**National Association of Industrialists and Businessmen**


# Water Report

# OUR NEED FOR A NATIONAL WATER POLICY

**SECOND EDITION**

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National Associaton of Industrialists and Businessmen

# Our Need for a National Water Policy

**Second Edition**

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## PREFACE

Water besides its vital importance for humankind, is a main natural resource for countries' existences, their security interests and their economic developments. Water share in the world changes regionally and with time and water has nowadays become a strategic resource due to rapid population growth, pollution and misusage.

Water resources have always designated the power ingredients equilibrium and the quality of civilizations in human history and now become a more vital and strategic resource. Therefore the ongoing war in the world among the power ingredients upon oil and other natural resources has know gained a new dimension with water.

The recent situation and the progressing water shortage has forced the countries to develop more effective and sustainable water policies. Water should not be considered as a profit bearing agency for global companies and a commercial goods in the market in policy making in near future. Therefore active water policies and cooperation has become a necessity in developing national and regional policies. Faulty water management is an important agency in water shortages faced especially in underdeveloped and developing countries besides growing population and pollution. New water resources allocation policies should be developed, exempt from global recipes, considering national benefits and social demands.

The factors effecting the power shares in the world are now different than the past. In the last quarter century the actors dealing with water problem and related strategies have changed in the global sense. In this new era the countries developing power strategies with their natural resources will be successful. Therefore today protection and development of natural resources constitute an important part of national security strategies.

Underdeveloped and developing countries should be cautious about global policies supported by international finance institutions and global games played on water. In the past fifteen years our water potential and water resources management draw attention of global companies and they have initiated some attempts. On the other hand the uncertainty faced at downstream of Euphrates and Tigris, the recent situation at the region and the foreign interferences force Turkey to maintain its "National Water Strategy".

In this frame work USIAD (Association of National Industrialists & Bussinesmen). Water Report has been prepared to contribute to maintain the national policy and related strategies on the subject.

Best Regards

Fevzi DURGUN

President

## INTRODUCTION

Water resources have always played an important role in history of civilizations and today water resources keeps its importance as natural and strategic resources.

Sumerians were the first in history who developed the agricultural irrigation scheme in Mesopotamia by digging drainage channels to Euphrates and Tigris valleys. Similar developments were envisaged at the Nile Valley in Egypt, Indus Valley in India and Yellow River Valley in China. Water management in world history played important roles in flourishing and as well as declining periods of civilizations. There is a connexion between the dawn fall of dynasties and water management in Egyptian, Chinese, Indian and Mesopotamian civilizations.

Today water gains ground as a vital part of life and the ecosystem. Water is a source for sustainable agriculture, energy generation, industry and tourism, besides being a main human need.

The strategic consideration of water in 21$^{st}$ century will increase due to the environmental pollution and population growth and therefore water policies has attained a global dimension in the past twenty years.

How the water need of rapidly growing world population will be met is an unanswered question and the inadequacy of world's fresh water resources and the increasing demand initiate conflicts between countries.

In some countries facing water shortage and in Turkey, being a country taking part in Middle East and facing aridity, several methods are tried and applied to provide additional water sources. Among these methods acquiring fresh water from saline sea water is the mostly applied one.

Although Turkey owns more water resource compared to other countries in the region Turkey is designated as a water stress country in terms of water allocated pro person.

"Land and Water Resources" are limited national sources and public property essential for sovereignty. They own an economic value and they are a national heritage from past to future.

Global companies are interested in our water resources especially highly in the past twenty years and therefore the need to maintain a national water politics is growing every day. The domestic and foreign policy to be followed by Turkey should consider the sustainable water security and the stability at the region.

# CHAPTER I

## 1. WATER RESOURCES IN THE WORLD

### 1.1. NATURE AND WATER

Water, a vital source for human beings and other living organisms is a limited source. The availability of utilizable water in nature changes in time and with location. In other words the amount of water is constant but the distribution of water resources over the world is unbalanced. Water has gained a strategic aspect in recent times, especially in water scarce regions due to high population growth and hence the increasing demand, pollution and climate changes.

Water is an input in agricultural and industrial production and water is an energy source at the same time. Hence water source has a strategic characteristic in national development process.

### 1.2. WORLD'S WATER RESOURCES AND UTILIZATION

Total quantity of water in the world is around 1.4 million $km^3$ and 1.365 million $km^3$ of which is saline water (% 97,5) and 35 million $km^3$ is fresh water (% 2,5). 97 % of this fresh water is found as underground water.

The distribution of water resources in continents with their population percentages are given in the table below.

**Tablo 1.1:** Distribution of Water Resources

| CONTINENETS | POPULATİON (%) | WATER RESOURCE (%) |
|---|---|---|
| **North America** | 8 | 15 |
| **South America** | 6 | 26 |
| **Europe** | 13 | 8 |
| **Africa** | 13 | 11 |
| **Asia** | 60 | 36 |
| **Australia and Islands** | 1 | 5 |

**Reference: UN**

Utilizable amount of fresh water found in lakes, rivers, dams' reservoirs constitute only 0.3 % of total fresh water and 90 % of fresh water resources are found at poles and underground, which shows us the scarcity of fresh water available.

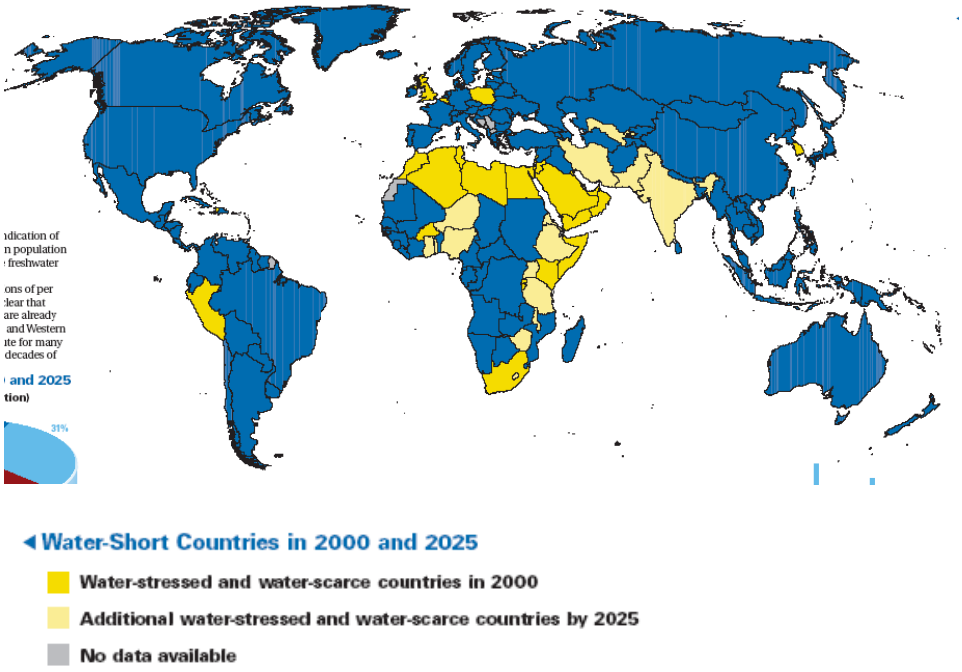
In the last century world's population increased three times whereas the demand to water increased seven times. Water consumption in the world in 1940 was 1.000 $km^3$ and this value is doubled in 1960 and became 4.130 $km^3$ in 1990. The population growth and the uneven distribution of water resources over the world lead not to supply the water demand of 40 % of the population in eighty countries.

The general criteria in classify countries according to their water supply is as follows; when the utilizable water pro person annually is less than 1 000 $m^3$ then the country is specified as “water poor”, when the utilizable water pro person annually is less than 2 000 $m^3$ then the country is specified as “water scarce” and when the utilizable water pro person annually is between 8 000 and 10 000 then the country is specified as “water rich”.

## 1.3. WATER PROBLEM

- ¾ th of world’s surface area is covered with water and the world is designated as “blue planet”. However 97.5 % of this water is saline and the 70 % of remaining 2.5 % is found as icebergs in the Antarctic and Greenland and major part of the remaining water is ground water. So only 1 % of water resources at the world is utilizable for humans.
- 82 % of world’s population has access to healthy water. This number is 99 % in industrialized countries, 66 % in developing countries, 38 % in Africa, 63 % in Asia and Pacific, 77 % in Latin America - Latin America – Caraibes – North Africa and Middle East and 93 % in Turkey.
- The source of fresh water is 0.5 million km 3 of evaporating water from oceans. 90 % of evaporating water precipitates to seas and most of the other remaining part precipitating to ground evaporates again.
- The increasing demand to water, pollution of water resources and mismanagement of water resources makes water a more scare source. When uneven distribution of water over the world is added to these factors, water management becomes then a crucial problem of the era.
- Water problems mostly effect the underdeveloped countries. 34 % of population in developed countries are under the effect of medium to high water stress. According to UN medium stress is defined as more than 20 % of accessible water resources is consumed by humans. Whereas high stress is defined as the consumption more than 40 %. UN evaluation states that 2/3 of low income countries will face medium or high stress in 2025 and other low income countries that are not under stress will face a crisis due pollution and lack of institutional and technologic capacity in water management.
- Scientists from USA, England and Australia worked out the “Facing the Challenging Climate” report last year and this report was sent to world’s leaders. The report points out that in the coming decade the critical threshold can be exceeded due water shortage and aridity caused by the global warming and there the world might come to an “unamendable” point.

- Another report prepared by WHO and UNICEF states that over one million people in the world now is deprived of drinking water.
- 40 % of world's population live with water distress. This ratio is expected to become 50 % in the coming 20 ~ 25 years due global warming and growth of water consumption three times more than the world's population.
- 1,4 milliard people, approximately 20 % of the world's population is deprived of adequate drinking water and 2,3 milliard people is lacking healthy water. It is expected that in 2050, 75 % of the world's population (9,3 milliard people), namely 7 milliard people in 60 countries will face water shortage.
- International Agriculture Research Consultancy Group" warns that in case the water consumption will keep going at the same degree until 2025, one third of the world's population will effected from water shortage. Experts state that in Africa people who do not have access to clean water will be doubled in 20 years and this number of people will reach to 600 million.
- Water pollution is a world wide problem and 7 million people is recently dying every year from illness caused by water contamination.
- Turkey is a water stress country in terms of its water resources. Renewable water resources of Turkey is decreasing in quantity, when increasing consumption due to the facts of population growth, urbanization and industrialization, is considered.



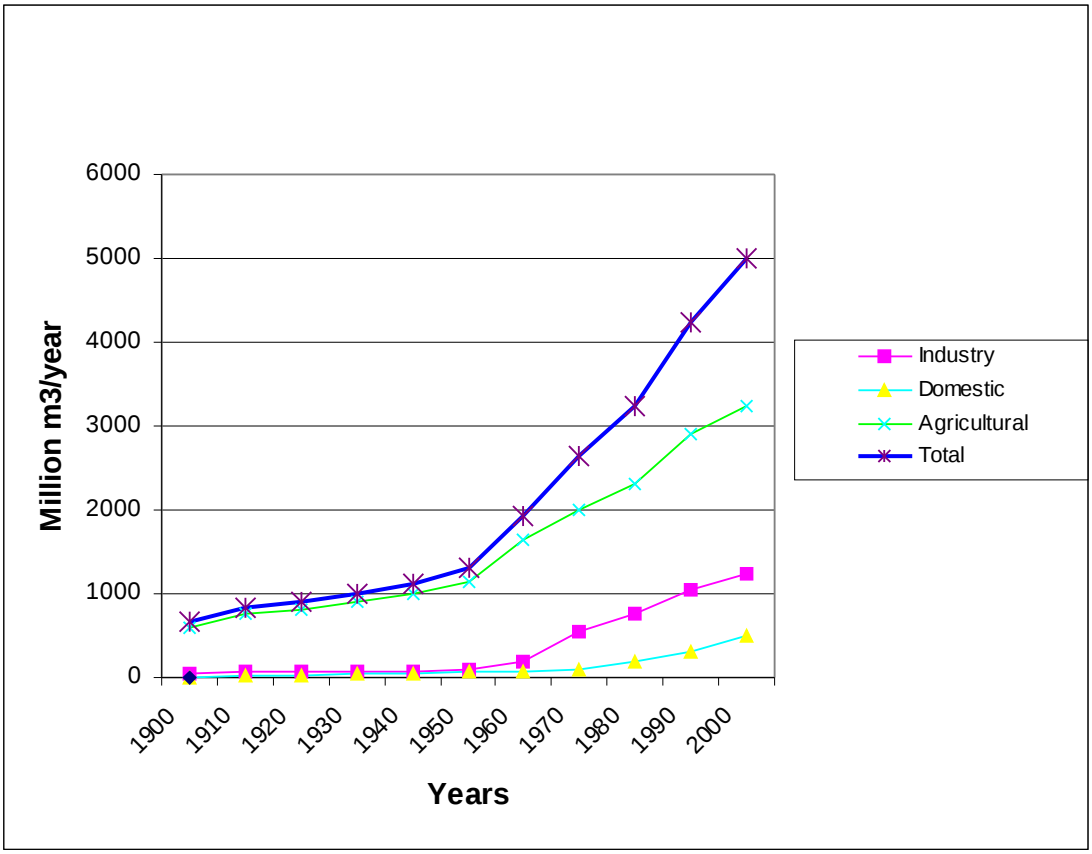
**Water Problem in 2000 and 2025**

Brazil and China own more than half of the world's water resources. This uneven distribution of water besides already being a scarce source, conduces the negative issue of fact of access to health and adequate water, going from bad to worse. Water resources gaining strategic importance, especially in some regions in the world, is a scarce source in underdeveloped countries. Industrialized countries are definitely in a superior state when access to and utilization of healthy water is concerned, but there exists a growing water shortage in African and Asian Pacific countries. According to the results of the studies carried by UN, World Bank and some other water institutions in 2000's, 50 to 100 milliard dollars is needed to decrease the number of people to half, having no access to clean water resources. It is expected that more than 3 milliard people will face water scarcity upon 2025. The uneven distribution, high costs and foresights show up the necessity of humanistic approaches and a new global policy determination in water management. The new global policy should consider that everybody has right to access to healthy and adequate water.

## 1.4. SECTORAL WATER UTILIZATION

Today humankind utilizes 67 % of clean and fresh water in agriculture, 23 % in industry and 10 % for domestic purposes.

**Changes in sectoral utilization of water between 1900 and 2000**



As it can be observed from the figure that the main increase at water utilization is observed in agricultural utilization. However the sectoral utilization of water changes depending on the industrialization and development degrees of countries. Table 1.2 shows the variation in sector specific water consumption of developed, developing and underdeveloped countries.

**Tablo 1.2: Clean and Fresh Water Utilization**

| | World's Average | Developed Countries | Developing Countries | Underdeveloped Countries |
|---|---|---|---|---|
| Agriculture % | 67 | 39 | 52 | 86 |
| Industry % | 23 | 46 | 38 | 7 |
| Domestic % | 10 | 15 | 10 | 7 |

**Water utilization in industry, some examples:** One automobile manufacturing in average 300 ~ 400 tons, one ton steel manufacturing 240 tons, refining of one barrel ( ~ 200 lt) crude oil 7 tons, manufacturing 1 kg fabric 200 liters

**Domestic utilization, some examples:** 50 ~ 60 liters for bathing, 4 ~ 5 liters for teeth brushing, daily minimum 25 liters for toilets , 100 ~ 120 liters for every washing of dishes and clothes with wash machines

**Agricultural utilization:** Quantity of water utilized in agriculture depends on the applied irrigation methods. The main water loss is caused by evaporation and seepage in open channels. The irrigation water utilized in Turkey is around 10 500 $m^3$ per hectar.

Sector specific utilization of water in the world is summarized below.

### 1.4.1. Agricultural Utilization

As it is mentioned before approximately two thirds of the water is utilized in agriculture in the world. Cereal is the main production in agriculture and cereal preserves its position of being a main ingredient in human nutrition especially in developing countries(Şahinöz 1993). 1 000 ton water is needed for one ton cereal production (Postel 1996). This water amount does not include the water lost due evaporation from soil due inefficient irrigation methods. According to Postel (1996) directly or indirectly (including animal food) 300 kg cereal per person is consumed annually and when the growth of world's population of 90 million people per year is considered, every year 27 milliard $m^3$ of additional water is needed to feed the world's population. This value corresponds to average annual flow of Euphrates river or the half of average annual flow of Yellow River in China.

Although cereal consumption pro person varies disparately on country basis, it is assumed that world's average does not change in time and with this assumption 780 milliard $m^3$ additional water is needed in 2025 to satisfy world's cereal demand (Postel 1996). This value corresponds to nine times the annual flow of river Nile. All these show us the distress that will be faced in near future and the importance of precedence of water utilization in agriculture.

The surface of irrigated area over the world has doubled in the last half of this century in order to fulfill the food requirement of growing population. However this tendency of increase faced in the irrigated lands is decreasing in the last years due technological, environmental and economic problems faced in water resources development. In 1990 approximately 250 million hectares land is irrigated over the world and this has provided one third of world's cereal need (Uses of Water 1996).

73 % of water is utilized in irrigation in the world. The irrigated land was about 253 million hectares in 1995, 290 million hectares in 2010 and 330 million hectares in 2025.

### 1.4.2. Urban and Domestic Water Utilization:

#### *1.4.2.1. Domestic Water Utilization:*

Domestic water utilization is the consumption of drinking and cleaning water in houses, hotels, restaurants and laundries as and irrigation water of gardens and is a little proportion in total water consumption in many countries. This value varies between 75 and 380 liters per person per day and is directly proportional to living standards and income level(Mc Ghee 1991).

Daily consumption of water in some regions of USA is around 600 liters per person (Uses of Water 1996). This value has changed between 140 and 200 liters per/day in İstanbul in the last ten years. The domestic water consumption in Senegal is only 29 litres per day which corresponds to a value of 1/24 in USA(Uses of water 1996).

The domestic water consumption is 145 lt/person/day in Germany, 125 lt/person/day in France, 193 lt/person/day in Swedwn and 111 lt/person/day in Turkey in 1984 (Yılmaz,2004). These are average values. The water consumption in large cities is estimated to be 20 to 40 % greater than these values (Mc Ghee 1991). Domestic water consumption is approximately 50 % of urban water consumption(Uses of Water 1996).

#### 1.4.2.2. *Commercial and Industrial Water Consumption*

Commercial and industrial water consumption corresponds to water utilized in factories, offices, shops and similar issues. In cities in which population is over 25 000 the commercial water consumption is 15 % of total consumption(Mc Ghee 1991).

#### 1.4.2.3. *Public Consumption*

Public consumption corresponds to utilization in public buildings and areas for which the people do not pay anything. This value is around 50 to 75 lt/person/day (Mc Ghee 1991).

#### 1.4.2.4. *Losses*

Losses correspond to utilization which can not be measured and paid by anybody. This value changes between 20 to 60 % (Mc Ghee 1991).

Total water consumption is cities is the sum of the above given items. Urban water consumption in developed countries is around 150 to 200 lt/person/day. However this value was 550 lt/person/day in USA in 1990s. In developing countries it is around 50 lt/person/day. Nevertheless the percentage of urban water consumption is always very low in total consumption. It is only maximum 10 % in USA (Tomanbay 1998).

Average urban water consumption in the world is 150 lt/per capita/day. Urban water consumption for some regions are given below in table 1.3

**Table 1.3. Daily urban water consumption per capita (lt)**

| | |
|---|---|
| **World average** | **150** |
| Industrialized countries average | 266 |
| African countries average | 67 |
| Asian countries average | 143 |
| Latin American countries average | 184 |
| Arabian countries average | 158 |
| Türkiye | 111 |

(Yılmaz, 2004)

### 1.4.3. Industrial Utilization

Industrial utilization covers the energy generation, power plant cooling water, water utilized in industrial production and cleaning of industrial wastes. Nuclear and fossil plants utilize huge amounts of cooling water. Industrial water consumption value is usually considered to be the development level of a country. Industrial water consumption in developing countries is around 5 % whereas it is 85 % in Belgium and Finland (Terence 1991).

**Table 1.4. Water Utilization in different sectors** (%)

| SECTOR | World | Developed Countries | Developing Countries | Under Developed Countries | EU | Türkiye |
|---|---|---|---|---|---|---|
| **Agriculture** | 67-70 | 39 | 52 | 86 | 33 | 72 - 75 |
| **Industry** | 22- 23 | 46 | 38 | 7 | 11 | 10 - 12 |
| **Domestic utilization** | 8- 10 | 15 | 10 | 7 | 16 | 15 - 16 |

Reference: Dursun 1999, Anonymous 2003, S. Yılmaz 2003, ÇOB 2005

**Table 1.5. Agricultural Areas** (1000 Ha)

| | 1980 | 1990 | 1995 | 2000 | 2002 |
|---|---|---|---|---|---|
| **World** | 210,222 | 244,988 | 262,304 | 275,188 | 276,719 |
| **Turkey** | 2,700 | 3,800 | 4,186 | 4,745 | 5,215 |

Reference: Faostat, 2004.

Throughout the world 16 % of the agricultural areas are irrigated. The irrigated area was 262 million hectares in 1995 and this value is estimated to be 290 million hectares in 2010 and 330 million hectares in 2025.

