Analysis reports of the River Basin Working Group

- Characterisation
- Pressures and Impacts
- Environmental Objectives
- Measures

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1 Introduction

The project, entitled the "*Implementation of European Water Framework Directive In Turkey*" has been given a start in the year 2001 after signing a Memorandum of Understanding between Holland and Turkey. The project is being conducted within the framework of MATRA, a programme aims at supporting the European Union candidate countries from the technical point of view, and to set up good relations with these countries. According to the agreement mentioned herein above, under the lead of Grontmij Consulting Engineers based in Holland the following consortium has been formed to carry out a pilot project; KENTKUR Consultant based in Ankara. Supporting organizations include, Netherlands Economic Institute (NEI), Ecorys (NEI), the International Institute for Infrastructure Hydraulic and Environmental Engineering In (IHE), Directorate-General of Public Works and Wastewater Management, East Div. **(RIZA),** and Waterboard Hunze & Aa's.

In respect to the Water Framework Directives mentioned above, the aim of this work is to form River Basin Management Plans, in order to achieve a reliable integrated water quality among all the EU countries and the new EU candidate countries.

For this reason, an on-going project at the pilot region of Buyuk Menderes Basin was initiated on February 2002. The main factor of selecting the pilot region of Buyuk Menderes Basin is the different activities that are being accommodated at this large area of the basin for its rich under-over ground natural resources (agricultural, Truism and Industrial activates), and the corresponding effects on the water quantity and quality in the region. Therefore, the outcome management plans of this project would be used as an example to establish a comprehensive management plans for the other 25 basins in Turkey.

In this report; the present situation of the water in the basin is defined as a result of the works done by the River Basin Working Group (RBWG) for the selected pilot region of Buyuk Menderes. The water quality and the activities that affecting this water quality are defined.

2 Characterisation

2.1 General description of the basin

2.1.1 Location

Büyük Menderes River Basin is located at the southeastern part of Turkey between the latitute of 37° 12'- 38° 40' north and longitute of 27° 15'- 30° 15' east. Basin is surrounded by the provinces of Izmir, Manisa and Usak at north; Mugla at south; Afyon and Burdur at east and Aegean sea at west. It covers the %3.2 of countrys surface area with an areas of 24.873 km^2. The general state of the basin is given as 1/1.000.000 scaled map at Figure 2.1.

The BM river is the longest (584 km) in Aegean region of Turkey. The river itself starts karstical originated spring of limestone deposits of Afyon province and with the union of other tributaries its become BM river at low lands of the basin. Then flows through the Aegean sea at Aydin Province.

2.1.2 Climate

At the coastal regions of the basin Mediterranean climate, whereas at the upside of the basin continental climate is dominating. At the places where sea effect is significant the weather is warmer then the other regions. At the western part of the basin the maximum monthly precipitation is changing between 79 mm to 132.3 mm, whereas in the eastern regions this value is changing between 14 mm to 80.2 mm. The annual average precipitation decreases from 999 mm at the western parts to 350.4 mm at the eastern parts, with an annual average of 635 mm. The annual average total evaporation is 2122 mm. As conclusion there is a decrease in precipitation is observing due to the increase in temperature in the basin.

