact Assessment • Conservation projects for river basins • Coordination of EU accession process in terms of environmental chapter. 	<p>Environmental Law No 2872 (1983) addresses the qualitative assessment of water resources. Wetland By-Law No 25818 (2005) EIA By-Law No 25318 (2003) The 1988 Water Pollution Control By-Law (Regulation)</p> <ul style="list-style-type: none"> • classifies inland waters in line with water quality standards & identifies industrial effluent discharge criteria. • prevention of pollution of surface waters, protection of groundwater, restoration of polluted aquatic ecosystems. <p>establishment of action plans for water quality improvement and long-term water basin quality management plans.</p>
General Directorate of Environmental Management	<ul style="list-style-type: none"> • Determine targets, principles and polluting factors in order to conserve ground and surface water and sea and soil resources, and prevent or eliminate pollution; prepare and implement procedures and principles for pollution control in surface and ground water, sea and soil; develop and implement capacity building measures, and identify technologies and measures needed to put in place for pollution control. • Prepare plans for water conservation and use; and carry out required activities aimed at ensuring the integrated management of continental water resources on a watershed basis. • Undertake activities to determine the quality classes of water resources, increase water quality, and ensure optimum use. • Issue discharge permits, monitor and inspect discharges and treatment systems, and approve projects for treatment systems 	<ul style="list-style-type: none"> • The Environmental Law No. 2872 • The Law on Organizations and Functions of the Ministry of Environment and Forests No. 4856 • The Regulation on Water pollution Control • The Regulation on Control of Pollution in and around Water Caused by Hazardous Materials • The Regulation on the Quality of Surface Water Used or to be Used as Drinking Water • The Regulation on Urban Waste Water Treatment.
The General Directorate of State	<p>Affiliated to the Ministry of Reconstruction and Resettlement earlier years, later to the Ministry of Energy and Natural Resources and to MoEF since 2007.</p>	<p>Establishment Law No 6200 (1953)</p>

Name of the Institution	Major Authorities	Relevant Major Legislation
Hydraulic Works (DSI)	<ul style="list-style-type: none"> • responsible for water resources development • responsible for provision of drinking, potable, and industrial water for the municipalities, and, if required, provision of waste water treatment – • ensures the long-term supply of drinking and industrial water plans, executes and in most cases operates works for flood protection, irrigation, drainage and hydropower generation • responsible for performing basic investigations such as, flow gauging, soil classification, water quality monitoring in order to prepare watershed plans, preparation of river basin development plans • formulation of proposals for construction financing and subsequent operation of these works. 	<p>Groundwater Law No.167 (1960) regulates the usage, development and protection of groundwater resources.</p> <p>Drinking Water Law No1053 (1968 and amended in 2007).</p>
General Directorate of Afforestation and Erosion Control	By the Forest Law General Directorate of Forestry and General Directorate of Afforestation and Erosion Control have authority (although not very clearly) to prepare watershed management plans within basin rehabilitation planning (Article 58).	Forest law Law No 6831 (1956)
Ministry of Health	The Ministry of Health's responsibilities on water i) for determining quality standards for drinking water and water for consumption, monitoring standards and preparing legislation in relation to drinking water networks ii) natural mineral waters bottled iii) thermal waters	General Hygiene Law No 1593 (1930) Ministry of Health Organisation and Responsibilities Decree of Law No 181 (1983)
The General Directorate of Bank of Provinces	<p>affiliated to the Ministry of Public Works and Settlement, major responsibilities with water management for the settlements (population of 3,000 to 100,000);</p> <ul style="list-style-type: none"> • to provide infrastructure projects on a turn-key basis for municipalities, • to provide credit for financing these projects, • to prepare urban development plans, • to provide technical assistance for construction, mapping, selling or renting materials and equipment, • to insure property and to train the staff of the municipalities. 	Law of Bank of Provinces No 4759
Undersecretariat of State Planning Organization (SPO)	Principal function is to prepare annual investment programs and five years development plans for various sectors of the economy. In line with the policies and principles set out in the development plans, adjusts the national fund for the allocation of the projects and the programs	SPO Legislation-Decree Law No 540

Name of the Institution	Major Authorities	Relevant Major Legislation
	which are under the responsibility of various ministries	
Water and Sewage Administrations	<p>Connected to the Metropolitan Municipalities (16 out of 81 provincial capital municipalities) have taken part in the implementation of pollution control policies, including water supply and construction and operation of wastewater treatment facilities.</p> <p>Water and sewage administrations (within the border of all metropolitan municipalities) are responsible for taking legal, technical and administrative measures to preserve water basins and prevent water pollution.</p>	<p>Greater Municipalities Law No 3030 (1984) Law of Municipalities No 1580 (1920) Law of Establishment and Duties of the General Directorate of the Istanbul Water and Sewage Administration No 2560 (1981) Greater Municipalities Law No 5216 (2004)</p>
Ministry of Agriculture and Rural Affairs	<p>In accordance with the development plan and programs, MARA's responsibilities include: development of rural areas; assistance in identifying policies to improve agriculture, livestock, and fisheries production; policy implementation; carrying out research, analysis, as well as plans, programs, and projects related to production, consumption, and input needs to satisfy demand, while protecting and improving soil, water, plant, animal and other natural resources; ensuring that agricultural lands are used properly; coordinating with relevant institutions; undertaking buyer and environmental controls of fisheries production; and monitoring nitrate and water pollution in surface and groundwater resources, in accordance with relevant legislation.</p>	<p>Decree-Law-Establishment of Ministry of Agriculture and Rural Affairs No 441 (1991) eAquatic Products Law No 1380 (1971) Fisheries Regulation No 22223 (1995) Regulation on Water Protection against Agriculture-originated Nitrate Pollution No 253777 (2004) Soil Protection Land Use Law No 5403 (2005) Law of Establishment of Agricultural Reform GnDir No 3155 (1985)</p>
Agricultural Reform Directorate General	Engaged in basin development activities, as a legal entity attached to MARA	Established by Law No. 3155 of March 05, 1985
Special Provincial Administrations (SPA)	Affiliated to provincial governors, responsibility of SPAs in relation to water includes supplying potable water to rural communities. The former General Directorate of Rural Services' responsibilities are transferred to SPAs for irrigation, aquaculture and water supply in rural areas.	Special Provincial Administrations Law No 5302 (2005)
The General Directorate of Electrical Power Resources Survey	Affiliated to the Ministry of Energy and Natural Resources and has the responsibility of carrying out hydrological studies, geotechnical investigations and mapping activities to evaluate the national hydroelectric potential and subsequently preparing reconnaissance, prefeasibility, feasibility and final design studies of identified projects.	Law Establishment of The General Directorate of Electrical Power Resources Survey No 2819 (1953)
Ministry of Tourism	Consturation of waste water infrastructures & oversee water supply in tourism	4848 sayılı Kuruluş Kanunu

Name of the Institution	Major Authorities	Relevant Major Legislation
and Culture	development areas.	
The Ministry of Foreign Affairs	EU accession process and all issues related to trans-boundary waters	Ministerial Council Decision
State Meteorological Institute (SMI)	Responsible to provide short, long term weather broadcasts, climate data	Law Establishment of SMI No 3254 (1986)
Turkish Statistic Institute	Official Statistics	Turkish Statistics Law No 5429 (2005)
Gen Dir of Mineral Research and Exploration	Research and monitoring of mineral and geo thermal waters	Special Law for Establishment of MTA No 2804 (1935)



ANNEX - Table C. Public Institutions Working on Water Issues