**Table 1.6. Water Utilizable pro person in world's average**

| | **($m^3$/yıl)** |
|---|---|
| **Turkey** | 1 642 |
| **Asia** | 3 000 |
| **West Europe** | 5 000 |
| **Africa** | 7 000 |
| **South America** | 23 000 |
| **TOTAL** | 7 600 |

**Table 1.7. Poulation ratio having access to healthy water** (%)

| | |
|---|---|
| **World** | **82** |
| Industrialized countries | 99 |
| Developing Countries | 66 |
| Africa | 38 |
| Asia and Pacific | 63 |
| Latin America ve Caribbean | 77 |
| North Africa and Middle East | 77 |
| Turkey | 93 |

Reference: Yılmaz, 2004

## 1.5. GLOBAL WARMING AND WATER RESOURCES

Global warming has gained importance in the last 50 years. It is estimated that climate changes have effected human life in the last 50 years.

Snow cover and glacial amount have decreased in the last century. It is estimated that the melting ice will cause a rise in the mean sea level(Atalık 2005). Some researchers claim that evaporation will increase and this will enhance the rain water. However some others estimate that strong einds will increase the evaporation from the soil which will lead to aridity in some regions.

**The probable effects of global warming on Turkey**

Turkey is considered to be in the risk group countries. The researchers conclude that our water resources will decrease and forest fires, aridity and desert effects will cause ecological degradations.

According to the V. Technical Report of IPCC; between 1901 and 2000

- temperature increased 0,2 ºC in every 10 years
- precipitation decreased 10 % in average
- between 2071 and 2100
- At west of the line drawn from Samsun to Adana the temperature will increase 3-4 ºC and at the east of the line 4-5 ºC
- Daily precipitation will decrease to 0,25 mm
- Evaporation will increase
- Aridity will increase
- Forest fires will increase
- Fish diversity will decrease
- Erosion will increase

## 1.6. TRANSBOUNDARY WATERS

There exists 261 transboundary basins in the world. These basins correspond to 45.3 % of the land area, 40 % of the world's population and 60 % of the river flows. There exists 145 countries having transboundary water basins and 200 countries including the tramnsboundary waters also. There exists also serious problems within the countries in terms of water utilization. Therefore transboundary waters have become an international debate. International legal concerns have not yet been established.

**"**UN Agreement for International Waters Utilization Except from Navigation" is accepted in 1997. although Turkey took active part in negotiations it was not a party. The agreement was signed with 103 countries approval and 3 countries (Turkey, China and Brundhi) disapproval and 27 countries noncommittal votes. 15 countries have ratified the agreement up to now. 35 countries have to ratify the agreement for agreements coming into force.

The binding agreement about transboundary waters is "Transboundary waters and utilization and protection of international lakes" which came into force in 1997 prepared by UN European Economic Commission. Euphrates and Tigris basin is not in the content of this agreement. However the applications provided in EEC region is thought to provide examples fot these rivers.

The last legal document concerning transboundary waters is "Water and Health Protocol" signed in the III. Environmental and Health Ministers Conference in London. This is prepared as an appendix to "Transboundary Waters and Utilization and Protection of International Lakes Agreement". This protocol was not signed by Turkey.

EU is a party of the above mentioned three agreements and desires Turkey also to be a party.

## 1.7. WATER PROBLEM IN MIDDLE EAST

A regional collaboration is needed in solving the problem in Middle East. However application of sovereign collaboration policies in the region is difficult due realization of 60 % of the world's oil production in the region. Therefore although it is not a global problem it is the concern of global actors. It could only be solved by technical and regional collaboration in the region.

### 1.7.1. Middle East – Water - War

In recent years it is thought that water could be war a triggering factor. However all the scientific and technical studies designate that there would not be war due to water conflicts in the region.

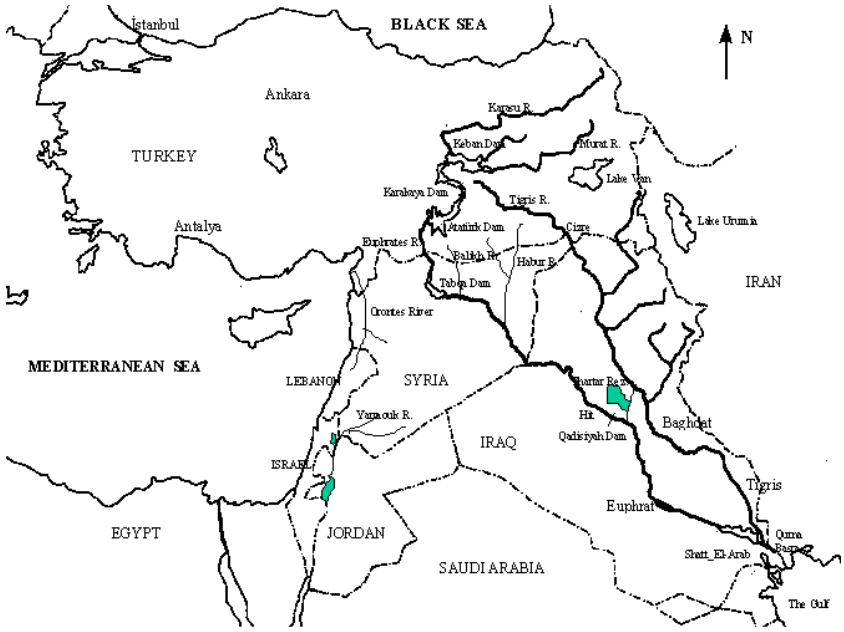
There exists a mistrust between Turkey, Syria and Iraq due their geographical locations, economic concerns and regimes of the countries. Nevertheless this mistrust is thought not to lead conflict.

The strategic and geopolitical characteristics in the region make the problem complicated. However there exists power balance between world's politics controlling agents at the region which is based on hostility. These actors do not desire the breakdown of this balance and do not want a real reconciliation and peace at the region. Therefore water would not be leading factor for a war in the Middle East but a pretext.

Thus water is issue a synthetic crisis between Turkey and its neighbors. However the increasing tension in the region makes the problem insoluble in time (Yıldız 2005). Therefore technical

collaboration will be an important step in creating confidence between the countries. Then the countries will collaborate for peace not for war.

Turkey should get prepared for not being an actor of artificial war scenario in the Middle East.




**Tigris and Euphrates Basins and Neighbor Countries**

## 1.8. PROBABLE DEVELOPMENTS IN IRAQ EUPHRATES AND TIGRIS

In future Iraq would probably be a federative state formed of Kurds in the north, Sunnis in the middle and Shies in south. This condition should have be considered in analysis of our transboundary waters with Iraq.

The utilization of water resources and their legal concerns in the federative units is unknown. Euphrates and Tigris rivers will cause mutual agreement problems within Iraq(Bilen 2003) which would have probable effects on Turkey.

Shies have 128, Kurds 53 and Sunnis 55 seats in the Iraqi's parliament after 2005 elections. The probable Kurdish occurrence in North Iraq might probably desire new rights in water resources management.

The federative structure most probably complicate the situation in the area compared to a unitary state structure.

Euphrates and Tigris rivers can only provide the needs of Turkey, Suria and Iraq. They should not be considered as a potential source for other countries and it is also imposibble in terms od international law. These rivers should not be considered as sources to solve the hydro political issues between Israil-Suria, Israil-Jordan and Israil-Phalestina (Bilen 2006).

## CHAPTER II

## 2. WATER RESOURCES IN TURKEY AND WATER UTILIZATION

### 2.1. A BRIEF SUMARRY

| | |
|---|---|
| Average annual precipitation | :643mm. |
| Discharge to rivers and lakes | :186 milyar $m^3$/year |
| Under ground water potential | :41 milyar $m^3$/year(Brut) |
| Economically utilizable water potential | : 110 milliard $m^3$/year |
| Water consumption in 2003 | : 40.2 milliard $m^3$ (6.2 milliard m3 underground water + 34 milliard m3 ground water) |
| Water consumption in 2003 according to sectors | : 29.5 milliard m3 irrigation (%74)<br>6.2 milliard m3 domestic water (%15)<br>4.3 milliard m3 industry (%11) |
| Irrigation water from underground water | : 2.1 milliard m3 |
| Domestic water from underground water | : 2.0 milliard m3 |
| Industrial water from underground water | : 2.1 milyar m3 |
| Renewable water (population 65 million) | :1700 m3/person/year |
| Daily water consumption pro person | : 250 l/s |

Average irrigation cost per hectare (including dams and irrigation works) :8000 $

### 2.2. WATER RESOURCES

Annual precipitation amount is 501 milliard $m^3$ 37 % of which (186 milliard $m^3$) is surface runoff and 95 milliard $m^3$ of its is economically utilizable. The renewable water potential is 234 milliard $m^3$ and 41 milliard $m^3$ of its is underground water and 193 milliard $m^3$ is rivers. The economically and technically utilizable under ground water potential is 12 milliard $m^3$ annually. 8.8 milliard $m^3$ of its is allocated by DSI and 6 milliard of its is recently used.

95 milliard $m^3$ of the utilizable underground and surface water potential of Turkey is obtained from national rivers and 3 milliard $m^3$ from neighbouring rivers making in total 98 milliard $m^3$. The underground potential is 12 milliard $m^3$ . However these resources are distributed unevenly.

### 2.2.1. Sytematic Water Resources Development

Systematic water resource development started in the 1950s with the establishment of the General Directorate of State Hydraulic Works (DSI). At that time, the use of agricultural land could not be extended because most of the suitable land was already developed. On the contrary, cultivated land had to be limited due to striking erosion problems. Land with high potential had to be used more intensively through irrigation in order to secure food production and to increase export potential. Approximately 8.5 million ha of land that was estimated to be economically irrigable, but only 1.2 million ha were irrigated in the early 1960s. It was the vast development potential of both the Euphrates and Tigris rivers which, in the 1960s, created the idea of harnessing their waters in a region where nearly one-fifth of Turkey's irrigable land can be found.

While Turkey intends to develop water resources all over the country, the Southeastern Anatolia Project (GAP )is of particular importance for generating hydropower and producing agricultural commodities. All the more, it is the government's desire to stabilize this under-developed region politically by significantly raising the population's standard of living.

Geographically, Turkey's territory is divided into 26 large river basins which show a large variation in average annual precipitation, evaporation and surface run-off parameters. Turkey is a country with considerable water resources. In total, average annual run-off is of 186 billion cubic meters (bcm) of which 112 bcm could be exploited at reasonable cost. Surface water contributes 98 bcm and groundwater 14 bcm. However, due to the high population and urban growth rates (4%), many regions of the country (south-east, Marmara, Aegean and Mediterranean) are already facing seasonal or even chronic water shortages therefore necessitating infrastructural development in the water sector.

From the 1950s to date, Turkey has made considerable progress in developing its water resources for multiple uses. The construction of dams and reservoirs were the main means of saving water during the short rainfall seasons to facilitate year round availability. Today, an extensive network of dams and reservoirs is maintained of which the larger dams serve multiple purposes (e.g. flood control, irrigation, domestic water supply, hydropower etc.).

Due to population growth and urbanization, water and energy demand is expected to increase. According to DSI statistics, annual per capita water availability in the year 2007 was 1,430 m3 with a population of about 72 million. By the year 2030 this amount will decline to 1,000 m3 per capita/year with an expected population of 100 million. The annual per capita energy consumption, which is at present far below the world average, is expected to increase from 1,840 kWh (1999) to

6,794 kWh (2020). To achieve this growth rate and reach energy consumption levels of the OECD countries, huge investments are envisaged.

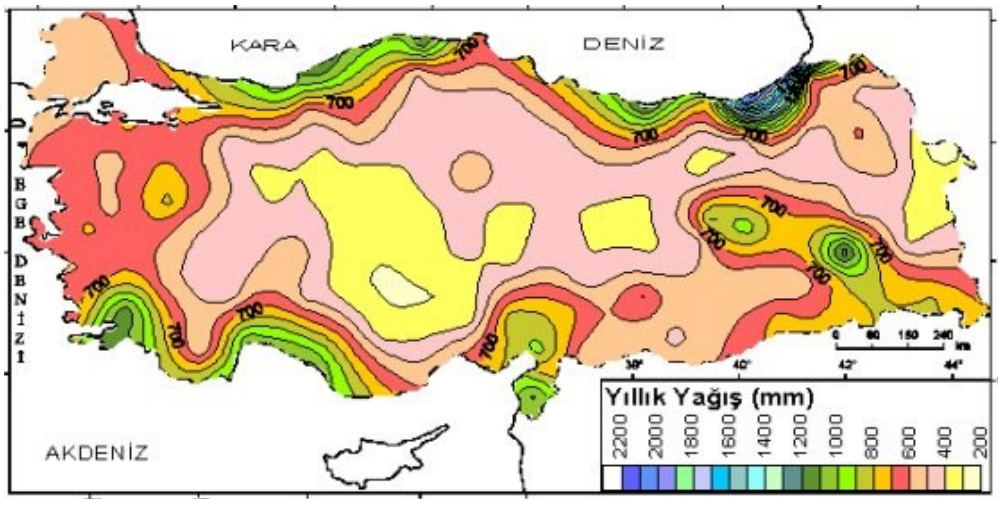
### 2.2.2. Climate

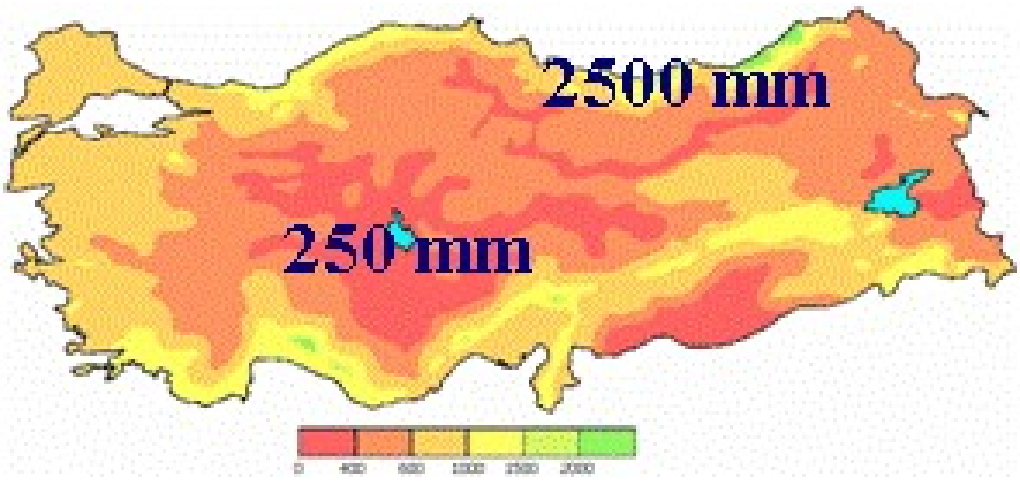
Turkey has a semi-arid climate with some extremities in temperature. Turkey is surrounded by seas on three sides and high mountains stretching along the Black Sea coast in the north and along the Mediterranean Sea coast in the south. Distance from sea and fluctuations in altitude result in climatic variance within short distances. Temperature, precipitation and winds vary, based on climatic features. The difference in the north to the south latitude (6o) also plays a role in this temperature change. The southern coastal fringes enjoy the Mediterranean climate featuring hot, dry summers and mild, rainy winters. The northern coastal fringes are of the Black Sea climate, which is mild and rainy in almost all seasons. Surrounded by high mountains, Central Anatolia features a steppe climate with little precipitation and daily and yearly temperature values differing significantly. Winters are long and cold in Central and Eastern Anatolia, while mild and short in coastal regions.

### 2.2.3. Precipitation varies by far with respect to the region and period

Especially the mountainous coastal regions receive abundant precipitations (1,000-2,500 mm/year). Inner parts away from coastal fringes receive relatively less precipitation. Precipitation is 500-1,000 mm/year in the Marmara and Aegean regions and in the plateaux of East Anatolia. Most parts of Central Anatolia and Southeastern Anatolia have precipitation only 350-500 mm annually, whereas the environs of Lake Tuz receive the lowest precipitation level (250-300 mm/year).

Snow falls in almost every region of Turkey, but the number of days on which it snows and the durations of snow cover vary considerably with regard to the regions. It snows less than one day a year in the Mediterranean Region while more than 40 days in Eastern Anatolia on average. The duration of snow cover is less than one day in the Mediterranean and Aegean coastal fringes, 10-20 days in the Marmara and Black Sea coastal areas, 20-40 days in Central Anatolia, and 120 days in the Erzurum and Kars provinces in Eastern Anatolia.






**Annual Precipitation Variation in Turkey**

Countries can be classified according to their water wealth:

- Poor: Annual water volume per capita is less than 1,000 m3
- Insufficient / Water Stress: Annual water volume per capita is less than 2,000 m3
- Rich: Annual water volume per capita is more than 8,000-10,000 m3

Turkey is not a rich country in terms of existing water potential. Turkey is a water stress country according to annual volume of water available per capita. The annual exploitable amount of water has recently been approximately 1,500 m3 per capita. Turkish Statistical Institute (TURKSTAT) has estimated Turkey's population as 100 million by 2030. So, the annual available amount of water per capita will be about 1,000 m3 by 2030. The currentpopulation and economic growth rate will alter water consumption patterns. As population increases, annual allocated available amount of water per person will decrease. The projections for future water consumption would be valid on the condition that the water resources were protected from pollution at least for the next 25 years. It is imperative that available resources be evaluated rationally so as to provide cleanand sufficient water resources for the next generation.

In 2003, 40.1 billion m3 volume of water was consumed in various sectors in Turkey; 29.6 billion m3 in the irrigation sector, 6.2 billion m3 in the water supply sector, 4.3 billion m3 in the industrial sector. This sum corresponds to development of only 36.5% of the available exploitable potential of 112 billion m3. With ongoing studies, it is aimed at using the maximum portion of available potential in the country.

**Sectorel Use of Water** [1]

As of 2007, water use, related to sectors, was as follows: the irrigation sector used 29.3 bcm/year (74%), domestic water 5.8 bcm/year (16%), and industry 4.2 bcm/year (10%). In total, 36% of the usable water potential is utilised.

Although agriculture's contribution to the Turkish economy is declining (from 35% in 1970 to 11.5% in 2007), agriculture is still vital to the national economy employing 30% of the country's work force. Crop production on the 4.85 million ha of irrigated land creates the basis of agricultural exports to European countries and to Near East and North African regions. Export of agricultural and agro-industrial commodities were valued at US$4.4 billion and accounted for 16% of Turkey's total export value in 2001. According to DSI estimates, 8.5 million ha of land is technically and economically irrigable and subject to further development. It is expected that the high share of water consumption in agriculture will decline from 74% at present to 65% through the use of modern irrigation techniques.

Domestic water use accounts for 15% of the water resources developed (2003) showing high variations throughout the country. Domestic water use is highest in the Marmara Region, and far below the national average in north-eastern and eastern Anatolia. With more than half of Turkey's population living in urban areas, construction of water supply, sewerage and waste water treatment plants has received high political attention. Population growth together with high internal migration from rural to urban areas over the last 30 years has caused domestic demand to increase. In urban areas, access to a drinking water supply was 83% in 1990 and 81% in 2000; in rural areas, it was 72% in 1990, and 86% in 2000. Currently, only about 55% of the population living in municipalities with more than 3,000 inhabitants are connected to a sewage system, whereas 36% of the population which usually live in greater metropolitan municipalities, are served by waste water treatment facilities.

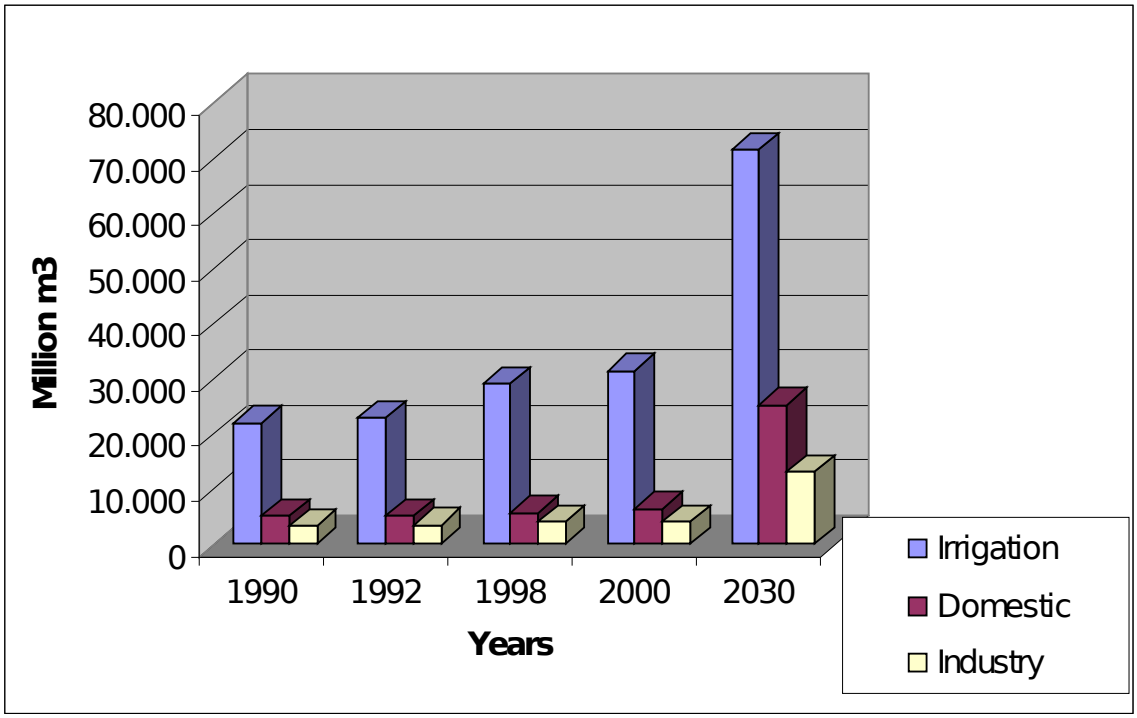
The percentage of water use in industry has not changed considerably over the past few years, being slightly over 10% (52% from surface water, 48% from groundwater). The major water consuming industries are steel, chemical, paper manufacturing, petroleum refining and agro-industry. In 2000, the greatest industrial demand came from the highly industrialised Marmara Region. Other industrial centres developing in the context of the Southeastern Anatolia Project will not change the overall precentage of industrial water use, and will only change the regional distribution.