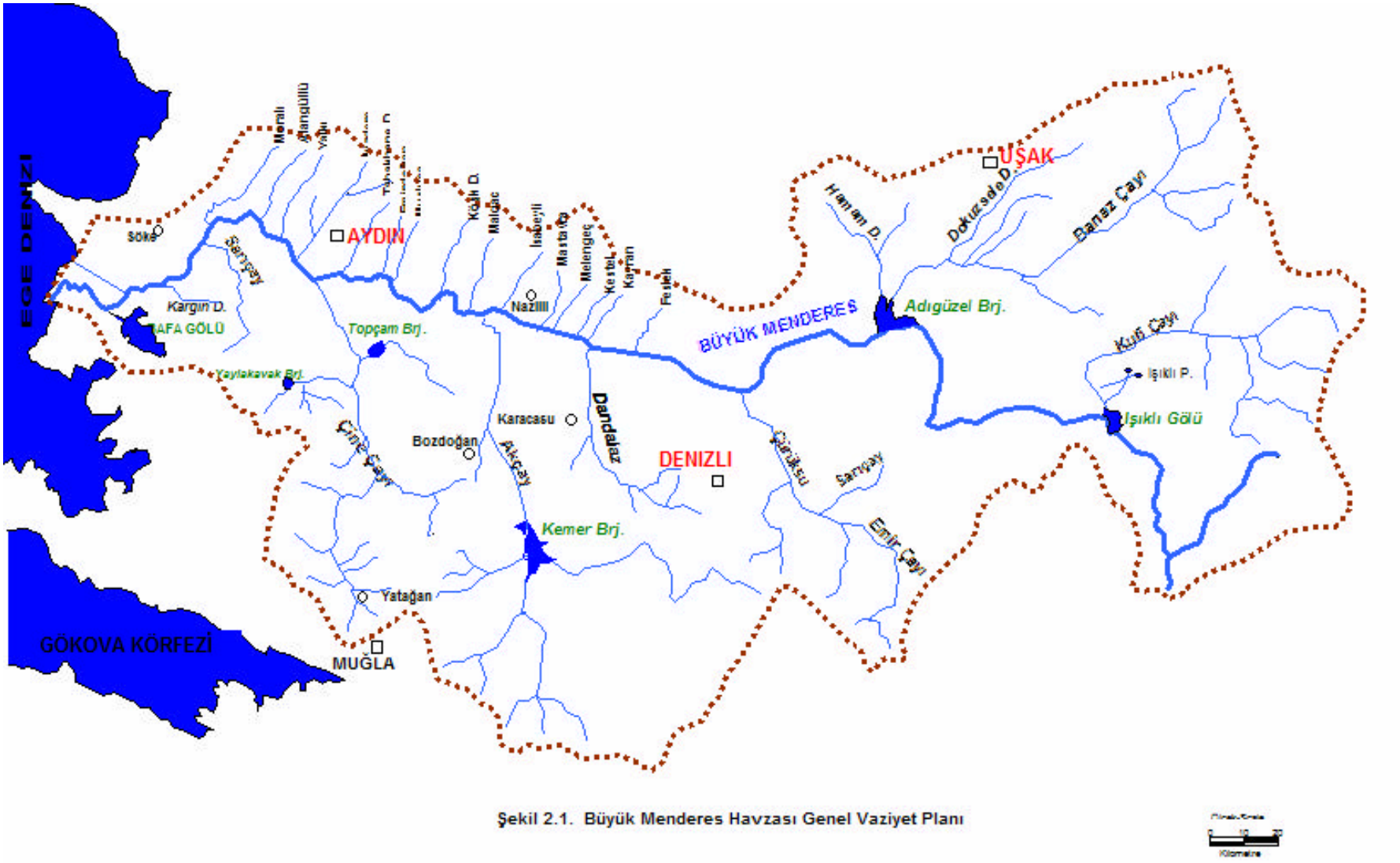


Figure 2.1 General State of the Basin

2.1.3 Topographical and Geological Characters

The valley in which the main river channel passes is the longest plain of the Aegean Region with a lenght of 220 km; starts from Aegean Sea to the east of the Mount Honaz located at east of Denizli province. Denizli Province, in general has a relatively high altitute (Mount Honaz 2571 m, Mount Baba 2308 m), at north at mid altitute (Mounts of Big and small Cokelez 1840 m, Mounr Small Cokelez 1734 m). The altitute of the basin is 300 m at south eastern side, 220 m around Denizli Province and decreases to 150 m around Saraykoy. The mid section of the Buyuk Menderes Basin is a long plain in between Ortakçi at east and foots of Mount Gumus at west (ruins of Magnesia). It is surrounded by mountains of Aydin at north side and mount Mentese at south. The end section of the Büyük Menderes Basin starts at the ruins of Magnesia which is located on hills of Mount Gümüs. It is surrounded by Mount Samsun at north, Mounts Besparmak and hills of Akköy at south.

Büyük Menderes Havzasi'nda genel bir stratigrafik siralamada kristalen seriler ve neojene ait formasyonlarla kuvaternere ait alüvyonlar yer almaktadir. Paleozoik yasli kristalen serilere ait olmak üzere gnayslar ve sistler, mermerler ve yari kristalen kireç taslari ayirtlanmaktadir. Neojen yasli seriler yer yer yüzlerce metre kalinliga eriserek kristalen serilerin üzerine gelmektedir. Neojen çakilli, kumlu, killi, marnli, kum tasli ve konglomerali seviyeler halindedir. Neojen yer yer kömür yataklari içermektedir. Kuvaterner genis alüvyon sahalari ve yanderelerin agizlarinda tesekkül etmis birikinti konileri ile temsil edilmektedir. Büyük Menderes Nehri 5-15 km genisliginde dogudan batiya uzanan bir alüvyon seridi meydana getirmistir (DSI, 1994). The geological map of the basin is given in Table 2.2.

2.1.4 Soil Type

According to the DSIs' field studies carried on in different times; throughout the whole basin the existing base soil type, currently irrigated and/or irrigatable soil type is generaly aluvional, with different bodies from light to heavy, with a good permeability, deep profiled and has high of productivity. At the irrigated sited, especially at high poorly drainaged sites pH, saltation, sodium and high undergrounwater problems exist and these problems increaing from upstream to lower areas.