Equally important is Turkey's rising energy demand with an annual average growth rate of 7.3%. In 1999, Turkey consumed 118.5 billion kWh, by 2005 this will reach to 195 billion kWh, and by

[1] Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp "*Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups* "
Department of International Relations, Middle East Technical University,2008 Ankara, Turkey

2010, projections are 285 kWh. In the 1970s Turkey was seriously hit by the energy (oil) crises and after 1997 became an importer of electricity. At present, hydropower provides about 40% of the total power generated, but there is more additional potential. The hydropower share is expected to increase in particular through the construction of power plants on the Euphrates and Tigris.

**Table 2.1 :** Sectoral Water Utilization in Turkey




## 2.3. RIVER BASINS IN TURKEY

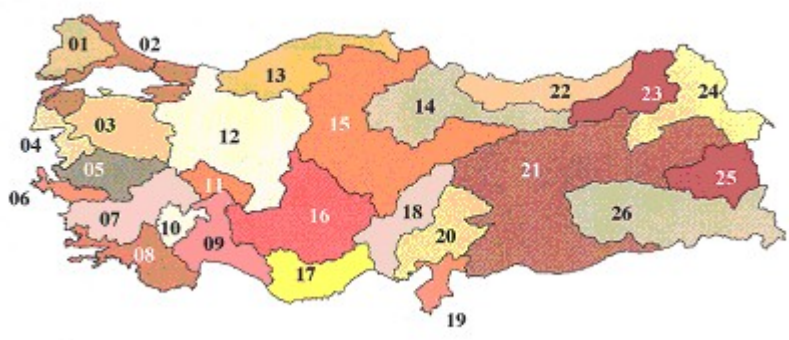
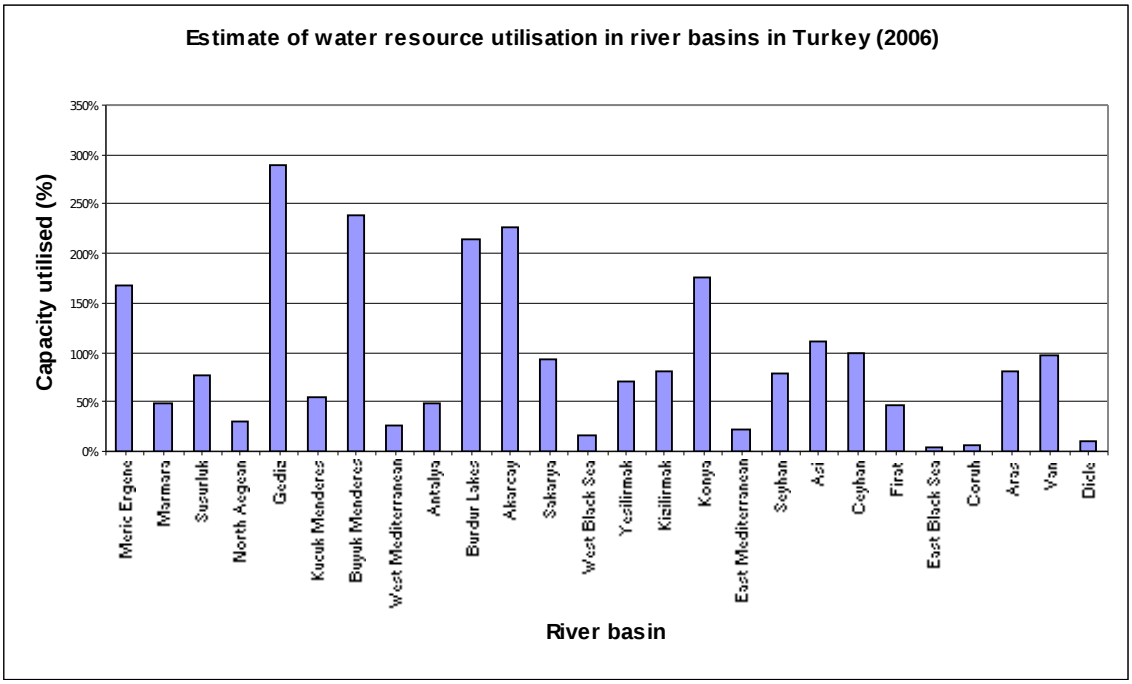
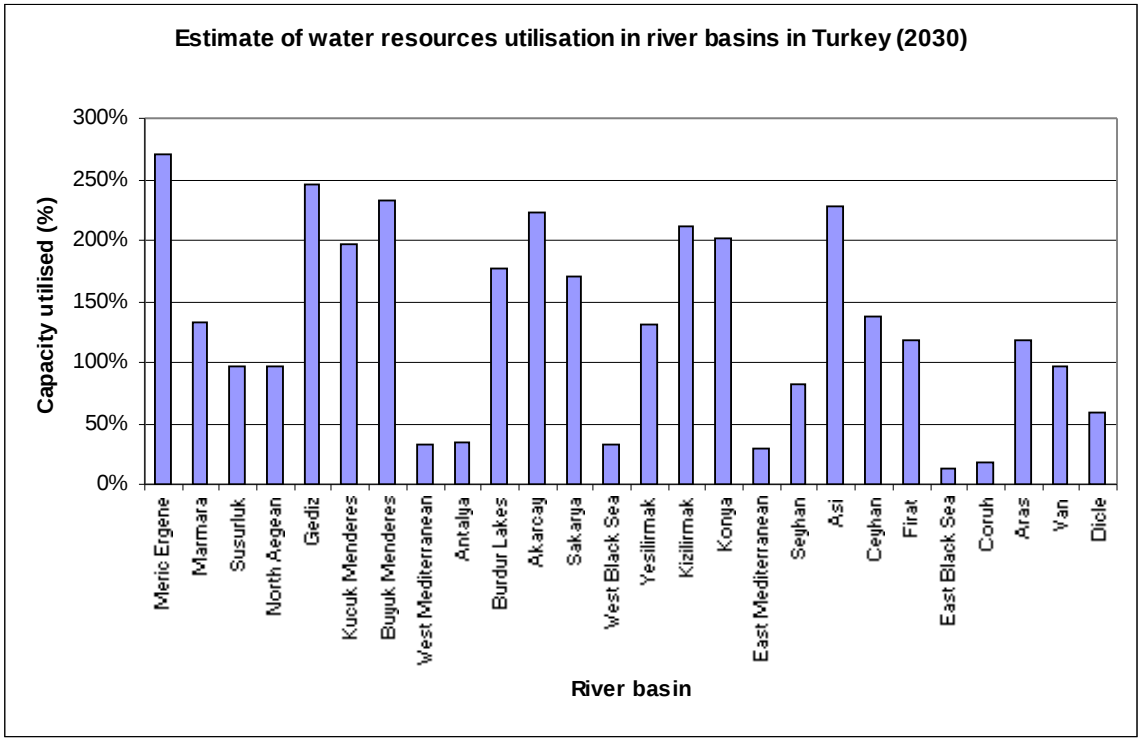


Table 2.2. Annual Average Water Potential of Basins (DSİ)

| Name of Basin | Precipitation Area ($km^2$) | Mean Annual Runoff ($km^3$) | Potential Sharing Ratio | Mean Annual Yield ($l/s/ km^2$) |
|---|---|---|---|---|
| (21) Euphrates-Tigris Basin | 184.918 | 52.94 | 18.5 | 21.4 |
| (22) East Black Sea Basin | 24.077 | 14.90 | 8.0 | 19.5 |
| (17) East Mediterranean Basin | 22.048 | 11.07 | 6.0 | 15.6 |
| (09) Antalya Basin | 19.577 | 11.06 | 5.9 | 24.2 |
| (13) West Black Sea Basin | 29.598 | 9.93 | 5.3 | 10.6 |
| (08) West Mediterranean Basin | 20.953 | 8.93 | 4.8 | 12.4 |
| (02) Marmara Basin | 24.100 | 8.33 | 4.5 | 11.0 |
| (18) Seyhan Basin | 20.450 | 8.01 | 4.3 | 12.3 |
| (20) Ceyhan Basin | 21.982 | 7.18 | 3.9 | 10.7 |
| (15) Kızılırmak Basin | 78.180 | 6.48 | 3.5 | 2.6 |
| (12) Sakarya Basin | 58.160 | 6.40 | 3.4 | 3.6 |
| (23) Çoruh Basin | 19.872 | 6.30 | 3.4 | 10.1 |
| (14) Yeşilırmak Basin | 36.114 | 5.80 | 3.1 | 5.1 |
| (03) Susurluk Basin | 22.399 | 5.43 | 2.9 | 7.2 |
| (24) Aras Basin | 27.548 | 4.63 | 2.5 | 5.3 |
| (16) Konya Closed Basin | 53.850 | 4.52 | 2.4 | 2.5 |
| (07) Büyük Menderes Basin | 24.976 | 3.03 | 1.6 | 3.9 |
| (25) Van Lake Basin | 19.405 | 2.39 | 1.3 | 5.0 |
| (04) North Aegean Basin | 10.003 | 2.90 | 1.1 | 7.4 |
| (05) Gediz Basin | 18.000 | 1.95 | 1.1 | 3.6 |
| (01) Meriç-Ergene Basin | 14.560 | 1.33 | 0.7 | 2.9 |
| (06) Küçük Menderes Basin | 6.907 | 1.19 | 0.6 | 5.3 |
| (19) Asi Basin | 7.796 | 1.17 | 0.6 | 3.4 |
| (10) Burdur Lakes Basin | 6.374 | 0.50 | 0.3 | 1.8 |
| (11) Akarçay Basin | 7.605 | 0.49 | 0.3 | 1.9 |
| **TOTAL** | **779.452** | **186.86** | **100** | |

1 $km^3$=1 billion $m^3$


Estimate of water resource utilisation in river basins in Turkey (2006)
Capacity utilised (%)
350%
300%
250%
200%
150%
100%
50%
0%
Meric Ergene
Marmara
Susurluk
North Aegean
Gediz
Kucuk Menderes
Buyuk Menderes
West Mediterranean
Antalya
Burdur Lakes
Akarcay
Sakarya
West Black Sea
Yesilirmak
Kizilirmak
Konya
East Mediterranean
Seyhan
Asi
Ceyhan
Firat
East Black Sea
Coruh
Aras
Van
Dicle
River basin


Estimate of water resources utilisation in river basins in Turkey (2030)
Capacity utilised (%)
300%
250%
200%
150%
100%
50%
0%
Meric Ergene
Marmara
Susurluk
North Aegean
Gediz
Kucuk Menderes
Buyuk Menderes
West Mediterranean
Antalya
Burdur Lakes
Akarcay
Sakarya
West Black Sea
Yesilirmak
Kizilirmak
Konya
East Mediterranean
Seyhan
Asi
Ceyhan
Firat
East Black Sea
Coruh
Aras
Van
Dicle
River basin

| No | River basin | Total flow | Estimated water supply available | | | Water consumption | | | | | | | | Demand v |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Irrigation | | | Domestic | | | Industry | Total | |
| | | A | B | C | D | E | F | G | H | I | J | K | L | M |
| | | | A x 0.518 | B x 0.142 | B + C | | E x 2.65 | F / 100,000 | | H x 1.16 | F / 100,000 | J x 0.65 | G + J + K | L / D |
| | | Average annual flow (km3) | Surface water available for use | Ground-water available for use | Total water available for use | DSI Equipped irrigation area by 1998 | Estimated total equipped irrigation area by 2006 | Estimated consump-tion | Population in 1997 census | Population in 2006 | Estimated consump-tion | Estimated consump-tion | Total Water Consump-tion | Capacity use (%) |
| | | (km³) | (km³) | (km³) | (km³) | (ha) | (ha) | (km³) | (No.) | (No.) | (km³) | (km³) | (km³) | |
| 1 | Meric Ergene | 1.330 | 0.689 | 0.098 | 0.787 | 42,763 | 113,429 | 1.134 | 1,056,473 | 1,225,509 | 0.112 | 0.073 | 1.319 | 168% |
| 2 | Marmara | 8.330 | 4.315 | 0.611 | 4.926 | 15,577 | 41,318 | 0.413 | 11,329,437 | 13,142,147 | 1.199 | 0.779 | 2.392 | 49% |
| 3 | Susurluk | 5.430 | 2.813 | 0.399 | 3.211 | 75,048 | 199,065 | 1.991 | 2,674,579 | 3,102,512 | 0.283 | 0.184 | 2.458 | 77% |
| 4 | North Aegean | 2.090 | 1.083 | 0.153 | 1.236 | 9,809 | 26,018 | 0.260 | 617,011 | 715,733 | 0.065 | 0.042 | 0.368 | 30% |
| 5 | Gediz | 1.950 | 1.010 | 0.143 | 1.153 | 110,822 | 293,955 | 2.940 | 2,327,897 | 2,700,361 | 0.246 | 0.160 | 3.346 | 290% |
| 6 | Kucuk Menderes | 1.190 | 0.616 | 0.087 | 0.704 | 1,410 | 3,740 | 0.037 | 1,972,770 | 2,288,413 | 0.209 | 0.136 | 0.382 | 54% |
| 7 | Buyuk Menderes | 3.030 | 1.570 | 0.222 | 1.792 | 148,379 | 393,575 | 3.936 | 1,975,402 | 2,291,466 | 0.209 | 0.136 | 4.281 | 239% |
| 8 | West Mediterranean | 8.930 | 4.626 | 0.655 | 5.281 | 46,776 | 124,073 | 1.241 | 890,441 | 1,032,912 | 0.094 | 0.061 | 1.396 | 26% |
| 9 | Antalya | 11.060 | 5.729 | 0.812 | 6.541 | 107,605 | 285,422 | 2.854 | 1,558,219 | 1,807,534 | 0.165 | 0.107 | 3.126 | 48% |
| 10 | Burdur Lakes | 0.500 | 0.259 | 0.037 | 0.296 | 22,548 | 59,809 | 0.598 | 200,200 | 232,232 | 0.021 | 0.014 | 0.633 | 214% |
| 11 | Akarcay | 0.490 | 0.254 | 0.036 | 0.290 | 20,445 | 54,230 | 0.542 | 665,447 | 771,919 | 0.070 | 0.046 | 0.659 | 227% |
| 12 | Sakarya | 6.400 | 3.315 | 0.470 | 3.785 | 96,498 | 255,961 | 2.560 | 5,703,375 | 6,615,915 | 0.604 | 0.392 | 3.556 | 94% |
| 13 | West Black Sea | 9.930 | 5.144 | 0.729 | 5.873 | 23,562 | 62,498 | 0.625 | 1,892,776 | 2,195,620 | 0.200 | 0.130 | 0.956 | 16% |
| 14 | Yesilirmak | 5.800 | 3.004 | 0.426 | 3.430 | 77,377 | 205,242 | 2.052 | 2,290,024 | 2,656,428 | 0.242 | 0.158 | 2.452 | 71% |
| 15 | Kizilirmak | 6.480 | 3.357 | 0.476 | 3.832 | 90,179 | 239,200 | 2.392 | 3,963,186 | 4,597,296 | 0.420 | 0.273 | 3.084 | 80% |
| 16 | Konya | 4.520 | 2.341 | 0.332 | 2.673 | 161,409 | 428,137 | 4.281 | 2,430,709 | 2,819,622 | 0.257 | 0.167 | 4.706 | 176% |
| 17 | East Mediterranean | 11.070 | 5.734 | 0.813 | 6.547 | 39,335 | 104,336 | 1.043 | 2,051,695 | 2,379,966 | 0.217 | 0.141 | 1.402 | 21% |
| 18 | Seyhan | 8.010 | 4.149 | 0.588 | 4.737 | 128,697 | 341,369 | 3.414 | 1,695,572 | 1,966,864 | 0.179 | 0.117 | 3.710 | 78% |
| 19 | Asi | 1.170 | 0.606 | 0.086 | 0.692 | 20,650 | 54,774 | 0.548 | 1,277,313 | 1,481,683 | 0.135 | 0.088 | 0.771 | 111% |
| 20 | Ceyhan | 7.180 | 3.719 | 0.527 | 4.246 | 148,392 | 393,610 | 3.936 | 1,418,391 | 1,645,334 | 0.150 | 0.098 | 4.184 | 99% |
| 21 | Firat | 31.610 | 16.374 | 2.320 | 18.694 | 283,217 | 751,233 | 7.512 | 7,199,119 | 8,350,978 | 0.762 | 0.495 | 8.770 | 47% |
| 22 | East Black Sea | 14.900 | 7.718 | 1.094 | 8.812 | 0 | 0 | 0.000 | 2,494,663 | 2,893,809 | 0.264 | 0.172 | 0.436 | 5% |
| 23 | Coruh | 6.300 | 3.263 | 0.462 | 3.726 | 6,131 | 16,262 | 0.163 | 467,718 | 542,553 | 0.050 | 0.032 | 0.244 | 7% |
| 24 | Aras | 4.630 | 2.398 | 0.340 | 2.738 | 77,900 | 206,630 | 2.066 | 889,157 | 1,031,422 | 0.094 | 0.061 | 2.222 | 81% |
| 25 | Van | 2.390 | 1.238 | 0.175 | 1.413 | 45,100 | 119,628 | 1.196 | 1,005,209 | 1,166,042 | 0.106 | 0.069 | 1.372 | 97% |
| 26 | Dicle | 21.330 | 11.049 | 1.566 | 12.615 | 25,804 | 68,445 | 0.684 | 2,818,791 | 3,269,798 | 0.298 | 0.194 | 1.177 | 9% |
| | **TOTAL** | **185.550** | **96.374** | **13.656** | **110.030** | **1,825,433** | **4,841,961** | **48.420** | **62,865,574** | **72,924,066** | **6.654** | **4.325** | **59.399** | **54%** |
| | ASSUMPTIONS | | Based on SPO report figures total utilizable flow estimated as 110 $km^3$, 60% of average annual flow. Surface water element estimated as 88% of this volume, as groundwater element taken as 12% of this volume to match DSi estimate of 13.66 $km^3$ figure for available groundwater reserves. | | | Unit area water duty of 10,000 $m^3$/ha assumed | | | Individual average water consumption assumed to be 250 litres/day/person (based on figure given in SPO report). Individual basin figures factored up by national population growth rate | | | Industrial use assumed as 66% of domestic use (from SPO data on consumption) | | |

# Estimated water demand and supply for each river basin by sector in 2006

| No | River basin | Total flow | Estimated water supply available | | | Consumption | | | | | | | Demand vs Supply available | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Irrigation | | Domestic | | | Industry | Total | | |
| | | A | B | C | D | E | G | H | I | J | K | L | M | N |
| | | | A x 0.511 | B x 0.126 | B + C | | F / 100,000 | | H x 1.235 | F / 100,000 | J x 0.8 | G + J + K | L / D | D - L |
| | | Average annual flow ($km^3$) | Surface water available for use | Ground-water available for use | Total water available for use | Estimated total equipped irrigation area by 2030 | Estimated consump-tion | Population in 2006 | Population in 2030 | Estimated consump-tion | Estimated consump-tion | Total Water Consump-tion | Demand/Supply available | Demand - Supply available |
| | | ($km^3$) | ($km^3$) | ($km^3$) | ($km^3$) | (ha) | ($km^3$) | (No.) | (No.) | ($km^3$) | ($km^3$) | ($km^3$) | (%) | ($km^3$) |
| 1 | Meric Ergene | 1.330 | 0.689 | 0.098 | 0.787 | 163,625 | 1.636 | 1,225,509 | 1,513,503 | 0.276 | 0.221 | 2.133 | 2.712 | -1.347 |
| 2 | Marmara | 8.330 | 4.315 | 0.611 | 4.926 | 123,228 | 1.232 | 13,142,147 | 16,230,551 | 2.962 | 2.370 | 6.564 | 1.332 | -1.638 |
| 3 | Susurluk | 5.430 | 2.813 | 0.399 | 3.211 | 183,809 | 1.838 | 3,102,512 | 3,831,602 | 0.699 | 0.559 | 3.097 | 0.964 | 0.115 |
| 4 | North Aegean | 2.090 | 1.083 | 0.153 | 1.236 | 90,937 | 0.909 | 715,733 | 883,930 | 0.161 | 0.129 | 1.200 | 0.971 | 0.036 |
| 5 | Gediz | 1.950 | 1.010 | 0.143 | 1.153 | 174,204 | 1.742 | 2,700,361 | 3,334,945 | 0.609 | 0.487 | 2.838 | 2.461 | -1.684 |
| 6 | Kucuk Menderes | 1.190 | 0.616 | 0.087 | 0.704 | 45,681 | 0.457 | 2,288,413 | 2,826,190 | 0.516 | 0.413 | 1.385 | 1.968 | -0.681 |
| 7 | Buyuk Menderes | 3.030 | 1.570 | 0.222 | 1.792 | 324,798 | 3.248 | 2,291,466 | 2,829,961 | 0.516 | 0.413 | 4.178 | 2.331 | -2.386 |
| 8 | West Mediterranean | 8.930 | 4.626 | 0.655 | 5.281 | 133,724 | 1.337 | 1,032,912 | 1,275,646 | 0.233 | 0.186 | 1.756 | 0.333 | 3.525 |
| 9 | Antalya | 11.060 | 5.729 | 0.812 | 6.541 | 149,901 | 1.499 | 1,807,534 | 2,232,305 | 0.407 | 0.326 | 2.232 | 0.341 | 4.309 |
| 10 | Burdur Lakes | 0.500 | 0.259 | 0.037 | 0.296 | 43,037 | 0.430 | 232,232 | 286,807 | 0.052 | 0.042 | 0.525 | 1.774 | -0.229 |
| 11 | Akarcay | 0.490 | 0.254 | 0.036 | 0.290 | 33,380 | 0.334 | 771,919 | 953,319 | 0.174 | 0.139 | 0.647 | 2.233 | -0.357 |
| 12 | Sakarya | 6.400 | 3.315 | 0.470 | 3.785 | 377,514 | 3.775 | 6,615,915 | 8,170,655 | 1.491 | 1.193 | 6.459 | 1.707 | -2.674 |
| 13 | West Black Sea | 9.930 | 5.144 | 0.729 | 5.873 | 101,934 | 1.019 | 2,195,620 | 2,711,591 | 0.495 | 0.396 | 1.910 | 0.325 | 3.963 |
| 14 | Yesilirmak | 5.800 | 3.004 | 0.426 | 3.430 | 343,219 | 3.432 | 2,656,428 | 3,280,688 | 0.599 | 0.479 | 4.510 | 1.315 | -1.080 |
| 15 | Kizilirmak | 6.480 | 3.357 | 0.476 | 3.832 | 623,981 | 6.240 | 4,597,296 | 5,677,660 | 1.036 | 0.829 | 8.105 | 2.115 | -4.273 |
| 16 | Konya | 4.520 | 2.341 | 0.332 | 2.673 | 426,439 | 4.264 | 2,819,622 | 3,482,234 | 0.636 | 0.508 | 5.408 | 2.023 | -2.735 |
| 17 | East Mediterranean | 11.070 | 5.734 | 0.813 | 6.547 | 99,969 | 1.000 | 2,379,966 | 2,939,258 | 0.536 | 0.429 | 1.965 | 0.300 | 4.582 |
| 18 | Seyhan | 8.010 | 4.149 | 0.588 | 4.737 | 310,940 | 3.109 | 1,966,864 | 2,429,076 | 0.443 | 0.355 | 3.907 | 0.825 | 0.830 |
| 19 | Asi | 1.170 | 0.606 | 0.086 | 0.692 | 97,881 | 0.979 | 1,481,683 | 1,829,879 | 0.334 | 0.267 | 1.580 | 2.283 | -0.888 |
| 20 | Ceyhan | 7.180 | 3.719 | 0.527 | 4.246 | 515,642 | 5.156 | 1,645,334 | 2,031,987 | 0.371 | 0.297 | 5.824 | 1.372 | -1.578 |
| 21 | Firat | 31.610 | 16.374 | 2.320 | 18.694 | 1,869,660 | 18.697 | 8,350,978 | 10,313,458 | 1.882 | 1.506 | 22.085 | 1.181 | -3.390 |
| 22 | East Black Sea | 14.900 | 7.718 | 1.094 | 8.812 | 0 | 0.000 | 2,893,809 | 3,573,854 | 0.652 | 0.522 | 1.174 | 0.133 | 7.638 |
| 23 | Coruh | 6.300 | 3.263 | 0.462 | 3.726 | 42,535 | 0.425 | 542,553 | 670,053 | 0.122 | 0.098 | 0.645 | 0.173 | 3.080 |
| 24 | Aras | 4.630 | 2.398 | 0.340 | 2.738 | 279,165 | 2.792 | 1,031,422 | 1,273,806 | 0.232 | 0.186 | 3.210 | 1.172 | -0.472 |
| 25 | Van | 2.390 | 1.238 | 0.175 | 1.413 | 90,027 | 0.900 | 1,166,042 | 1,440,062 | 0.263 | 0.210 | 1.373 | 0.972 | 0.040 |
| 26 | Dicle | 21.330 | 11.049 | 1.566 | 12.615 | 609,224 | 6.092 | 3,269,798 | 4,038,200 | 0.737 | 0.590 | 7.419 | 0.588 | 5.196 |
| | **TOTAL** | **186.050** | **96.374** | **13.656** | **110.030** | **7,254,454** | **72.545** | **72,924,066** | **90,061,221** | **16.436** | **13.149** | **102.130** | **0.928** | **7.900** |
| | ASSUMPTIONS | | Based on SPO report figures total utilizable flow estimated as 110 $km^3$, 60% of average annual flow. Surface water element estimated as 88% of this volume, as groundwater element taken as 12% of this volume to match DSi estimate of 13.66 $km^3$ figure for available groundwater reserves. | | | Unit area water duty of 10,000 $m^3$/ha assumed. Areas are DSi figures for economically irrigable areas for each basin | | Individual average water consumption assumed to be 500 litres/day/person (based on figure given in SPO report). Individual basin figures factored up by estimated national population growth rate to 2030. Note: the 500 litres/day/person is considered very high. | | | Industrial use assumed as 80% of domestic use to match SPO figure | | | |

**Estimated water demand and supply for each river basin by sector in 2030**

## 2.4. INSTITUTIONAL STRUCTURE

The investing organizations in water resources development in Turkey are DSI, EIEI, Ministery of Environment and Forestry and Bank of Provinces. The main supervising organizations are Ministery of Agriculture, General Directorate of Meteorology, Municipalities, Ministery of Environment and Forestry, Ministery of Health, Ministery of Finance, State Planning Organization, State Statistics Organization and universities.

Water resources in Turkey are planned centerally and DSI has the main mission in this task.

## 2.5. WATER RESOURCES MANAGEMENT

A major problem in the country at present is that numerous authorities are involved in the management of water resources. This is further complicated by the fact there exists regulations of an identical subject by more than one law or directive. In some cases, there are different provisions which are applicable to the water of the same status. The main Laws in the Water Sector in Turkey are:

***The Bank of Provinces Law, 1945***---The Bank of Provinces was established with a mandate to assist all municipalities, irrespective of size, in the financing and construction of their infrastructure works including water supply (drinking water) and sewerage, under the Ministry of Public works and Resettlement.

***Establishment of General Directorate of the State Hydraulic Works (DSI), 1954***---The law defines duties and authorities of DSI and determines its organizations. Water resources management and nation-wide responsibility for water sector planning is centralized within DSI, under the Ministry of Energy. DSI acts to some extent as a means of water sector integration, although this is not systematically established in the legislation.

***Groundwater Law, 1968***---According to this law, groundwater is the sole property of the State, and DSI is the only legal authority responsible for the investigation, use, and allocation of ground waters.

***Drinking Water Supply Law, 1968***---This law authorized DSI to provide drinking water to cities having a population of more than 100,000 provided that the government authorizes DSI and the concerned city council approves.

***Rural Area Water Supply Law***---Responsibility for supplying drinking water to villages was originally assigned to DSI, but later was transferred to the General Directorate of Rural Services.

***The Law of Environment, 1983***---Based on the principle of "polluter pays," this law deals with the issue of environment in a very broad scope. The aim of the law, which considers the environment as a whole, is not only to prevent and eliminate environmental pollution, but also to allow for the management of natural and historical values and land in such a way as to utilize and preserve such richness with concern for future generations as well.

As can be seen there are separate enactments dealing respectively with matters such as rural and urban water supply, groundwater, irrigation and hydropower, yet DSI coordinates water use at the national level. Any agency that requires a potential development project or is interested in investing

in a water-sector related activity has to cooperate with DSI and must obtain prior approval from DSI concerning the source and volume of water to be used for each project.

Two major problems result from having more than one authority given authority by different laws for the management of water resources: First, is the inevitable overlap of authorities. The second problem is the matter of coordination where different authorities are empowered by different laws for the same act.

A number of Government agencies are directly involved in water resource issues such as DSI, Ministry of Environment and Forestry, MARA as well as other agencies that are indirectly involved such as Ministry of Health, Ministry of Industries and the Ministry of Interior. Without a clear and unambiguous Water Law it is not obvious where the rights and responsibilities of the various actors start and stop. DSI has many legal rights associated with development of surface and groundwater but does not manage these supplies nor accept responsibility for the pollution resulting from use of these sources.

Neither IAs, ICs, WUOs, nor other users of surface waters have effective water rights. In other words they do not have long-term legal rights to abstract and use specified quantities of water. As there is likely to be increased competition for Turkey's water resources over the coming years, comprehensive water resource planning and modeling, on a basin or watershed basis and the introduction of effective water rights, will become essential if the sector is to be effectively managed and future investments encouraged.

As is declared in the National Environment Assessment Plan of 1999, sustainable management of water resources becomes almost impossible since different organizations carry out water management activities at different levels without taking water basins as a whole (NEAP, 1999). Besides the lack of coordination, the present situation creates a struggle between different organizations for authority.

Even if numerous authorities are involved in the management of water resources. DSI plays most important role in water management in Turkey

The General Directorate of State Hydraulic Works (DSİ), is a legal entity included in general budget, and is the primary executive state agency responsible for planning, management, development, and operation of the nation.s overall water resources. DSİ works under the aegis of the Ministry of Energy and Natural Resources (MENR).

The General Directorate of DSİ was established by Law No. 6200 on 18th December 1953. As a public agency, it is responsible for four major tasks namely, irrigated agriculture enhancement, hydroelectric energy generation, water supply to large cities, and flood prevention measures. In order to achieve the above mentioned objectives, DSI primarily develops dam projects which are at the centre of the four objectives. Therefore, DSI is mainly known as a public agency developing dam projects. It is also an authority responsible for allocation of the nation's surface and groundwater for single and multiple purposes.

### 2.5.1. Strategies and Policies

There are many organisations involved in water management with overlapping, conflicting and unclear tasks. Because different laws and regulations authorise a number of different institutions to manage the same water resources, these overlapping competencies have given rise to conflicts over tasks and responsibilities in the water sector. Table 2.3 presents an overview.

Another current weakness of the Turkish system is the separation of water quality and water quantity management. The main organizations involved are MoEF with responsibilities related to water quality and DSI with responsibilities for water quantity, although in recent years DSI has also

taken upon itself some tasks on water quality (e.g. water quality monitoring for irrigation purposes).

General Directorate of State Hydraulic Works (DSI) (under the Ministry of Energy and Natural Resources) is responsible for water quantity management of both ground and surface waters including the monitoring of water resources.

The Ministry of Environment and Forestry (MoEF) is responsible for pollution prevention of water resources, water quality management of surface water and the related permitting and inspections. In addition the implementation

of the Regulation on the Control of Water Pollution, Regulation on protection of wetlends, Regulation on inspection and the Regulation on EIA both fall under the responsibilities of the MoEF.

Another major weakness of the Turkish system is that there is no sufficient delegation of tasks and responsibilities (like; planning, financing, permitting and enforcement) to competent authorities on the level of river basin districts to enable sustainable water management. DSI has 26 well-organised DSI District Offices; MoEF has Environmental Directorates in each of the Provinces (81), although some of these are still rather weak.

**Overview of Turkish Governmental Organisations and Their Tasks in Water Management**

**Organisation Main Tasks and Responsibilities (summarised)**

Ministry of Environment (MoE*) water resource pollution prevention, environmental standards, permitting and inspection, EIA

State Hydraulic Works (DSI) water resource investigations, river basin development, planning, , water supply to municipalities above 100 000 population

Ministry of Health (MoH) drafting drinking water legislation, setting drinking water standards and implementation and monitoring of these standards, mineral waters legislation, bathing water legislation

Bank of Provinces (BoP) planning, financing and constructing of water and wastewater treatment plants, water supply for populations between 3000 and 100 000.

State Planning Organisation (SPO) Overall planning for investment for water resources (e.g. dams, reservoirs, water supply) and pollution control (e.g. sewerage and sewage treatment)

Directorates of Water and Sewage of Greater Municipalities Inspection of discharges of industrial sewage and construction, operation and maintenance of water and wastewater treatment plans

GD Rural Services (GDRS) Drinking water and sewerage for villages (<3000) Ministry of Agriculture (MoARA) Fishery and Aqua Culture legislation, responsible for all water quality issues in aquaculture and fishery areas including coastal waters, pesticide control and monitoring

General Directorate of Electricity (GDE) Water resources for energy production

Ministry of Forestry (MoF*) Protection projects of water basins

Ministry of Tourism (MoT) Building wastewater infrastructure systems in tourist areas

Ministry of Interior (MoI) Implementation of water legislation on local Authorities

State Meteorological Institute (SMI) Weather forecasting

State Institute of Statistics (SIS) Compile official statistics

* In 2003, the Ministry of Environment merged with the Ministry of Forestry to form the Ministry of Environment & Forestry (MoEF).

### 2.5.2. Agricultural Irrigation Development

Almost one third of Turkey.s total area (78 Mha) is arable land (28 Mha). Comprehensive studies pointed indicate that 8.5 million ha of the arable land is economically irrigable in Turkey. As of 2006, 4.97 million ha of an 8.5 million ha area have been equipped with irrigation facilities, this being 2.85 Mha developed by DSI, 1.1 Mha developed by the GDRS(now abolished), and about 1.0 Mha by small- scale privately owned irrigation schemes. Moreover, 6.5 million ha of 8.5 Mha land have been envisaged for development by DSI, 1.5 million by Other State Agencies (OSA), and 0.5 million ha by small- scale privately owned irrigation schemes by the year 2030.

As of 2006, irrigation projects the total area of which is 2.85 million ha developed by DSÝ constitute one third of total irrigable area (8.5 Mha) of Turkey. When we look at the figures

achieved so far, DSÝ.s development of 2.85 Mha means that 10% of the total agricultural area of 28 million ha and 57% of Turkey.s irrigated area of 4.97 million ha are being irrigated. It is estimated that the irrigation area to be developed by DSÝ by 2030 will increase to 6.5 million ha (76%). Turkey, with its present irrigation development of 58% (4.97 Mha of 8.5 Mha), aims at reaching the 8.5 million ha which is technically and economically viable in today.s conditions in order to meet food requirements, to grow agricultural products for industry in a balanced, stable and continuous manner, to solve the unemployment problem of the population working in the agricultural sector, and to raise living standards. Thus, completion of the remaining irrigation projects of 3.53 million ha is of big importance fort he above mentioned purposes.

Approximately 92% of the total area is irrigated by using surface irrigation methods such as furrow, border, and wild flooding. The remaining part is irrigated with pressurized irrigation methods, i.e sprinklers and drips. An area of about 200,000 ha is equipped with sprinkler irrigation systems consisting of portable pipes, which are widely used among farmers in Turkey. In DSÝ irrigation projects, an area of more than 90,000 ha. has been irrigated by sprinkler irrigation (mainly for sugar beet, cereals, clover, sunflower, melon, and vegetables). DSI has developed a 12,000 ha area in which mainly citrus fruits, vineyards, strawberries, and vegetables are cultivated by using drip irrigation.

Water is one of the most important inputs in agricultural development. It provides moisture for plants in the soil and thus increases yield, and also makes the agricultural sector free from climatic conditions, creates additional employment, improves income distribution in rural areas, makes fertilizer use possible, increases a variety of production, and results in yields of more than one crop, depending on the length of the growing period. By 2030, when areas equipped with irrigation infrastructure by DSÝ will reach 6.5 million ha, it could provide additional employment for 2 million people. In addition to this economic contribution, irrigated agriculture halts migration to the big cities and brings about social benefit.

Realization and success of irrigation projects depend on various factors. Firstly, land has to be suitable forirrigation; secondly, the irrigation source has to be adequate and water quality has to be appropriate for irrigation. After these two main conditions, an irrigation scheme to convey water to the irrigation area for farmers. use and a drainage system to take excess water away from the irrigation area has to be constructed. All these physical facilities have to be complete and perfect. However, these factors alone may not be adequate for successful irrigation. Since irrigation is a vigorous activity, success of irrigation depends on the knowledge and skills of farmers as well as good management by responsible authorities.

### 2.5.3. Energy Generation

The level of energy consumption indicates the level of industrialization and prosperity of countries. Recently, annual energy consumption per capita in Turkey has reached 2,150 kWh (kilowatt hours), which is still below the world average of 2,500 kWh. The average energy consumption for the developed countries is 8,900 kWh, but it varies from 12,322 kWh in the USA to 827 kWh in China. Industrialization is our main target on the road to economic and social development. Therefore, it is essential to meet the energy demands of industry and other consumers in a timely and sustainable manner.

While total energy generation in Turkey in the 1950.s was a mere 800 GWh (gigawatt hours), this figure has increased by about 200 times, reaching 161,000 GWh/year today. The current installed capacity in Turkey is 36,679 MW (megawatt), which could generate an average of 237,000 GWh/year; however, total generation remains at 161,000 GWh for reasons such as failures, maintenance and repair activities, operation policy, economic recession, low demand, drought, efficiency, etc. In other words, average capacity utilisation remains at 68%. Capacity utilisation has been 62% in thermal plants and 90% in hydroelectric power plants. 26% of energy generation in Turkey depends on hydroelectric power, which is a renewable energy source, and the remaining 74% on thermal power (natural gas, lignite, coal, fuel oil, etc., which are fossil fuels). A special emphasis has recently been placed on alternative energy sources such as wind and geothermal power and there have been some steps taken towards introducing the nuclear power as well.

Table 2.3 Installed Capacity and Energy generation in Turkey

**ENERGY INSTALLED CAPACITY AND GENERATION IN TURKEY ***

| Installed Capacity and Annual Generation | | 2004 | | | | 2005 (Provisional) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | CAPACITY | | ACTUAL | Capacity Use | CAPACITY | | ACTUAL | Capacity Use |
| | | Installed (MW) | Generation (GWh) | Generation (GWh) | Ratio (%) | Installed (MW) | Generation (GWh) | Generation (GWh) | Ratio (%) |
| THERMAL POWER | COAL | 8,296 | 54,339 | 34,448 | 63 | 10,076 | 67,689 | 43,839 | 65 |
| | FUEL OIL | 3,023 | 19,852 | 7,670 | 39 | 3,110 | 20,506 | 8,479 | 41 |
| | NATURAL GAS | 12,798 | 96,480 | 62,242 | 65 | 13,484 | 102,218 | 66,491 | 65 |
| | OTHERS | 28 | 207 | 104 | 50 | 28 | 20 | 98 | 47 |
| | TOTAL | 24,145 | 170,877 | 104,464 | 61 | 26,697 | 190,619 | 118,907 | 62 |
| Geothermal and Wind Power | | 34 | 156 | 151 | 97 | 41 | 41 | 193 | 178 |
| Hydroelectric Power | | 12,579 | 12,465 | 45,396 | 46.084 | 102 | 12,941 | 46,459 | 41,889 |
| **GENERAL TOTAL** | | **35,587** | **36,824** | **216,429** | **150,698** | **70** | **36,679** | **237,272** | **160,974** |

(*) Reference: APK (Research, Planning and Coordination Department) of TEİAŞ (Turkish Electricity Transmission Authority), January 2005

Natural gas and oil in Turkey are insufficient energy resources. Therefore, Turkey has to import oil, natural gas, and even hard coal to meet its energy needs. In recent years, an upward trend has taken place in the consumption of natural gas in Turkey for both domestic and industrial use. Natural gas power plants aim to meet the growing energy demands of industries. Therefore, the share of

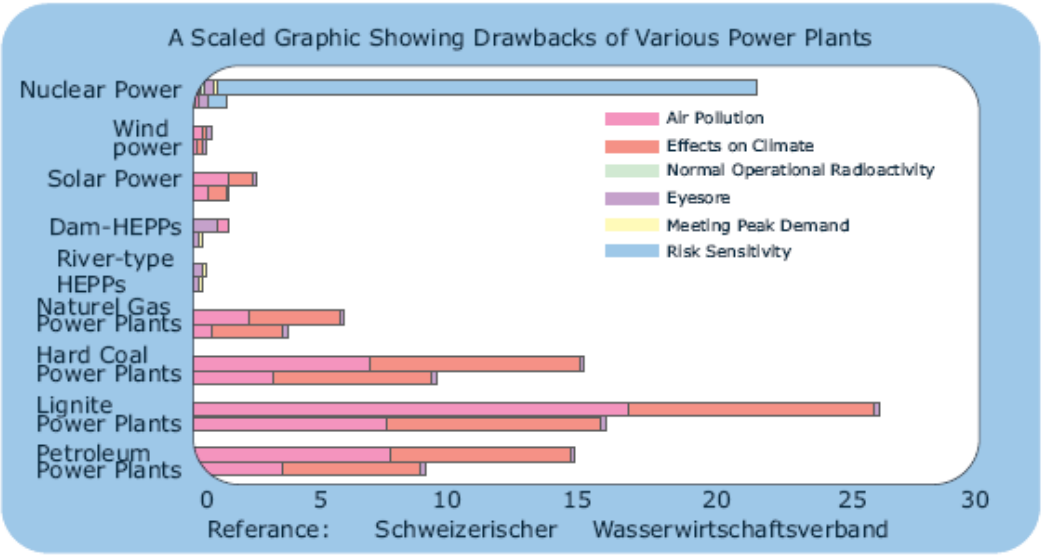
hydroelectric power has dropped while the share of thermal energy has increased in overall energy generation. Nevertheless, the European Union places great emphasis on green power in energy policies (hydroelectric, wind, solar, and biomass energies).

Thus, it is important to harmonize the energy policy and relevant legislation in Turkey with European energy policy. Consequently, the weight of hydroelectric power in overall generation needs to be increased. The two authorities in charge of developing hydropower potential are DSÝ and the Electrical Power Resources Survey and Development Administration. The latter focuses more on survey and planning, whereas DSÝ deals with both planning and realization of projects.

The following table makes a comparison of various sources of energy in terms of air pollution, effects on climate, normal operational radioactivity, eyesores, meeting peak demand, and risk vulnerability. This table indicates that hydroelectric power plants are the least risky and the least harmful ones in comparison with the other types of power plants.