Due to discharge of high boron contented waters of Sarayköy Jeothermal Santral and hot springs og Tekke to the Buyuk Menderes River and use of this water in irrigation, high contents of boron element found in Akcay and Nazilli plains.

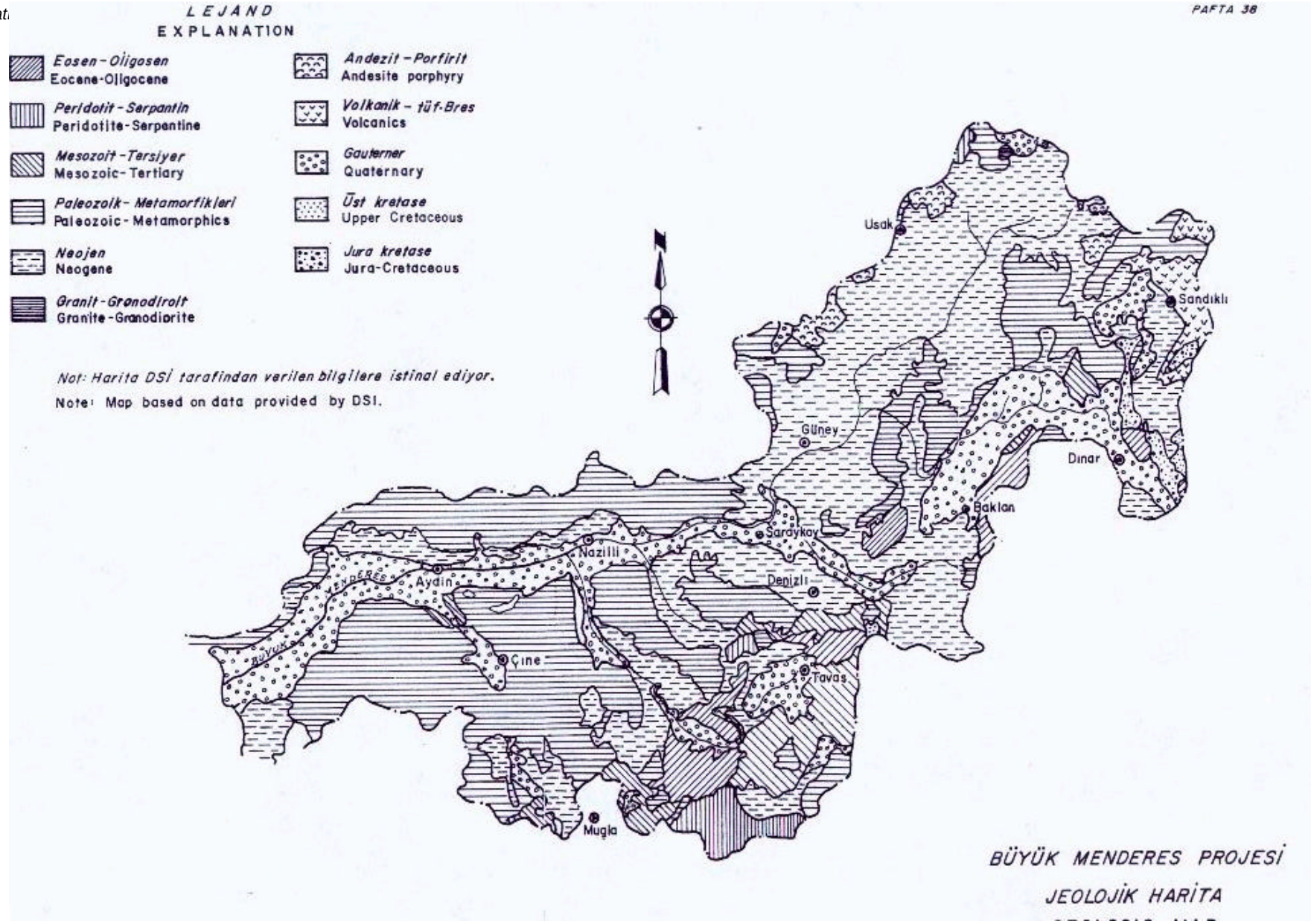


Figure 2.2 Geological map of the basin

2.1.5 Flora and Fauna

Flora

There are 10.500 taxon in the Turkish flora from which 3.000 of them are endemic to the country. These plants are very intense in certain habitats and regions. Buyuk Menders is the one of the centers of these intense locations. It has been found out that there are intense taxons in some areas of the basin.

Although someendemic plants such as, Centaurea cariensis, Campanula lyrata ssp. lyrata, Ranunculus reuterianus are widespread throughout the country, especially in western Anatolia, some species like Campanula tomentosa, Chronanthus orientalis, Minuartia recurva ssp. carica, Microsciadium minutum are mostly founf in Buyuk Menderes Basin and they are high priority protected plans against any disturbance.