Hydroelectric power plants should be preferred because of their environment-friendly technologies with the lowest risk potential. These plants are able to respond to unexpected demand fluctuations. Therefore, they are operated as peak power plants in Turkey as well as in other countries. Hydroelectric power is environment-friendly, clean, renewable, able to meet peak demands, highly efficient (over 90%), involves no fuel cost, is a balancer of energy prices, has a long life- span (200 years), its cost recovery is short-run (5-10 years), its operational costs are low, (approximately

0.2 cent/kWh), and it is an indigenous source of energy which is national and natural.




If half of the world.s economically viable hydroelectric potential were developed, greenhouse gas emissions would be decreased by 13%. Compared to other power plants, hydroelectric plants have

the lowest operational cost, the longest operational life, and the highest efficiency rates. There are economic, environmental and strategic reasons for giving priority/incentives to hydropower stations among other power plants. Moreover, HEPPs use our own national resources.

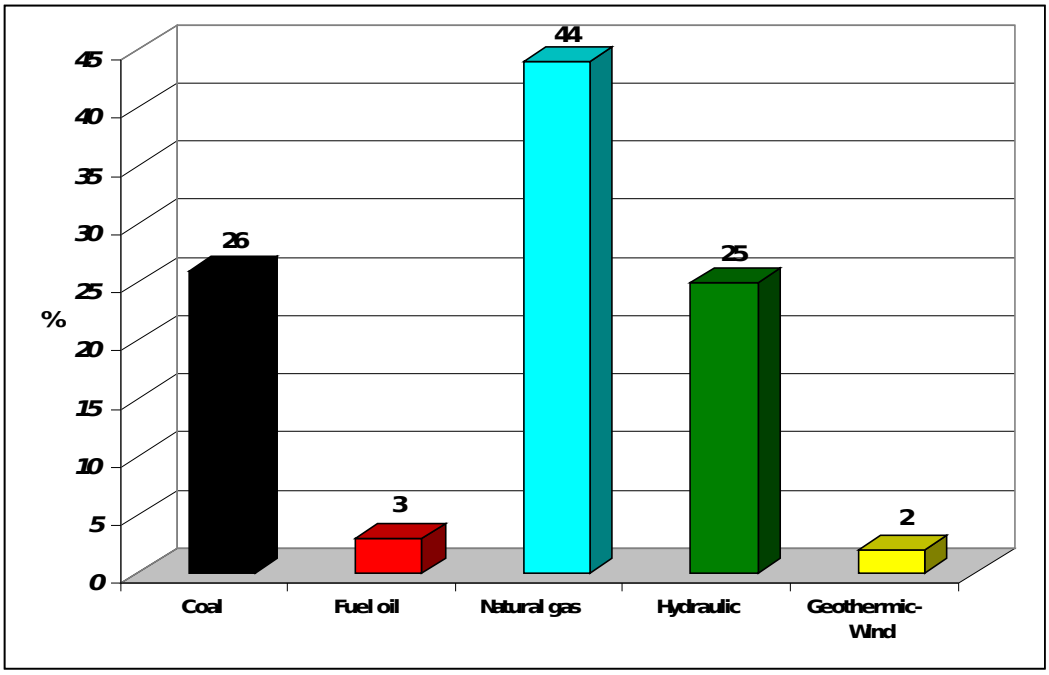
The hydroelectric potential of a country is calculated under the presumption that all natural flows, until the country.s borders or until the sea, will be used with 100% efficiency. This calculation produces the gross theoretical hydroelectric potential of a country. However, even the latest technologies available today cannot make utmost use of this potential. Therefore, the maximum potential that can be used in the existing technologies is referred to as the technically viable hydroelectric potential. Nevertheless, not every technically viable utility is economically viable. Thus, the portion of the technically viable potential that can be realized under the existing and expected local economic conditions is referred to as the economically viable hydroelectric potential. Turkey.s theoretical hydroelectric potential is 1% of that of the World and 16% of that Of Europe.

The gross theoretical viable hydroelectric potential in Turkey is 433 billion kWh and the technically viable potential is 216 billion kWh. The economically viable potential, however, is 130 billion kWh. The tax deductions and subsidy policies for green energy in the European Union will contribute to efforts aimed at increasing the economically viable potential of hydroelectricity.

At present Turkey has 138 hydroelectric power plants in operation with total installed capacity of 12,878 MW generating an average of 46,277 GWh/year, which is 36% of the economically viable hydroelectric potential. Forty-one hydroelectric power plants are currently under construction with 3,962 MW of installed capacity to generate an average annual 9,779 GWh representing 8% of the economically viable potential. In the future, 540 more hydroelectric power plants will be constructed to be able to make maximum use of the remaining 73,877 GWh/year of economically viable potential. As a result of these works, a total of 716 hydroelectric power plants with 36,697 MW will tame rivers to harness the economically viable hydropower of Turkey.

The USA has developed 86% of the country.s technically viable hydroelectric potential while Japan has realized 78%, Norway 68%, Canada 56% and Turkey 21%. The International Energy Agency (IEA) has foreseen a 53% increase of the current use of world hydroelectric power and other renewable energy sources by 2020, which is a sign that all hydroelectric potential will be put into operation. The European Commission has incorporated an action plan into the European Union strategies to double the ratio of renewable energy sources in gross internal energy consumption (from 6% to 12%) and to increase the same ratio to 22.1% in terms of electricity generation by 2010.

As a primary executive public agency in hydroelectric power development, State Hydraulic Works has developed 10,380 MW (81%) of the total of 12,878 MW realized installed capacity in Turkey. 20 of the 25 largest realized hydroelectric power plants in Turkey have been developed by State Hydraulic Works.




**Annual Energy Generation with Different Sources (2008)**

### 2.5.4. Environmental Concerns

Article 56 of the Turkish Constitution in 1982 identified the concept of the environment. After the Environment Law was enacted in 1983, many regulations came into force pursuant to Article 31 of the Law. Of these regulations, those concerning DSÝ are the Water Pollution Control Regulation and Environmental Impact Assessment (EIA) Law. EIA work for water resources development projects are implemented by Environment Section Directorate of DSI. (III. Part of Konya-Çumra Project , Mersin- Tarsus Project etc.)

The activities in Environment Sector are coordinated and executed by Environment Section Directorate under Investigation and Planning Department.

Pollution research projects and water pollution maps are prepared in cooperation with other organizations. Environmental concerns stressed by international environmental conventions, such as the Convention on Combating Desertification, and the Ramsar Convention are taken into account in development projects. The necessary information, data and reports are prepared for continuous water resources quality monitoring (surface and groundwater in the whole country) activities.

Major activities for rescuing the archeological heritage and for wetlands protection are as follows:

- Rescue Projects for the Archaeological Heritage under the Keban Dam Reservoir and Lower Euphrates;
- Archaeological Excavations under the Tahtalý Dam Reservoir (İzmir)
- Allianoi Excavations under the Yortanlý Dam (Bergama)
- Archaeological Excavations under Manisa Gördes Dam
- Salvage Projects of Ilýsu (Hasankeyf) and Karkamýþ Dam Reservoirs
- Project of Pollution Effect of Irrigation Water for Balýkesir and Kepsut Plains
- Manyas Project (Balýkesir)
- Investigation Project of Sources of Lake Pollution in Atatürk Dam
- Project of Paşabağ Region Irrigation
- Dreinage Projects for Solving Environmental Problems in Harran Plain
- Gala Lake National Park Project
- Eğmekaya Reedbeds Protection Project (Aksaray)
- Ecological Protection Project for Mucur-Seyfe Lake (Kırþehir) and
- The Sultansazlığı Develi Project (Kayseri)

- Menderes Basin Project

### 2.5.5. Flood Control

The floods combined with the landslides experienced by Turkey on May 21-25, 1998, caused deaths, suffering, and extensive damage to both public and private property in the West Black Sea Region (WBSR). In order to combat floods, develop flood management, and reduce or eliminate long-term risk, the Government of Turkey, with the assistance of the World Bank , has developed the TEFER project (Turkey Emergency Flood Earthquake Rehabilitation) and loans of US$ 369 million, US$ 84 million of which

is intended for DSI projects have been allocated. The Government of Turkey secured this loan (World Bank Loan No. 4388-TU) from the International Bank for Reconstruction and Development (IBRD).

### 2.5.6. Erosion Control

General Directorate of DSI has always had a sensitive for erosion control activities. In this framework in order to supply the sustainability of water and land resources and increase their efficiency, DSI makes investigations on erosion and sediment control and for the prevention of harms from floods.

Through 263 projects of DSI, 210 settlements and 20,500 ha agricultural land has been protected from the effect of erosion and sediment. Also together with ongoing 196 projects 165 settlements and 15,000 ha agricultural land will be protected. In 32 dams, where is thought to have problems because of sediments in the future, investigations are done to control the erosion and sediment. In 7 of these dams, Kemer Dam (Aydın), Kürtün Dam (Gümüşhane), Nilüfer Dam (Bursa), Kartalkaya Dam (K.Maraþ), Ayvalı Dam (K.Maraş), Atikhisar Dam (Çanakkale), Çamlıgöze Dam (Sivas) the activities for application of river .MECRA. erosion is going on in limits of the given budget.

Afforestation work and creation of recreation facilities by DSI aim at prevention of erosion, decreasing the sediment amount deposited in dams through rivers, restoring the environment of dam basins and their catchments. Areas planted with trees also serve as public promenades and picnic areas. According to the cooperation protocol signed in 2003 between the General Directorates of DSI and Forestry and Erosion Control, an area of 20,000 ha will be afforested by planting 60 million saplings in four years. Using erosion control techniques will protect water and soil resources, thus more green country will be handed down to future generations. Erosion and sediment control structures constructed by DSI helps to restore environment

and to protect basin resources.

## 2.6. TRANSBOUNDARY WATERS

There exists important transboundary waters İn Turkey and these are mostly located in South Eastern Anatolia.

The transbounsary waters are given in the table below. The total amount of transboundary waters is 66 milliard $m^3$ which constitute the 36 % of the total potential.

**Tablo 2.4:** Water and Land Borders of Turkey

| ***Neighbour Countries*** | ***Length of Border (Km)*** | ***Length of Water Border (Km)*** | ***Ratio of Water Borders to Total Borders (%)*** |
|---|---|---|---|
| Suria | 877 | 76 | 9 |
| OldSoviet Union | 610 | 243 | 40 |
| Iran | 454 | 20 | 4 |
| Irak | 331 | 38 | 11 |
| Bulgaria | 269 | 50 | 19 |
| Greece | 212 | 174 | 82 |
| ***Total*** | **2753** | **601** | **22** |

Turkey is a upstream country in five of these six basins. 22 % of Turkish borders are constituted by rivers.

**Table 2.5**: Transboundary Waters in Turkey

| No | River | Related Country (From upstream to downstream) |
|---|---|---|
| | **RIVERS AT THE BORDER** | |
| 1 | Meriç River | Bulgaria-Turkey-Greece |
| 2 | Aras River | Turkey-Azerbeican-Iran-Armenia |
| 3 | Arpaçay | Turkey-Armenia border |
| 4 | Hezil River (Tributary of Tigris) | Turkey-Iraq border |
| 5 | Mutlu River (Rezve) | Turkey-Bulgaria border |
| | **TRANSBOUNDARY WATERS** | |
| 1 | Euphrates River | Turkey-Suria-Iraq |
| 2 | Habur River(Res-ul-Ayn.Pınar) | Turkey-Suria |
| 3 | Nusaybin Çağ-Çağ Pınar | Turkey-Suria |
| 4 | Sacir Suyu (Tributary of Euphrates) | Turkey-Suriya |
| 5 | Culap (Tributary of Euphrates) | Turkey-Suriya |
| 6 | B.C.rcıp suyu (Tributary of Euphrates) | Turkey-Suriya |
| 7 | Karacurum River | Turkey-Suriya |
| 8 | Balık Suyu | Turkey-Suria |
| 9 | Zerkan Suyu | Turkey-Suria |
| 10 | Senpas Suyu | Turkey-Suria |
| 11 | Dicle Nehri | Turkey-Suria -Iraq |
| 12 | Zap Suyu (Tributary of Tigris) | Turkey-Iraq |
| 13 | Şemdinen River (Tributary of Zap) | Turkey-Iraq |
| 14 | Drahini D. (Tributary of Hezil) | Turkey-Iraq |
| 15 | Nerduç River | Turkey-Iraq |
| 16 | Çoruh River | Turkey-Georgia |
| 17 | Asi River | Lubenan-Suria-Turkey |
| 18 | Afrin River (Tributary of Asi) | Turkey-Suria-Turkey |
| 19 | Sabun Suyu (Tributary of Afri) | Turkey-Suria-Turkey |
| 20 | Kura (Kür) River | Turkey-Georgia-Azerbaijan |
| 21 | Sarısu (Gürbulak sınır kapı) | Turkey-Iran |
| 22 | Kocadere (Veleka) | Turkey-Bulgaria |

### 2.6.1. Recent Developments in Middle East

Although Euphrates and Tigris rivers' water potential is approximetly one fourth of Turkey's potential they are not easily developed as they are transboundary waters.

The first activities to hinder the utilization of Euphrates and Tigris rivers' water potential has been first initiated with the start of GAP. These two basins are thought to be held as a single basin.

Today the water management policy at the Middle East and Turkey's potential has become a main concern of EU and UN.

### 2.6.2. UN's Prospects

UN defendes that 2040 will be a very critical year both for Turkey and the countries in Middle East as they fill face a very arid period and it is estimated that the crops will dry. Therefore Euphrates and Tigris rivers will become very importany and there will exist a possibility that Suria and Iraq together will bomb the dam's in southeastern parts of Turkey. Then a policy ha sto be developed from now on to hinder this situation.

### 2.6.3. Water Security and Evaluation

Israil desires to be the leading country in the Middle East. Israil's 20 % of water demand is supplied from West Bank and Israil hinders the usage of Phalestina.

In negotiations between Israil and Suria about the water resources in Golan, Euphrates potential has always come to order.

An agreement about the water resources management in the region seems difficult. 65 % of world's oil reserves are found in Middle East; however the oil consumption at the region is only 4 %. So the global actors desire to play a similar role in the case of water at the region.

Water management problem can not be solved unlessaA stability at the region should have been achieved.

Turkey should be alert in every respect in developing the water resources and should define a policy. As there exists always a potential in hinderance of projects of GAP.

In policy developing Turkey then needs concentration on development of new technical and sociological analysis at the region.

Proposing to consider the Euphrates and Tigris basins as a single basin will be a good step.

# CHAPTER III

## 3. WATER RESOURCES MANAGEMENT IN THE WORLD

Water will have an important role in the 21 st centuries ecomical and political sturucture. Therefore there is a need in renovation in water resources development. However it seems that new water development policies will be achieved slowly when the ongoing situation is taken into account. A plan should be developed as soon as possible to provide the needs of humankind with the renewable resources without destroying the ecosystems.

There exists two approaches for utilization and management of water resources in the 9th development plan (2007-2013) of Turkey

- Water is a human righ and should be provided to people as cheap as possible as a public concern
- Water is a human need su bir insan gereksinimidir. It is a commercial good and should be priced according to market needs.

The second option has begun to be considered in the frame of new liberal and global policies since 1970. Water management of under developed countries has become one of the main concerns of global companies and developed countries. Thus water's management which is utilized by only 5 % of world's population has become an issue of global companies since the last quarter of the 20th century. Privatization of water services also became a main issue in World Water Forums.

Global companies enounce that world's population is increasing and water will become a very valuble commodity in near future and therefore privatization of water is a necessity and investments can only be afforded by private sector. The pricing of water by State will be an extravagance.

The management of water resources of a country by global agencies will lead to many problems in terms of national planning of water resources. Argentinia and Boliva are the two examples that have faced these problems.

### 3.1. CHANGES IN WATER RESOURCES MANAGEMENT AND SERVICES

- 2/3 of world's population (5,5 milliard) will face water scarcity in 2025 in case recent water policies continue.
- In almost every country state is the owner of water resources and managed by public organizations
- Water services in Turkey is also a public concern.

- 99 % of the water services in Asia, 97 % in Africa, 96 % in Middle and East Europe and South America, 95 % in North America and 80 % in Western Europe is handled by public institutions.
- The justification of privatization is that people will not save what they do not pay.
- Turkey is recently changing its water policy and has taken a step in the privatization process.
- Global Water Partnership(GWP) has been established in 1996 among which UN, governments, global banks, professional organizations, private sector, NGO's participated. The aim of the organization is stated as to organize the domestic and treatment water works in a global frame.
- World Water Council's (WWC) first meting was held Morrocco in 1997 and the second meeting İn Holland in 2000. Private sector, international organizations and the states were the participants.
- Stockholm Decleration: UN originated a conferans in Stockholm related to environmental issues in 1972 and Stockholm Decleration published at the end of the conference. There wasn't any provision related to water in the decleration which shows us that water was not a concern at the time.
- Dublin Decleration: In 1992 in Dublin "The International Conference on Water and Environment" (ICWE) was held. This was the second significant conference following UN Water Conference held in Mar del Plata (Argentinia) in 1977 at the subject of water. ICWE defended the issues considered in "UN Conference on Environment and Development" (UNCED)held in Rio de Janerio (Brazil) in 1992.
- Rio Decleration: This above mentioned decleration stated that a new golabl partnership is needed for a collaboration between states, societies and people. There wasn't aspecific issue related water among its 27 principals. The only concern was in Agenda 21.
- OECD defines water management as the management of all kind of utilizable water and water resources in terms of quantity and quality.
- According to World Bank the "Traditional Approach" in water management is problematic.

## 3.2. GLOBAL WATER POLICY

There are three main attributes in recent global water policy development. The first is policy on the basis of water basin management, the second management on the basis of capital not the state and the third to consider the water resources in the frame of global free trade.

### 3.2.1. Management on the Basis of River Basins

This management method has become a concern of mant international agreements.

Here the main problem is basins may belong to more than one country. The second problem is the existence of different political and governing structures of between these countries. The third problem is not only the countries but the companies have also interests in these waters and they should also take part in negotiations.

EU Directive 2000 is an example in developing water basin management in international basis.

In Rio+10 Meeting held in 2002 economic mechanisms in developing water management on water basins came into consideration.

### 3.2.2. Water Demand Approach

The global approach is based on “demand” rather than “supply”.

This approach has been defended by providing savings in national budget, by hindering losses in water distribution especially in developing countries. The method considers water as a commodity.

Water management is privatized both in maintenance of agricultural and domestic water and then after the system becomes more efficient than the case these issues are held by state.

### 3.2.3. Water in Global Trade

Contracdictory group claims that global investment and trade will accelerate the water contamination and increase the water consumption and thus will negatively effect the water potential. (UN 2000).

Contaminating industry migrates to underdeveloped countries where environmental obligations do not exist or scarce. This leads to rapid exhaustion of water resources in these countries. There after liberization of water resources will have a negative impact on water potential.

The problems faced in NAFTA are the examples of these applications.

On the other hand global companies coerce privatization and pricing of water to make water as a global trade commodity.

Environmental issues and protection of water contradicts with free trade vision and the tension between global trade and protection of environment increases although some steps have been taken for protection of environment.

Agreements concerning the investment and trade are becoming global where as the regulations related to environment and water protection are national. This issue creates also a tension. The global policy is recently based on liquidation of national considerations on environmential and water protection.

The hegemonic attempts on water resources of Argentinia, Bolivia, Gana, Phlipinnnes, South Africa and Nikaragua were opposed by society.

In Turkey the water management of Antalya Municipality were transferred to a global company and similarly in the operation right of Yuvacık Dam in İzmir is transferred to a global company. World Bank desires some similar processes to be applied in Çeşme - Alaçatı and Bursa water managements.

Besides there exists discrepancies in related public authorities to oppose to these developments.

Turkey should have  to develop a national water management policy as soon as possible in order not be a part of global desires on its water resources.

## CHAPTER IV

# 4. WATER RESOURCES MANAGEMENT IN TURKEY

## 4.1. Priority of the Water Resources Development[2]

While Turkey's major focus is on continuing water resource development because of their economic and social potential, protection of water-based ecosystems in rivers, lakes and deltas, and water pollution control is increasingly acknowledged, but has yet to reach satisfactory levels (Ministry of Environment 1998, Republic of Turkey 2003). However, both Turkey's National Environmental Action Plan and the Eighth Five Year Development Plan give top priority to these issues.

From the 1950s to date, Turkey has made considerable progress in developing its water resources for multiple uses. The construction of dams and reservoirs were the main means of saving water during the short rainfall seasons to facilitate year round availability. Today, an extensive network of dams and reservoirs is maintained of which the larger dams serve multiple purposes (e.g. flood control, irrigation, domestic water supply, hydropower etc.).

Due to population growth and urbanization, water and energy demand is expected to increase. According to DSI statistics, annual per capita water availability in the year 2007 was 1,430 m3 with a population of about 72 million. By the year 2030 this amount will decline to 1,000 m3 per capita/year with an expected population of 100 million. The annual per capita energy consumption, which is at present far below the world average, is expected to increase from 1,840 kWh (1999) to 6,794 kWh (2020). To achieve this growth rate and reach energy consumption levels of the OECD countries, huge investments are envisaged.

As of 2007, water use, related to sectors, was as follows: the irrigation sector used 29.3 bcm/year (74%), domestic water 5.8 bcm/year (16%), and industry 4.2 bcm/year (10%). In total, 36% of the usable water potential is utilised.

Although agriculture's contribution to the Turkish economy is declining (from 35% in 1970 to 11.5% in 2007), agriculture is still vital to the national economy employing 30% of the country's work force. Crop production on the 4.85 million ha of irrigated land creates the basis of agricultural exports to European countries and to Near East and North African regions. Export of agricultural and agro-industrial commodities were valued at US$4.4 billion and accounted for 16% of Turkey's total export value in 2001. According to DSI estimates, 8.5 million ha of land is technically and economically irrigable and subject to further development. It is expected that the high share of

[2] **Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp *"Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups "***
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water consumption in agriculture will decline from 74% at present to 65% through the use of modern irrigation techniques.

Domestic water use accounts for 15% of the water resources developed (2003) showing high variations throughout the country. Domestic water use is highest in the Marmara Region, and far below the national average in north-eastern and eastern Anatolia. With more than half of Turkey's population living in urban areas, construction of water supply, sewerage and waste water treatment plants has received high political attention. Population growth together with high internal migration from rural to urban areas over the last 30 years has caused domestic demand to increase. In urban areas, access to a drinking water supply was 83% in 1990 and 81% in 2000; in rural areas, it was 72% in 1990, and 86% in 2000. Currently, only about 55% of the population living in municipalities with more than 3,000 inhabitants are connected to a sewage system, whereas 36% of the population which usually live in greater metropolitan municipalities, are served by waste water treatment facilities.

The percentage of water use in industry has not changed considerably over the past few years, being slightly over 10% (52% from surface water, 48% from groundwater). The major water consuming industries are steel, chemical, paper manufacturing, petroleum refining and agro-industry. In 2000, the greatest industrial demand came from the highly industrialised Marmara Region. Other industrial centres developing in the context of the Southeastern Anatolia Project will not change the overall precentage of industrial water use, and will only change the regional distribution.

Equally important is Turkey's rising energy demand with an annual average growth rate of 7.3%. In 1999, Turkey consumed 118.5 billion kWh, by 2005 this will reach to 195 billion kWh, and by 2010, projections are 285 kWh. In the 1970s Turkey was seriously hit by the energy (oil) crises and after 1997 became an importer of electricity. At present, hydropower provides about 40% of the total power generated, but there is more additional potential. The hydropower share is expected to increase in particular through the construction of power plants on the Euphrates and Tigris.

While Turkey's major focus is on continuing water resource development because of their economic and social potential, protection of water-based ecosystems in rivers, lakes and deltas, and water pollution control is increasingly acknowledged, but has yet to reach satisfactory levels (Ministry of Environment 1998, Republic of Turkey 2003). However, both Turkey's National Environmental Action Plan and the Eighth Five Year Development Plan give top priority to these issues.

## 4.2 CURRENT INSTITUTIONAL FRAMEWORK IN WATER RESOURCES

### 4.2.1 Overview of institutions in the field of water management

There are many organisations involved in water management with overlapping, conflicting and unclear tasks. Because different laws and regulations authorise a number of different institutions to manage the same water resources, these overlapping competencies have given rise to conflicts over tasks and responsibilities in the water sector. Table 2.1 presents an overview.

A current weakness of the Turkish system is the separation of water quality and water quantity management (Carl Bro, 2001). The main organisations involved are MoEF with responsibilities related to water quality and DSI with responsibilities for water quantity, although in recent years DSI has also taken upon itself some tasks on water quality (e.g. water quality monitoring for irrigation purposes).

General Directorate of State Hydraulic Works (DSI) (under the Ministry of Energy and Natural Resources) is responsible for water quantity management of both ground and surface waters including the monitoring of water resources.

The Ministry of Environment and Forestry (MoEF) is responsible for pollution prevention of water resources, water quality management of surface w ater and the related permitting and inspections. In addition the implementation of the Regulation on the Control of Water Pollution, Regulation on protection of wetlends, Regulation on inspection and the Regulation on EIA both fall under the responsibilities of the MoEF.

Another major weakness of the Turkish system is that there is no sufficient delegation of tasks and responsibilities (like; planning, financing, permitting and enforcement) to competent authorities on the level of river basin districts to enable sustainable water management. DSI has 26 well-organised DSI District Offices; MoEF has Environmental Directorates in each of the Provinces (81), although some of these are still rather weak.

**Overview of Turkish governmental organisations and their tasks in water management**

**Organisation Main tasks and responsibilities (summarised)**

Ministry of Environment (MoE*) water resource pollution prevention, environmental standards, permitting and inspection, EIA

State Hydraulic Works (DSI) water resource investigations, river basin development, planning, , water supply to municipalities above 100 000 population

Ministry of Health (MoH) drafting drinking water legislation, setting drinking water standards and implementation and monitoring of these standards, mineral waters legislation, bathing water legislation

Bank of Provinces (BoP) planning, financing and constructing of water and wastewater treatment plants, water supply for populations between 3000 and 100 000.

State Planning Organisation (SPO) Overall planning for investment for water resources (e.g. dams, reservoirs, water supply) and pollution control (e.g. sewerage and sewage treatment)

Directorates of Water and Sewage of Greater Municipalities Inspection of discharges of industrial sewage

and construction, operation and maintenance of water and wastewater treatment plans

GD Rural Services (GDRS) Drinking water and sewerage for villages (<3000) Ministry of Agriculture (MoARA) Fishery and Aqua Culture legislation, responsible for all water quality issues in aquaculture and fishery areas including coastal waters, pesticide control and monitoring

General Directorate of Electricity (GDE) Water resources for energy production Ministry of Forestry (MoF[3]) Protection projects of water basins Ministry of Tourism (MoT) Building wastewater infrastructure systems in tourist areas

Ministry of Interior (MoI) Implementation of water legislation on local Authorities

State Meteorological Institute (SMI) Weather forecasting

State Institute of Statistics (SIS) Compile official statistics

### 4.2.2Monitoring and Enforcement

One of the central preconditions for effective environmental policy-making is extensive monitoring and enforcement. The monitoring of both environmental quality and emissions of pollutants are essential to set standards, to develop adequate strategies and measures, to control the behaviour of producers and polluters and to assess the effectiveness of certain policy instruments and programs. Adequate enforcement has to ensure compliance with the legislative requirements and standards.

*Monitoring:*

The overlapping and conflicting tasks of the different institutions are very much visible when it comes to monitoring. There are numerous organisations with a monitoring task:

- DSI: rivers (quality), lakes and groundwater (quantity, quality)
- MoE: sea, domestic and industrial discharges, project based river quality Monitoring

[3] ** In 2003, the Ministry of Environment merged with the Ministry of Forestry to form the Ministry of Environment & Forestry (MoEF).*

- SMI: meteorological
- GDRS: water quality for purpose of drinking water / irrigation , investigation, protection and development of soil and water resources, construction on drinking water facilities and treatment plants to villages, in small scale irrigation, drainage and land re-plotting
- MoH (Refik Saydam Hygiene Centre): chemical and microbiological quality of drinkable waters (Natural Spring Waters, Mineral Waters and Packaged Drinking Waters) and bathing waters (heath issues)
- MoT: sea and lake (European Blue Flag Campaign)
- BoP: quantity and quality (in relation to projects being developed)
- MoARA: aquatic parameters, water courses for pollution from pesticides and fertiliser run-off.

Problems specifically relate to the lack of sharing of information. Despite significant advances in environmental monitoring and the provision of environmental information by many environmental and non-environmental institutions, there are few regular, comprehensive environmental publications. Recently, MoEF started to publish provincial "state of the environment"- **reports.**

### 4.2.3.Environmental Policy

Environmental policy relies on a command and control approach. Regulations have evolved significantly and tend to approach those of the EU. However, there is a lack of adequate enforcement capability. Fines and penalties for non-compliance with environmental regulations would need to be revised in order to have some effectiveness (OECD, 1999); recently improvements are being undertaken. The Ministry of Environment is undertaking to develop an inspection and enforcement branch and strengthen its territorial capability. MoEF now has Environmental Directorates in each Province. The objective of the Ministry is to increase the number of inspectors with about 1.000 staff during the coming years. A Central Reference Laboratory for Environment has been established and an Environmental Inspection Regulation was introduced.

However, different governmental institutions have environmental enforcement tasks and responsibilities:

- Ministry of Environment: environmental permitting and enforcement for all environment sectors, including water;
- Ministry of Health issuing the Unhealthy Establishment Law permits;

- Ministry of Agriculture, Law on Water Products;
- DSI: groundwater extraction permits.

The division of tasks and responsibilities between Ministries remains unclear which creates problems in implementation. For example, a problem related to this is that water bodies are not (yet) classified (e.g. on the basis of water use) and thus this creates problems on who is responsible for which water bodies.

The number of staff with clear enforcement responsibilities and capabilities however is still very limited and clearly insufficient to effectively perform enforcement of current Turkish environment legislation. These problems will increase when EU legislation will be impl emented.

### 4.2.4.Co-Ordination And Co-Operation

Turkey has a number of governmental organisations with tasks and responsibilities in the field of water management. In this respect the situation is not much different from that in most other EU Member States or Accession Countries.

Tasks and responsibilities of these organisations are generally described in their respective Establishment Laws. However, the establishment of a new organisation, like the Ministry of Environment in 1991 through its Establishment Law did not result in changing e.g. updating or abolishing of other (Establishment) Laws in which similar tasks and responsibilities were given to an already existing organisation. This results in a situation where different institutions have the same, similar and overlapping tasks.

Beside these legal problems, Turkish governmental organisations do not have an open attitude towards other governmental institutions. The exchange of information between Ministries is very difficult if not absent. Each Ministry considers its own information as very valuable and is not prepared to share this information with other parties. This attitude also occurs within Ministries when different departments or officials hesitate to exchange reports and information with other officials and departments. This culture must be changed as the EU WFD Directive (and most other EU environmental legislation) is based on effective co operation and co-ordination between different government organizations.

## 4.2. LEGAL FRAMEWORK

Turkish environmental legislation related to water issues can be examined within four groups (Ekodenge, n.y.):

- Law on Environment and related regulations and directives on emissions (Regulation on Water Pollution Control)

- Laws on institutions with tasks concerning environmental issues (Laws on their establishments, etc.)
- Laws, regulations and directives on use of natural resources and water quantity issues (Law on Aquatic Products, Groundwater Law, etc.)
- Laws, regulations and directives on public health and w ater quality (Law on General Hygiene, Drinking Water Standards, etc.)

### 4.2.1. Main Turkish regulations in the field of water management

The many different laws mirror the large number of organisations involved in water management in Turkey. For example, many pieces of Turkish legislation are used to regulate the supply of drinking water. Table 2.2 below gives an overview of the main Turkish legislation in the field of water.

**Overview of Turkish Water Legislation**

**Laws and Regulations Institutions Implementation Issues**

Village Act no. 442 (Articles 1, 6, and13)

Act no. 831 on Waters (Articles 2, 7,and Annex 4)

Act no. 1580 on Municipalities (Article19/4 A)

Act no.6200 on the Organisation and Duties of the State Hydraulic Works (Articles 1 and 2/b)

Act no. 2560 on the Organisation and Duties of the Water and Sewage A dministrationof Istanbul (Articles 1 and 2/a)

Agricultural Reform Act no. 3155 (Article 2/c)

Act no. 3202 on the Organisation of the General Directorate of Rural Services (Article 2/d)

Government Decree no. 181 in Force of Law on the Organisation and Duties of the Ministry of Health (Article 9/e)

Government Decree no. 443 in Force of Law on the Establishment and Duties of the Ministry of Environment Act no. 167 and Regulation on Ground Water ResourcesAct no. 1380 and Regulation on Water Products General Hygiene act no. 1593

Regulation on the Control of Water Pollution (RCWP)

MoEF

SPO

SIS

TIS

Commission on Nuclear Energy

MENR

MoI

MoH

General Directorate of Mining

Researches

Refik Saydam Institute of Hygiene

Turkish Petroleum Inc.MoAgr, General Directorate ofWater Products

Ministry of Tourism

Ministry of Public Works and Settlement, General Directorate of State Hydraulic Works (DSI)

Electricity Surveys Administration

Bank of Provinces

Municipalities

Different organisations carry out water management activities at different levels

without respecting water basins.

Qualitative criteria for water resources not appropriate to protect the individual uses

Problems in implementation because of the variety and inadequacy of discharge standards

Unsatisfactory co-ordination at regional and local levels. Co-ordination in investment projects cannot be ensured.

Lack of co-ordination leads to wasteful use of resources and damages the sustainability of measures.

The General Directorate of Soil and Water Works was closed, but there is no new unit yet to undertake its tasks. Surveys and inventory works on soil-water relations have been left to chance.

There are uncertainties as to the management of irrigation facilities built by the General Directorate of Rural Services (GDRS)

According to the Law on Environment, the Regulation on Water Pollution Control came into force in 1988. The regulation aims at the evaluation of the factors causing water pollution and determines the discharge standards for domestic and industrial wastewater according to the characteristics of

water bodies. Reference is made to the establishment of an action plan for water quality improvement and to long-term water basin quality management plans. Positive actions have been taken: large enterprises have started to treat their wastewater before discharge; associations of water users have been created, which should improve irrigation water management; monitoring of w ater pollution has been extended. In parallel with tourism development, efforts have been made to improve the quality of coastal water, in particular in the Mediterranean region (OECD, 1999). On the other hand, minor progress has been achieved in terms of wastewater treatment. About 62% of the population in municipalities is connected to the sewerage system and only 12% is connected to a treatment system. Also, 75% of industrial wastewater is di scharged without any treatment (Turkish Government, 2001).

Currently, major efforts are being undertaken to incorporate EU requirements in Turkish legislation (e.g. standards for urban wastewater). However, the provisions are generally not detailed enough and many provisions are missing. Generally, part of the standards laid down in the Turkish legislation does not comply with EU legislation. A fundamental problem is that the wastewater regulations and discharge limits neglect the characteristics of the receiving environment. The main defects of the legislation concerning water management are the implementation of legislation and the delegation of tasks and responsibilities to competent authorities.

### 4.2.2. Legal development

Some of the main problems in the Turkish regulatory framework relate to the way these regulations have been developed and implemented in the past.

Most regulations have been developed independently, without taking earlier regulations into account or modifying or abolishing regulations in place, leading to conflicts in responsibilities and authorisation:

- Almost all involved authorities have responsibilities related to monitoring and licensing without creating a logical division of these tasks resulting in overlapping tasks and responsibilities;
- Tasks and responsibilities were assigned to Ministries or other governmental organisations without provision of the means to implement the regulations (e.g. equipment and personnel for water monitoring; inspectors etc.);
- There is clear separation of responsibilities for water quality and water quantity management: MoEF is responsible for water quality management (together with some other Ministries) while DSI is primarily responsible for water quantity management. However

effective water management requires an integrated approach e.g. close co-operation and coordination between these organisations;

- There is no central body collecting all water data and information and making it available to relevant institutions, including the general public.

## 4.3. LEGAL AND INSTUTIONAL ASSESMENT

Turkey has developed a wide range of legislation and governmental institutions in relation to water management. Although these regulations and the institutional framework do not yet correspond with EU requirements a sound basis for further development and strengthening of the current system is in place.

The main problems in the field of water management in Turkey as identified during several discussion sessions in National Platform meetings, at the training in the Netherlands and through questionnaires completed by all ministries involved, are listed below. The problems identified are not unique to Turkey and can be found to a certain extent in other countries as well, and thus are issues in which all countries can improve. These problems might not apply to all Ministries, but in general they reflect the overall institutional problems of water management in Turkey. Several of the listed problems result from the lack of co-ordination. For example, overlaps in implementation and monitoring results in inefficiency, and this creates budget/financing problems.

It should also be noted, that promising steps are undertaken to improve the current situation. Turkey is willing to harmonise their water legislation to the EU requirements, and the creation of the National Platform to discuss integrated water management and improve co-ordination between Ministries is an important step forward.

Institutional problems in water management:

1) Lack of co-ordination
   - no sufficient planning structure for integrated water management
   - no coincidence of regulations
   - coincidence of tasks
2) Lack of effective legislation
   - too many, overlapping laws, no updating
   - old laws and regulations
   - gap between regulations and enforcement
3) Lack of implementation

- no clear division of task and responsibilities between national and regional authorities
- inadequate monitoring and enforcement of regulation
- no structure to enable water management on the level of river basin di stricts

4) Lack of capacity
   - legal obligations are not in balance with enforcement capacities/capabilities
   - insufficient institutional capacity
   - economic problems
5) Lack of finances
   - heterogeneous distribution of resources
   - prices/charges are not sufficient to guarantee the service level required
   - insufficient and non-effective use of finances
6) Lack of participation
   - participation of water users
   - private sector investments
7) Lack of effective monitoring
   - enough data on water resources, but not brought together
   - lack of common database and information flow
   - insufficient monitoring infrastructure
8) Lack of regional planning
   - insufficient delegation of responsibilities to the regional and river basin district level.

### 4.4. Transitions-Privatisation of Drinking Water and Sewerage Services[4]

Public water services are increasingly getting subject to commercialization ranging from partial allowance of the private companies to privatization efforts since there has emerged a strong global understanding which accepts water a commodity due to the efforts of the leading international agencies like the World Bank. However, this process is neither smooth nor welcomed everywhere.

[4] *Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp "*Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups* "
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Commercialization of water is being protested by the civil society organizations and customers who pay the water bills. Yet, despite its mistakes, protests and deficiencies, commercialization of water services is seen as a necessary tool by a significant group of national and public authorities worldwide to tackle the financial restraints, infrastructure problems and the ecological challenges which signal possible decreases in the availability of safe drinking water in the world. This part will try to focus on the commercialization of the water services (drinking water and sewerage works mainly) accompanied or promoted by foreign credit agreements in several local cases in Turkey. The term commercialization is used in the broadest sense here including various forms of decentralization, liberalization and privatization as this broad usage of the term would be useful to point the motive of "profit making" of the private participants which are replacing or working alongside the traditional public actors. It is this profit oriented water politics which significantly transform the management of water services in the world.

Firstly, as the major actors of policy change, the international agencies taking active part in the commercialization of water services in Turkey through their financial instruments will be introduced. Secondly, changes in the institutional and legal structure of the water services management in Turkey will be dealt with by paying particular attention to the role of official institutions-local, national and international in these transitions. Thirdly, socio-economic and political impacts of the global dynamics and foreign credit use in the commercialization of the water services and facilities in the selected local cases in Turkey will be scrutinized. "*Build-Operate-Transfer (BOT) partnerships," "urban water services management troika"* and *"local management unions"* will be introduced as the leading actors of urban water services management and policy changes. It has to be noted that this is not an exhaustive study of such cases in Turkey.

***The Role of Major International Agencies in the Commercialization of Water Services***

The World Bank is the most influential actor/agency in the global water management at all levels. It is the biggest provider of loans and credits for water services projects worldwide. Environmental challenges, internal World Bank reform and the dynamics of globalization shape the World Bank's perspective on water. The Bank addresses these three issues under its concept of 'water resources management'. Privatization is the key tool recommended by the Bank to all countries to manage their water services and solve relevant problems. Water can and, even should, be privatized and managed by private actors.

However, the Bank has been trying to follow a softer version of this ideal in practice since the 1990s[5] but, in general, "French model" of water services management is being promoted by the Bank.[6] Other international creditors like the Asian Development Bank, German Development Bank (KfW), European Reconstruction and Development Bank and the International Monetary Fund (IMF) can be accepted as the alliances of the World Bank's principles on the management and commercialization of the water services.[7]

The Organization for Economic Co-operation and Development (OECD) is not really a significant actor in the management of water resources in the world. However, it can still influence agendas. The OECD maintains a basically economic perspective and stresses the benefits on water tariffs. Social and political issues are of secondary importance. Generally speaking OECD is a follower of the "Dublin principles"[8] in line with the World Bank. OECD's water policy focuses on the environmental management issues and recommends the pricing of water, privatization and active participation of the private sector in water management as a solution to tackle the environmental challenges threatening water availability and quality.

### *Changing Role of the Public Authorities*

The official institutions that have been exercising specific mandates in the management of drinking water and sewerage services throughout the history of the Turkish Republic are as follows: Bank of Municipalities, Construction Council of the Municipalities, Bank of Provinces, Fund of the Municipalities, Administration of Water Services, DSI, Ministry of Agriculture, Forestry and Rural Services, Turkish Electricity Institution, Ministry of Public Works and Settlements, Provincial Administration Directorates, Metropolitan Municipalities, other municipalities, national and foreign private companies, national and foreign creditors.

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[5] This change is probably a result of the criticisms against the World Bank. For example, after the unsatisfactory privatization experience in Antalya the World Bank is said to have adopted a kind of self criticism in its discourse, at least in Turkey. Birgul Ayman Guler (b), "Speech", TMMOB Su Politikalari Kongresi (21-23 Mart 2006, Ankara) [Union of Chambers of Turkish Engineers and Architects- Proceedings of the Congress on Water Policies], Insaat Muhendisleri Odasi, Ankara, Turkey, 2006, p. 59. The World Bank considers its performance in Antalya as "unsatisfactory" because of the lengthy delays in the processing of the projects, weakness in the content of the project and oversize of the project which exceeds the exact needs of the local population which turned into costly water bills. For the details of the Bank's own assessments see World Bank, Implementation Completion Report (TF-21388 CPL-38930 SCL-38936) on a Loan in the amount of US$ 100.0 million to the Republic of Turkey for Antalya Water Supply and Sanitation Project, Report No: 27700, May 28, 2004, World Bank Website, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/06/03/000112742_20040603123854/Rendered/PDF/277000TR.pdf [accessed on 15.03.2007].

[6] Finger, op cit, pp. 188-191, 62-64.

[7] Nilgun Gorer, "Commercialization and Privatization of Urban Water and Sewerage Services in Turkey: Poverty Reduction View" in I. H. Olcay Unver, Rajiv K. Gupta and Aysegul Kibaroglu (Eds.), Water Development and Poverty Reduction, Springer, Boston, USA, 2003, p. 178.

[8] Salman M. A. Salman, Regulatory Frameworks for Water Resources Management: A Comparative Study, World Bank, Herndon, USA, 2006. pp. 6-7.

Despite the fact that the "The Law on Water" (Law No. 831, 1926), first law regulating the water services in Turkey, granted the municipalities the responsibility to manage water services, central public institutions gained power and competence in this field over time. The Municipalities Law (Law No. 1580, 1930) is another example of the early legal regulations stressing the role of the municipalities in the water services, yet it is still observed that central governmental bodies gained more influence in the process.[9]

[*]Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp "*Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups* "
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One major transition occurred in the mid 1980s, i. e., drinking water and sewerage investments managed by the Bank of Provinces until then, moved to the administrative domain of the municipalities, especially Water and Sewerage Authorities of the Metropolitan Municipalities and began to be realized by the direct investments of the municipalities backed by foreign credits and loans; and with the participation of the national and foreign private sector companies.[10]

Changes had been made in the legal foundations of the Bank of Provinces in 1978, which separated the duties regarding drinking water from those on sewerage and the role of the Bank of Provinces to provide credits for the urban infrastructure investments of the municipalities was diminished in the restructuring process in the 1980s resulting in a gap to be filled by the international finance organizations soon.

All legal duties and rights of the Bank of Provinces in financing energy and electricity investments were transferred to the Turkish Electricity Institution in 1985 meaning a large scale privatization in this field. A general look at the financial sources of the municipalities to undertake sewerage investments reveals that the Bank of Provinces lost its former role it played until the mid 1980s. In the period of 1990s, the international financial organizations gradually took the advantage and lead in the field. However, it is also seen that the Bank of Provinces has gained its former importance back as the creditor in the

[9] For detailed accounts of the legal changes and historical division of work in the public management of the water services at the national and local level in Turkey see Birgul Ayman Guler (a), Su Hizmetleri Yonetimi: Genel Yapi [Management of the Water Services: General Structure], Turkiye ve Ortadogu Amme Idaresi Enstitusu [Public Administration Institute for Turkey and the Middle East], Ankara, Turkey, 1999, pp. 54-84; Guler (b), op cit, p. 57. Noting that this chapter is confined to the developments in the Republican era, especially the last wo decades, it would be still interesting to note that foreign companies, like French owned Turk Su A.S. ["Turkish Water Company"], working in the municipality services sector were already available in the 19th century Otoman Empire period in a less sophisticated and globalized manner, of course. So, if we are to take that period into account perhaps it would be possible to talk about not the "arrival", but the "return" of the "private" in our time. For this pre-Republic period, see Guler (a), op cit, pp. 128-130.

[10] Tayfun Cinar (b), "Turkiye'de Icmesuyu ve Kanalizasyon Hizmetleri: Yonetim ve Finansman [Drinking Water and Sewerage System Services in Turkey: Management and Financing]" in Tayfun Cinar and Hulya K. Ozdinc (eds.), Su Yonetimi: Kuresel Politika ve Uygulamalara Elestiri [Water Management: Critique of Global Politics and Practices], Memleket Yayinlari, Ankara, Turkey, 2006, p. 227.

early 21st century. The reason of this revival was the still ongoing investments of smaller municipalities to realize water services projects whereas the bigger municipalities have already completed most of their work.

Beginning by the year 2000, levels of foreign credit use and municipality budget resources decreased particularly in the case of the Metropolitan Municipalities. This change can be explained by the new policy of the central government to minimize the use of foreign credits and the completion of the projects of the Metropolitan Municipalities. There is similar pattern for the drinking water investments. A comparison of the debt structures of the Bank of Provinces and DSI reveals that 25-50% of the DSI's investments are financed through foreign credits whereas the Bank of Provinces uses its own financial resources. The credit agreement signed between the Bank of Provinces and the World Bank under the framework of the 213 million Euros "Municipality Services Project" points that the Bank of Provinces is likely to begin to rely on foreign credits in the near future just like the DSI. On the other hand, the Commission of Water Resources Planning and Electricity Power of the Ankara Branch of the Union of Chambers of Turkish Engineers and Architects (TMMOB) emphasizes that DSI is still considered as the most suitable public body deserving to have all the necessary competence to regulate the water services market in Turkey.[11]

Allocations from the national budget still remain as the main financial source for the municipalities to provide water services, but the municipalities are gradually getting more "soft loans" (state-to-state credits) or loans and/or credits from the international financial agencies (World Bank, European Investment Bank, Asian Development Bank, Islamic Bank, Council of Europe, Japan Institute For Overseas Investment etc.) under the guarantee of the Turkish Treasury. In the loan category, the World Bank has more financial importance in the debt profiles of the municipalities. Use of foreign credits obtained from international financial organizations not only results in the debts of the municipalities and rises in the service tariffs imposed on the final consumers but had also other impacts such as privatization and changes in the institutional structures of the municipalities and other relevant bodies. Since 1972 World Bank has provided credits worth US$1217.7 million in total to the projects in Istanbul, Ankara[12], Izmir, Bursa, Antalya and Cesme-Alacati. With the participation of the European creditors like the KfW

[11] Cinar (b), op cit, pp. 230-239. See Commission of Water Resources Planning and Electricity Power of the Ankara Branch of the Union of Chambers of Turkish Engineers and Architects, "Devletin Su Yonetiminin ve Su Islerinin Yeniden Yapilanmasi Sureci [Restructuration Process of the Public Water Management and Water Works]" in TMMOB Su Politikalari Kongesi (21-23 Mart 2006, Ankara) Bildiriler Kitabi 1.Cilt [Union of Chambers of Turkish Engineers and Architects- Proceedings of Congress of Water Policies Volume 1], Insaat Muhendisleri Odasi, Ankara, Turkey, 2006, pp. 139-140, 142.

[12] It is not suprising to see that Istanbul and Ankara, two biggest cities of Turkey, are the biggest users of foreign credits in different municipality investments including transportation. Indeed, it was Istanbul's Water and Sewerage Authority (ISKI), founded in 1981 as demanded by the credit requirements of the World Bank, which inspired the transformation of such authorities in other cities since then. See Guler (a), op cit, 132, 148-151.

Bankengruppe, the EU has been supporting the water services projects of the municipalities (Samsun, Eskisehir, Mersin, Bursa, Tarsus, Diyarbakir, Adana, Izmit, Ankara, Antalya, Sanliurfa and a Turkey wide project) in Turkey with significant rises since the 1999 Helsinki Summit through its loans and credits under the MEDA I and MEDA II projects and via the credits of the European Development Bank. Moreover, the Social Development Bank of the Council of Europe has provided credits to the several southeast Anatolian municipalities, and official bodies between 1992-1999, highest single credit amount being US$123 million.[13] EU accession process is expected to increase the investments, use of foreign credits and the participation of the private sector to meet the high EU standards especially on water quality.[14]

***Selected Privitisation Of Water Servises Cases from Turkey:***

*Local Politics, Investment Projects and Some Lessons*

***Antalya***

Authority transfer from the Antalya Water and Waste Water Authority (ASAT), which was established in 1994 under the Antalya Metropolitan Municipality with financial autonomy, to the French company ANTSU following the recommendations of the World Bank ended up as an unsuccessful example of the global water privatization policy at the local level. The result were the takeover of the urban water services management by *ASAT-ALDAS-ANTSU troika*, tariff rises and decreases in the service quality in Antalya, a very important tourism city. This was clearly the introduction of the "French Affermage Model" with its subsequent components like the “polluter pays” principle which increased the water bills by reflecting the costs of environmental protection measures to the consumers.[15]

ASAT-ALDAS-ANTSU water services management model was introduced in 1994 in accordance with the loan agreement signed between the World Bank and Antalya Metropolitan Municipality. Yet, there were problematic issues from the beginning like the transfer of the “ownership” of municipality infrastructure despite that fact that it was only to transfer the “right to operate”.[16] ANTSU’s duties and competences were returned to ASAT in 2002 as ANTSU left the market after an unsatisfactory period especially in terms of the

[13] Ferhunde Hayirsever Topcu (a), “Suda Dis Kredi: Izmit Ornegi [Foreign Credit in Water Management: Case of Izmit]” in Tayfun Cinar and Hulya K. Ozdinc (eds.), Su Yonetimi: Kuresel Politika ve Uygulamalara Elestiri [Water Management: Critique of Global Politics and Practices], Memleket Yayinlari, Ankara, Turkey, 2006, pp. 287-299.

[14] Cinar (b), op cit, pp. 244-245, 300-30. Interview with Dr. Tayfun Cinar, Department of Public Administration, Faculty of Political Sciences, Ankara University, April 2008.

[15] Gorer, op cit, p. 185. At this point it would be useful to remember that such changes are not neccessarily introduced or, let’s say, invented only by the private actors. As in the case of state contributions (“subsidies”) or regulations of any sort, costs of the new measures for any policy objective are again reflected to the customers or “tax payers” more properly. Massarutto, op cit, p. 499.

[16] Guler (a), op cit, p. 150.

legal dispute between the Antalya Metropolitan Municipality and the company over the issue of international arbitration.[17] ASAT took back the responsibilities again. As stated in the investigation report of the Civil Service Inspectorship of the Ministry of Interior Affairs dated 15 November 2001, the ASAT had official problems with the central government and Antalya Metropolitan Municipality over infrastructure and financial management in addition to its internal problems of fraud and maladministration in tenders and purchases. Furthermore, credit payments to the World Bank, which reached to YTL11.435.424[18] as of June 2005, have caused serious financial problems for the company especially in 2000. Moreover, the role and necessity of ALDAS, which was established in 1995 to provide consulting and consultancy services to ASAT as required by the loan agreement signed between the World Bank and Antalya Metropolitan Municipality, became a matter of discussion after the transfer of ANTSU's duties to ASAT in 2002. Additionally, investigations of the Ministry of Internal Affairs recorded that ALDAS made excessive and mistaken payments for payment items like technical trips made to France and personnel training and failed to audit the tenders. Court cases against ALDAS executives in 2003-2004 and Mayor of Antalya in 2002-2003 to investigate claims of fraud and maladministration in the management of water services all ended with acquittals.[19]

***İzmit***

"Izmit Urban and Industrial Water Supply Project" taking its roots from the late 1980s, became a matter of discussion because of its *Build-Operate-Transfer (BOT)* model. The transfer of the operation of the Yuvacik Dam to a private foreign consortium with Turkish partners; payments by the Turkish Treasury as the guarantor for unused water; and international arbitration issues became the headlines of the contention. The Planning Report of the General Directorate of State Hydraulic Works prepared in 1982-1983 on the Kirazdere (Yuvacik) Dam Project forecasted that the dam would provide 142 millions m3 of water for the increasing water demand (273 millions m3) in Izmit and districts by 2020. The tender of the dam construction was won by the Turkish GAMA company in 1987 and the construction of the dam was financed between 198-1991 by the amounts allocated from the credits of the Social Development Fund of the Council of Europe which actually provided to finance drinking water projects in 11 cities of Turkey. The BOT model, which had been initially opposed by the Izmit Municipality and the Turkish Treasury because of the model's relatively higher cost and prerequisites for pre-guaranteed purchase of the

[17] Guler (b), op cit, p. 58.

[18] YTL11.435.424 approximately equals to EUR 6,300,896.87.

[19] Gulser Oztunali Kayir and Husniye Akilli, "Antalya Su Hizmetlerinde Ozellestirme [Privatization of Water Services in Antalya]" in Tayfun Cinar and Hulya K. Ozdinc (eds.), Su Yonetimi: Kuresel Politika ve Uygulamalara Elestiri [Water Management: Critique of Global Politics and Practices], Memleket Yayinlari, Ankara, Turkey, 2006, pp. 318-338.

services, was later accepted in February 1995. As another note on regulation procedures, project was left outside of the competence of the Public Participation Fund. The project was undertaken by several national and foreign companies. The construction of the dam whose period of private management includes January 1999 to January 2014 was completed in 1998 and the dam became active in January 1999. Most controversial feature of the Yuvacik Dam has been its high cost. The Turkish Treasury was required to pay US$20 million per month to the company for the unused water as the Istanbul Water and Sewerage Authority declined to buy expensive water from Izmit in 1999 despite the fact that both sides had agreed in the first place. The problem remains unsolved.[20] Construction costs and final service tariffs of the BOT projects always simply exceeded those of the public investments as the private sector seeks profit in the first place and obtain credits with higher interest rates than the credits available to the public sector.[21]

***Çesme and Alacati***

Cesme and Alacati Union for the Construction and Management of Environmental Protection and Infrastructure Facilities" (CALBIR), which was founded by the Cesme and Alacati Municipalities in 1997 initiated the "Cesme-Alacati Water Supply and Sewerage Project." The Project is financed by the World Bank. CALBIR is an example of the local management unions established in the 1990s to make cooperation in the water services and obtain foreign credits in Turkey.[22] Cesme Municipality obtained credits from the World Bank for drinking water and sewerage services projects. The Municipality accepted the

[20] Guler (a), op cit, 164 and Guler (b), op cit, p. 60.

[21] According to the calculations of the General Directorate of State Hydraulic Works, as of January 1999, the cost of the dam project under the BOT scheme was US$890.9 million while it "could" actually be $US480 million under a public investment scheme. As accepted by the Thames Water PLC, this is one of the most expensive private sector projects in the world and the biggest single project undertaken by a British company in the last 25 years. According to the Supreme Court of Public Accounts Report dated April 2002, the change in the project's scheme from a public one to a BOT project was made without holding a new tender. According to the report, the authorities' decision to grant the GAMA-GURIS-Thames Water PLC consortium, the right to undertake the project resulted in unfair competition and rises in the total cost of the project. Topcu (a), op cit, pp. 303-308. Scandalous case of the Yuvacik Dam brough the arrest of some top GAMA executives and former secretary of Izmit Mayor in 2006. Former mayor was saved by his seat in the National Parliament and recently opened court case against the current Prime Minister for insulting his personality. As witnessed in Argentina and Colombia, past decisions of previous decision makers limit the scope of future decisions by new decision makers. New mayors find themselves bound by the debts of the earlier administrations. Argun A. Akdogan, "Latin Amerika'da Su Ozellestirmeleri [Water Privatizations in the Latin America]" in Tayfun Cinar and Hulya K. Ozdinc (eds.), Su Yonetimi: Kuresel Politika ve Uygulamalara Elestiri [Water Management: Critique of Global Politics and Practices], Memleket Yayinlari, Ankara, Turkey, 2006, pp. 199-200. This is also true for Izmit. Former mayor's decision to construct the Yuvacik Dam is now harshly criticized by the current mayor in his media releases and interviews. See for example, Kocaeli Metropolitan Municipality News Archive, "Kuresel Isinma Degil, Kuresel Yolsuzluk", 08 December 2006, Kocaeli Metropolitan Municipality Website, http://www.kocaeli.bel.tr/tr/okuma.asp?id=3513 [accessed on 29.04.2007]. The story of Izmit's Yuvacik Dam is simply a worst scenario case of the BOTs not only for the ordinary customers but for the political elites as well. Radikal, "Sadece Dokuz Suclu mu Var? [Are there only nine guilties?]", Radikal ["Radical", national daily newspaper], 22 April 2006.

[22] The municipalities have the right to form municipality unions since 1930s but this model gained widespread use only in the 1970s. Such unions are not confined to water services but tourism, irrigation and other municipality services. CALBIR itself has competences also in the solid waste management services. Guler (a), op cit, pp. 172-173, 200-214.

Bank's special condition on "private management of the facilities" when it could not get sufficient financial support from the Bank of Provinces. The US$13.1 million credit agreement covering 1999-2004 period was signed between the CALBIR and the World Bank under the official financial guarantee of the Turkish Republic. CALBIR was established in order to meet the demands of the World Bank regarding the safety of financial flows, anti-fraud measures and the inclusion of a private manager similar to the experiences of the Antalya Water and Environmental Health Project. It is possible to say that international market actors were more advantageous than the national private actors in the realization of the project as the World Bank specifically demanded the preference of international companies in the tenders worth US$500.000 and more to obtain the above mentioned items in line with the Bank's general policies. An agreement was signed with the consortium of the French Compagne Generale des Eaux (CGE) and Turkish TEKSER Insaat to complete the project.[23]

Creation of the municipality unions by different municipalities to provide public services ultimately results in the transfer of public competences of the municipalities to the municipality unions and then to national and international private companies as the municipality unions begin to work with foreign credits and private companies that win municipality unions' tenders. Emergence of such a multi-layered structure in the implementation of the public service duties widens the gap between the public authorities and the citizens, that is, the final users of the services, and complicates the democratic control of the public services. The formation process and the functions of the CALBIR, which was established to meet the requirements of the World Bank credit agreement signed by the Cesme and Alacati municipalities presents an example of the commercialization and privatization of the public services in Turkey. Facilitation of the access of the poor to urban services is among the objectives of such projects but it cannot be realized as prices and tariffs rise in the post-privatization period due to the high profit oriented policies of the private companies. Costly water bills were protested by even the richer segments of the society and were regularly covered by the media.[24]

[23] The objectives of the project were defined as the creation of the organizational structure for water services in the Cesme-Alacati region, employment of a private manager for achieving higher efficiency and to make improvements in the water quality, sewerage services and environmental conditions in the credit agreement Spending items of the project are as follows: construction (US$8.1 million), goods (US$1 million), auditing, training and employment of a private manager (US$4 million). Ferhunde Hayirsever Topcu (b), "Yerel Yonetim Birligi Eliyle Su Ozellestirmesi: CALBIR Ornegi [Water Privatization by a Local Administration Union: Case of CALBIR]" in Tayfun Cinar and Hulya K. Ozdinc (eds.), Su Yonetimi: Kuresel Politika ve Uygulamalara Elestiri [Water Management: Critique of Global Politics and Practices], Memleket Yayinlari, Ankara, Turkey, 2006, pp. 379- 390.

[24] Guler (b), op cit, p. 59. Hurriyet, "En pahali suyu Cesmeliler Iciyor [Cesme Locals Drink the Most Expensive Water]" Hurriyet ["Freedom", national daily newspaper], 2 May 2001; Cumhuriyet, "En Pahali Su 'Cesme' Suyu", Cumhuriyet ["Republic", national daily newspaper], 1 May 2001; Korkmaz Ilkorur, "Alcesu: Olumsuz Bir Ornek [Alcesu operator company in Cemse: A Negative Example]", Radikal ["Radical", national daily

Disappointments of the final consumers in the water services management process are a trigger of mass protests as witnessed in such cases all over the world today and regarded as a violation of human rights by the academic community.[25] In the case of CALBIR, efficiency of the services was not achieved despite the rise in the institutional costs. Most of the sewerage investment programs were not implemented due to the delay in the employment of the private manager.[26]

With regard to the examples presented in this part and others, private sector participation in the water services management is probably the most complex issue not only in academic and mainstream media discourse in Turkey. Lack of finance is often cited as the major problem of the municipalities to improve their water services infrastructures. Lack of high level coordination should also be taken into account.[27] Privatization is still considered solely as a financial operation to obtain new financial resources for public spendings in other fields. Technical, institutional, regulatory and social aspects have secondary importance. Unsuccessful or "unprofitable" cases can be even commented as "treason" among some political and media circles.[28] Keeping this uneasy background in mind, it can be noted that prospective studies in the field could contribute to the better understanding of the problems not only in water services management but other policy fields being subject to various forms of commercialization.

Despite "unsatisfactory" results and protests, commercialization of the water services is still being promoted by the international agencies and creditors in many countries including Turkey. This can not be observed as only a top-down hegemonic relationship imposed upon the public authorities. Rather, it is the voluntary or involuntary readiness and self deficiencies of the national and local public authorities which enable the implementation of the pro-commercialization agenda of the creditors and private companies. This process does not have to considered as an inevitably disastrous one per se. Rather, it is known that this process could or "has to" provide improvements in terms of service quality, availability and ecological protection. Yet, complaints of the final customers and court

newspaper], 31 May 2005.

[25] Nilgun Gorer Tamer, "Dunyada ve Turkiye'de Su Hizmetleri Yonetim Politikalarinin Degerlendirilmesi" in TMMOB Su Politikalari Kongesi (21-23 Mart 2006, Ankara) Bildiriler Kitabi 2.Cilt [Union of Chambers of Turkish Engineers and Architects- Proceedings of Congress of Water Policies Volume 2], Insaat Muhendisleri Odasi, Ankara, Turkey, 2006, pp. 448-449.

[26] Topcu (b), op cit, pp. 403-405.

[27] Chemistry Department of Yildiz Technical University (Turkey) and Department of Wastewater Management of Hamburg University of Technology (Germany), op cit, p. 22.

[28] Mehmet Ali Yurdusev, "Bir Etkin Su Yonetimi Araci Olarak Ozellestirme [Privatization as an Efficient Tool of Water Management]" in TMMOB Su Politikalari Kongesi (21-23 Mart 2006, Ankara) Bildiriler Kitabi 1.Cilt [Union of Chambers of Turkish Engineers and Architects- Proceedings of Congress of Water Policies Volume 1], Insaat Muhendisleri Odasi, Ankara, Turkey, 2006, p. 164. Entry of the international private companies to the water services sector today is also depicted as the "return of those who were driven away" by the anti-imperialist Turkish Republic after the collapse of the Otoman Empire in which foreign water companies could operate freely. Guler (b), op cit, pp. 58-60.

decisions point that there are serious mistakes and examples of maladministration in the way private companies participate in the water resources management. The question is the acceptance of this reality and the necessity of beginning to follow more transparent, efficient, reliable and economic mechanisms for participation of the private actors. It would be too optimistic to assume that such a paradigm change can simply emerge in the public and private sector circles. A gradually developing impact of civil pressure(s) on behalf of the ordinary citizens or small users or tax payers at the local, national and, if possible, global level may push socially responsible reforms in the management of water services through working public and private partnerships.

KAYNAK :

- Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp "*Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups* "
  Department of International Relations, Middle East Technical University,2008 Ankara, Turkey

## IRRIGATION SYSTEMS TRANSFER PROGRAM

## 1. WORLD BANK APPROACH TO IRRIGATION DEVELOPMENT IN TURKEY

World Bank specialists prepared a Turkey Report under the mission of World Bank Economic Sector Work (ESW) in March-June 2006, This world Bank internal report namely 'Irrigation and Water Resources with Focus on Irrigation Prioritization and Management' has some interesting (!) suggestions given belove:

**Problems related to water over-use in river basins.**

Available surface water resources in Turkey have been estimated at 110 $km^3$. Water use data (2000) show that irrigation is the main user with an estimated 31.5 $km^3$ (75 percent of the total use), domestic uses are about 6.4 $km^3$ (15 percent), and industry and other uses account for about 4.1 $km^3$ (10 percent). Although not directly clear from this data, there are issues related to water scarcity in Turkey which will force major changes in institutional responsibilities, practices, and culture. This onset will not happen across the board across Turkey's 26 river basins, but rather river basin by river basin. There are probably 8-10 of these basins (including Tigris, Antalya, East Black Sea, Çoruh, West Mediterranean, East Mediterranean) which will not be under stress anytime in the foreseeable future. But there are also six where calculated utilization already exceeds long term capacity (resulting in shortages among water users, groundwater mining, and pollution of the resource) by substantial volumes, i.e. by over 100 percent for the Gediz, Large Menderes, Burdur Lakes, and Akarçay, by 75 percent for Konya, and 50 percent for Meriç Ergene. What happens to these six basins, and 10 others under threat, will likely depend on institutional responses over the next few years.

***The first step required of DSI, if it is to stay relevant to Turkish water resource management in the 21st century, is to formally accept that the days of new irrigation development in most of the Turkish territory are probably coming to an end to avoid the looming water shortage.*** It should be noted that this situation is common to countries and regions with large irrigation sectors reaching a high state of development, such as California in the USA and various regions in Australia. With irrigation accounting for about 75 to 80 percent of all water consumption in Turkey, it is clear where the water for higher value needs in future is going to have to come from.

**Recommendations for DSI and irrigation and drainage.**

DSI has been the premier water resources development agency in Turkey since its establishment in December 1953. As indicated, it has made a major contribution to the economic development of Turkey throught the planning, design, construction, management and operation of dams and irrigation schemes. To continue this key role, DSI needs to change with them if it is to survive and prosper as an organization. The majority of the feasible irrigated area has been developed, as have most of the feasible dam sites. DSI frequently quote a figure of 8.5 million hectares as the economically irrigable area in Turkey. This is a long-standing figure which needs to be carefully reviewed in the light of the increasing demand from other water uses, notably domestic and industrial. In addition, due attention needs to be paid to the environmental requirements, which may not have had such prominence at the time this figure was established. Including the projects that are currently under construction the total irrigated area will be some 5.35 million ha, 63 percent of the above target figure, which may well be about the upper limit of the area that can be feasibly developed for irrigation.

**Recommendations for prioritization of irrigation investments.**

In order to overcome the constraints related to prioritization for resource allocation, a transparent system for allocating investments in the irrigation sector, along with related dams, could have the following features:

(i) *Establish commitment funding*, so that once a package, project or contract receives any funding, it receives the full necessary amount in the next and subsequent years to finish it at the technically appropriate speed;

(ii) *Examine every unfinished project or contract*, assessing what is needed to finish it fast, the size and timing of benefits that would follow from finishing it fast, and whether it could beneficially be modified or reduced in scope (truncated). This would involve the formulation of a 'finishing package' for each unfinished contract, and examining its merits as a package, independent of the merits of the project which it seeks to finish;

(iii) *Screen and rank all unfinished contracts* in a pragmatic but rational and transparent way, comparing their finishing packages, and select some to be completed rapidly, some to be 'frozen', perhaps some to be truncated to make them more economic, and perhaps some to be abandoned altogether; and

(iv) *Avoid starting new projects* until all unfinished projects and packages are either being completed fast or have been permanently abandoned.

Belowe mentioned statements indicated in the World Bank Working Paper named "Irrigation and Water Resources with a Focus on Irrigation Prioritisation and Management" publıshed June 2006

***"DSi frequently quote the figure of 8.5 million hectares as the "economically feasible irrigated area" in Turkey[29]. This figure needs to be reviewed and updated for each river basin as a matter of urgency.***
***DSi is using this figure to argue that it is only part way through the development of the potential resource (5.35 million ha out of 8.5 million ha, 63%), and that there is some way to go yet. From the analysis carried out in Appendix C it is apparent that the potential irrigable area has already been developed, and possibly exceeded. There is the real possibility that in some basins in the next 5-10 years water will have to be taken out of irrigation and transferred to other uses"***

### *2. Accelerated DSİ Irrigation Systems Transfer Program:*

After 1993, irrigation management in Turkey was undergone a rapid transformation. World Bank offered a loan to address the problematic areas of the irrigation practices in Turkey. The condition of the loan was the full transfer of organization and management responsibilities of the irrigation facilities to the water user groups. The transfer is presented as the main "cure" for the problems of irrigation in Turkey. As a result, Turkey started a national accelerated program of O&M transfer in irrigation sector starting from 1993, whereby almost 90% of the irrigation schemes were transferred to the IMOs, IAs in particular, for carrying out management, operation and maintenance of these schemes.
Key background conditions leading to the irrigation management transfer (IMT) include: adoption of the neoliberal policies in overall macro-economic decisions since the mid-1980s, which ended up decreasing levels of public investments and public sector borrowings in many sectors including irrigation; national budgetary crisis that led to severe

[29] See Economist's Report for details of how the "economically feasible irrigated area" is determined.

limitations on financial allocations to DSI in general and to the O&M Department in particular; and progressive deterioration of the irrigation infrastructure due to the deferred maintenance.[30] Moreover, the country was witnessing escalating labor costs in nation wide level. In this context, through the application of operation and management transfers, government aimed to decrease the number of DSI personnel responsible for the O&M services. In this way, O&M staff was aimed to be released for design and construction works which were deemed priority.[31] Moreover, operation and management costs undertaken by the state would decrease as a result of the devolving authority to the water users. [32] Furthermore, cost recovery system didn't function properly in the existing system as the fee collection levels were very low and the collections were realized two years after the costs were incurred. In that respect, although water fee rates collected from the user farmers shall cover the 100% of the O&M service costs; in practice, only a fraction of real cost amount can be recovered as a result of the high inflation rates.[33] Moreover, as the water fees were taken up and retained by the officers of the Ministry of Finance, collected money didn't make a contribution to the DSI budget.

Along with the above conditions at national level, World Bank's motivation for the transfers became an important initiator for the transitions in irrigation management. In the event, starting from the mid-1980s, World Bank authorities were pushing Turkish governments for taking measures to reduce operation, management and investment costs of irrigation facilities.[34] A World Bank supervision mission paid a visit to DSI in 1992 and facilitated the transfer process. The World Bank staff emphasized that if DSI transferred the responsibility of operation and maintenance of irrigation systems as well as collection of fees to the IAs, the overall cost recovery system would function properly. Within the context of the loan agreement Bank offered to exchange international experience on transfer of irrigation and drainage facilities with practices in Turkey. Hence, the World Bank team organized a Bank-sponsored study trips to Mexico and the United States where the DSI staff accumulated knowledge pertaining to the irrigation management transfer to locally-controlled organizations.

However, it would be imperative to consider first and foremostly the socio-economic and socio-cultural peculiarities of the country by paying particular attention to the regional disparities in terms of economic development in implementing the accelerated IMT program In order to include the farmers in the transitions in the best way, they called for more gradual transfers with targeted timetables.

[30] M. Svendsen & G. Nott, *Irrigation Management Transfer in Turkey: Process and Outcomes*, World Bank, Economic Development Institute (EDI) Participatory Irrigation Management Case Studies Series, Washington D.C., 1999, p.20.
[31] DSI, *Irrigation Management Transfer*, Capacity Building Symposium on Integrated Water Resource Management, 2004, p.32 www.emwis.org/documents accessed in May 2008.
[32] Republic of Turkey, *Turkey Country Report*, 2003, p.30.
[33] M. Svendsen & G. Nott, op. cit., p. 44.
[34] World Bank, *Turkey Irrigation Management and Investment Review*, Washington D.C., USA Report No 11589–TU, 1992.

The farmers should be involved in irrigation management, but it was observed that participatory nature of the program could not reach expected levels, particularly in regions like southeastern Anatolia where tribal structure still dominates rural life. Hence they suggest that public agencies like the DSI should develop support programs to strengthen the administrative and technical nature of the IAs.[35]

***Result: "More Privatization, Less Participation?"***

The Irrigation Associations in Turkey have been established through the existing local government structures. IA is not a product of any grass-roots movement or organization. DSI staff was the major initiator and executor of the transfer program. There were intensive negotiations between the agency (DSI) and the local communities including the representatives from the local governments concerning the terms of transfer.

Hence, there are presently three main types of organizations involved in the management, operation and maintenance of the irrigation schemes, extending from the primary water source down to the farm level, namely:

- DSI managing the bulk water supplies and the main supply canals and controlling the distribution water to the IAs,
- Irrigation Associations managing the secondary systems and controlling the distribution water in the heads of the tertiary hydraulic units,
- Informally organized groups of irrigators controlling water distribution to individual farmers within the tertiary hydraulic units.

In that structure, operation and management responsibility of irrigation schemes is shared between DSI and the relevant bodies that are authorized by it.[36] Based on the aim of providing irrigation for all needy areas in the country, transfer program was restricted to the O&M service provision. In that respect, the possession of the schemes and the equipment remains in the State.[37]

In this context, if the irrigation facility is used by only one local administration, for example by a village or a municipality, DSI transfers the O&M responsibility of the facility to this specific local unit. If the facility provides the irrigation service of more than one local units, for example of a couple of municipalities and villages, than the transfer is made either to the irrigation cooperatives based on the Cooperatives Law No. 1163 or the irrigation associations established according to the Municipality Law.[38] A new law on Local Government Associations, Law No. 5355, has been enacted recently and a section included in this law on the establishment of water users associations.

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[35] Aysegul Kibaroglu, "Building Bridges Between Key Stakeholders in the Irrigation Sector: GAP-RDA's Management Operation and Maintenance Model" in I. H. Olcay Ünver & Rajiv K. Gupta (eds.), *Water Resources Management: Crosscutting Issues*, METU Press, Ankara, 2002, pp. 172-199.

[36] Article 2 of Law No. 6200

[37] Republic of Turkey, op.cit., p. 88.

[38] **DPT (State Planning Organization) *7th Development Plan, Land and Water Special Committee Report*, Ankara, 2007, p. 60.**

Though the new law makes some improvements on the previous municipal law there are still considerable difficulties with registering essentially private entities under a public administration law.[39]

Hence, the establishment, membership, management, and rights and obligations of Irrigation Associations are governed by three principal legal instruments: the Municipality Law, the Transfer Agreement between DSI and IA, and the Statute of the IA. IAs were established under Municipality Law, the use of which, appears to have been dictated by administrative convenience rather than its appropriateness to managing relatively complex irrigation and drainage systems. As IAs are based on existing local administration, a large number of them could be formed quickly, but there has been no direct involvement of irrigators in the transfer process. IAs have a very short period to establish them before starting operations and they lack the necessary technical and managerial skill.[40] The Statute is the document establishing the IA as a corporate body. IAs operate directly under the Statute, and have not developed formal internal regulations or written procedures for management and conduct of their meetings or sanctions, despite the fact that the Statute requires that such regulations are prepared and approved by the Governor's office. Model regulations are not available from DSI. The Transfer Agreement, prepared by DSI, sets out the rights and responsibilities of the IA and DSI. The Transfer Agreement specifies parties to the agreement the irrigation facilities O&M instructions to IA. The Agreement does not specify in detail irrigation, drainage and service facilities transferred, and no inventory or condition report is made at transfer.

The critics of the transition, namely the Chamber of Agricultural Engineers emphasized that maintenance, rehabilitation and modernization of the irrigation canals some of which are 40 years old, could not be accomplished because the IAs have neither the capacity nor legal liabilities to carry out such functions. Chamber of Agricultural Engineers is of the opinion that Turkey could not complete the irrigation investment unless public institutions will be fully in charge of building new irrigation systems concomitantly with the rehabilitation of the old systems.[41]

IAs have not been provided with system specifications or performance, detail drawings, maps or O&M manuals. As a result, IAs are unclear as to their duties, for example, they do not consider to have a responsibility for drainage. The O&M and sharing of costs of systems providing services for more than one IA are not defined. The transfer is silent on water entitlement and the conditions under which DSI might reduce or withdraw supply. IA, which is established under municipal laws, has three main governing bodies: the General assembly, Chairman and the Board. The General Assembly, typically with 30 to 70 members, consists of mayors and village administrators (Muhtar,

[39] World Bank, Economic Sector Work (ESW) Irrigation and Water Resources with a Focus on Irrigation Prioritisation and Management, Working Paper, Water Resources and Institutions, June 2006, pp. 38-9.

[40] **Halcrow-Dolsar-RWC Joint Venture, *Identification Report* Volume 1, Main Text, October 1994, GAP-MOM Study, Management Operation and Maintenance of GAP Irrigation Systems 3, 1994.**

[41] Gokhan Gunaydin, Chair, Chamber of Agricultural Engineers, "Openning Speech", at the Symposium on "Climate Change, Drought and Water Management," Ankara, March 22, 2007.

in Turkish) as “natural members” and a number of “selected members,” who are chosen by natural members. DSI is an observer member. The Board has typically seven members. The General Secretary and Accountant are Board members and either the Assembly or the Board members elect the remainder from General Assembly members. The Chairman is regarded as a separate administrative organ of the IA, and has specific duties, which include representing the IA, preparing budgets, implementing General Assembly and Board decisions, acting as paymaster, and conduct Board meetings. The IA must employ a General Secretary, who must be an agriculture engineering graduate, and who has no specific duties other than to undertake the services of the IA under directions of the Chairman. Some IAs employ an O&M Technician to supervise fieldwork. Maintenance is undertaken with daily hired labor, if at all. Recruitment of staff is not transparent, and depends on the decision of the Chairman, who often favors relatives.

The IA General Assembly, based on Muhtars, does not represent the irrigator, whose only recourse is through elections for the post of Muhtar every five years. As a result the IA does not look after the interests of the majority of its customers. The Chairman and Board members, who are usually large landowners, can and do, favor themselves, and other individuals, with exemptions from paying water charges or extra water supplies, and tend to try to reduce water charges to below sustainable levels. Some training support has been given to IA accountants, through seminars run by DSI, but there is no adequate system to identify training needs and support IA staff who require it. This is an ongoing need as accountancy staff is periodically replaced. DSI provides some support to General Secretaries through annual workshops and seminars, but there is no formal training program, working manuals or sets of procedures, available for new staff. As a result, IA practices vary widely, and standards of management vary from good to very poor. Where there are no standard procedures it is difficult to identify and correct poor practices.

Hence, the lack of clearly defined operational guidelines and insufficient numbers of adequately trained staff within the organizations, has led to poor co-ordination and inefficient management and implementation of operations and maintenance at all levels in the irrigation systems. This has resulted in an unreliable and poor delivery of services to the end user, the farmer. The current process of establishing and handing over IA, results in poor IA performance, with very considerable long-term risks and economic costs. The potential benefits from introducing good O&M into new irrigation schemes at an early stage are very large, and the cost of doing so small. The IAs need to be properly trained before taking over the system, be provided with adequate support through O&M guidelines, systems, manuals, be properly supervised during the initial seasons, and be subject to performance monitoring.

Although the successive governments have been quite content about the outcomes of the “reform”/transitions in irrigation management along with the World Bank, that shows Turkey as a “success case”, the measures taken for the participatory irrigation management received

considerable criticisms. Led mainly by the Chamber of Agricultural Engineers,[42] criticisms are focused on a number of aspects. In this context, participatory content of the transfers are questioned generally. Composed of the members of local administrations, neither the General Assembly nor the Board of the IAs provide opportunity for direct participation for the irrigators. Moreover, as they are formed with a top-down approach, rather than a grassroots movement coming from the demand of farmers, democratic character of the unions is debated. The main issue that is criticized by the Chamber of Agricultural Engineers is the units that the transfers were made. According to the Chamber, irrigation cooperatives which have been established based on the Cooperatives Law and have been functioning since the 1960s provide efficient ground for the democratic, participatory farmer management. In that context, transfer's focusing on the irrigation associations which have no specific law is problematic. In their contention, transfers shall be made to the irrigation cooperatives like in the European practices, not to the irrigation associations which lack technical, administrative and legal capacities.[43] Constituting the major block against the transitions, the TMMOB, in general, asserts that the irrigation management should be realized as a public service. Thus, in their reasoning, consuming the biggest share of the water supply in the country and being an important element of socio-economic development, irrigation management shall not be left to the technically inefficient and inexperienced irrigation associations.[44]

KAYNAK :

Assoc. Prof. Dr. Aysegül Kibaroğlu, Argun Başkan, Sezin Alp *"Neo-Liberal Transitions In Water Management In Turkey: Mainstream Actors And Opposition Groups* "Department of International Relations, Middle East Technical University,2008 Ankara, Turkey

[42] Nuvit Soylu at al., "Turkiye Su Kaynaklari ve Sulama Hizmetleri Yapilanmasi" [Water Resources in Turkey and Structuring of Irrigation Services]" in TMMOB Su Politikalari Kongesi (21-23 Mart 2006, Ankara) Bildiriler Kitabi 2.Cilt [Union of Chambers of Turkish Engineers and Architects- Proceedings of Congress of Water Policies Volume 2], Insaat Muhendisleri Odasi, Ankara, Turkey, 2006, pp. 339-348.

[43] Baki Remzi Suicmez, Turkiye'deki Sulama Isletmeciligi [Irrigation Management in Turkey] http://www.zmo.org.tr/etkinlikler/usy03/13.pdf accessed in April 2008.

[44] Interview with Erkan Alemdaroglu, former Regional Director, GAP Regional Development Administration, member of the Chamber of Agricultural Engineers, Ankara, June 2008.

## 4.5. DEVELOPING A NATIONAL WATER POLICY

### 4.5.1. Necessary Regulations

♦ Less waste water production in industry and recycling and clean water production techniques should be provided.

♦ A Water Law should be implemented.

♦ Spring waters should have to be regulated under Under Ground Water Law no 167.

♦ A new law should be established for the protection of water basins.

♦ Law no 6200 related to the establishment and mission of DSI should be reregulated on a national water policy basis not for the interests of global governors

♦ Irrigation Cooperatives and Unions Law should be established.

♦ Law no 441 related to the establishment and mission of Agricultural Ministery should be renewed.

♦ Water protection should be considered in public schools.

♦ Research and Development Regulation should be renewed.

♦ "Ecological basin management" should be basis of water management system and the data should be collected and analysed centerally.

♦ Law no 6200 should be renewed as mentioned before and DSI should be the central authorative instution in water management.

♦ Application of penalties should be provided.

♦ Colloboration should be achieved with neighbouring countries in the subject of transboundary waters.

♦ Resettlements should be considered in small distributed residentials.

♦ Regulated and controlled irrigation systems should be provided.

♦ Irrigation investments should be accelerated.

♦ Hydrometric inspection should be automized.

♦ Water transfer between the basins should be developed.

♦ Protoclos with academic institutions should be provided.

- Protection of water resources should be considered in media.

**OVERALL CONCLUSION**

Water is a scare natural resource distributed unequally in our country as it is the case throughout the world. Water besides being a vital source for human beings, it plays an important role in development of countries. Then water becomes a strategic source.

Water source is important for nations' existence, security interests and their development. However rapid population increase, pollution and ineffective utilization are the negative impacts on water.

In history water resources played an effective role in development of civilizations and today its importance is increased. Water resources has recently become vital and stratetic in food supply.

Thus sustainable management of water resources has gained importance.

All the above mentioned pressures led nations to develop more effective and sustainable water policies. These policies should be determined considering national and social benefits and not according to the directives of global power bearers. 21st century has started a period in which global strategies are tried to be developed and applied.

In today's world power is constituted by different ways than the past. The effect of global policies on water has been increasing since the end of the 20th century. In this new era nations who utilize their national resources strategically will be successful. Therefore today the protection of water and other resources is also a part of national security plans.

Our country is not a water rich country. Therefore the development and management of our water resources reasonably is important. Development of our water resources was stared with the errection of the Turkish Republic. In this scope institutions were established.

State's water allocation and planning policy in Turkey comprises main goals such as to gain independence from imported energy sources; to increase production levels of agriculture; to satisfy increasing water demand from industry and urban as well as rural populations; and to correct regional economic and social imbalances in the country thus raising the living standards of the population. Hence, since the 1950s, water resources planning and development was carried out by the central government agencies through public investments.

However, since the early 1980s, neoliberal transformation of Turkish political economy resulted in significant changes in water policy discourses and practices. To illustrate, the World Bank guided and partially financed the privatization of the irrigation water management in the early 1990s.

Within the framework of the *accelerated transfer program* the Irrigation Associations were established with the tasks of operation and maintenance of almost entire irrigation systems in the country. Moreover, commercialization of the water services (drinking water and sewerage) has been underway since late 1980s with increasing roles of the local private business, transnational water companies and international credit agencies. Furthermore, liberalization of the hydroelectricity sector has also been initiated by the key legislation adopted in 2001.

Under these circumstances Turkey should have to develop a national water strategy as soon as possible in order to develop and utilize 65 % of its water resources.

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