106 endemic taxon has been described in the region. Species of Ferulago humilis, Campanula lyrata ssp. lyrata found out in all studied areas. In addition to these Aristolochia hirta, Stachys cretica ssp. smyrnaea, Verbascum parviflorum, Galium brevifolium ssp. brevifolium are also very common in the basin. The most endemic taxon found at Mountains of Aydin. In this region 836 taxon has been desribed and 73 of them found out to be endemic. The Dilek Peninsula comes second with 30 endemic of total of 713 taxon.

The highest endemism found out in genuses of Campanula and Galium and genuses of Anthemis, Centaurea and Verbascum followed these genuses.

The 12 of the total of 106 endemic plants found in the basin are less spread. From these 8 of them are very rare endemics and 4 of them endangered species.

Fauna

Büyük Menderes River, starting from Aegean Sea carries Medaterranean climate and vegetation to upstream of the basin. This warm Mediterranean climate and vegetation provides high diversity of fauna. Around 250 bird species living in the region. Due to its bieng on the one of the 4 big bird migration route of palearktig region, especially during the migration periods diversity and richens of bird species increases to high numbers. Many numbers of waterfowls species wintering in the basin and many other bird species reproduces.

Some important bird species of the basin

- *Pelecanus crispus* (Tepeli Pelikan-Pelican)*
- *Otis tarda* (toy) endangeres
- *Esetta garzetta* (Küçük akbalikçil)
- *Nycticorax nycticorax* (Gece balikçili)
- *Ciconia nigra* (Black Stork) (*Significant decrease in numbers.)*
- *Fulica atra* (Coot
- *Tadorna ferruginea* (Angit)
- *Streptopelia turtur* (Üveyik)
- *Alectoris chukar* (Kinali keklik)
- *Passer hispaniolensis* (Sögüt serçesi)
- *Hirundo rustica* (Swift)
- *Anser anser* (Geese)
- *Caprimulgus europaeus* (Çoban aldatan)
- *Upupa epops* (Ibibik)
- *Buteo rufinus* (Rough Legged Buzzard)
- *Circaetus gallicus* (Kaya kartali)
- *Falco peregrinus* (Ada kartali)
- *Falco tinninculus* (Kestrel)
- *Phalacrocorax pigmeus* (Cüce karabatak)*
- *Ixobrychus minutus* (Küçük balaban)
- *Ardea cinerea* (Külrengi balikçil)
- *Ciconia ciconia* (Ak leylek)
- *Tadorna tadorna* (Suna)
- *Anas platyrhychas* (Yesil bas)
- *Columba palumbus* (Tahtali güvercin)
- *Turdus merula* (Black Bird)
- *Carduelis carduelis* (Saka)
- *Phoenicopterus ruber* (Flamingo)
- *Netta fufina* (Macar ördegi)
- *Alcedo atthis* (Yali çapkini)
- *Buteo buteo* (Sahin)
- *Accipiter gentilis* (Goshawk)
- *Hieraeetus fasciatus* (Atmaca kartali)
- *Athena noctuca* (Kukumav)
- *Laurus argentatus* (Gümüs marti)

Some mammalians living in the basin

- *Sus scrofa* (Wild boar)
- *Felis caracal* (Karakulak)
- *Vulpes vulpes* (Fox)
- *Canis aureus* (Jacal)
- *Martes fonia* (Kaya sansari)
- *Lepus europaeu* (Rabbit)
- *Sciurus anomalus* (Squirel)
- *Capra aegagus* (Wild goat)
- *Felis lynx* (Lynx)
- *Felis sylvestris* (Wild cat)
- *Canis lupus* (Wolf)
- *Hyaenidae hyaea* (Stripped hyena)
- *Meles meles* (Badger)
- *Monachus monachus* (Monk seal)*
- *Mustela nivalis* (Gelincik)
- *Lutra lutra* (otter)

* Indicates endangered species

** Indicates threatened species

2.1.6 Population and Social State

Population

The total population of provincial center and counties of provinces in the basin, according to counts of year 2000 are given in Table 2.1.

Table 2.1 Population State of Provincial Centers and Counties in the Basin

Province	County	City population	Village population	Total	Population intensity (person/km^2)
AFYON	Dinar	35 424	52 880	88 304	65
	Hocalar	2 646	10 178	12 824	23
	Kizilören	2 556	1 576	4 132	18
	Sandikli	37 804	38 814	76 618	63
	Sincanli	5 826	52 710	58 536	69
USAK	Merkez	137 001	42 457	179 458	137
	Banaz	16.212	27 138	43 350	42
	Es me	11 615	27 254	38 869	29
	Karahalli	5 243	9 180	14 423	43
	Sivasli	6 837	19 359	26 196	52
	Ulubey	5 132	14 885	20 017	25
DENIZLI	Merkez	275 480	125 239	400 719	502
	Akköy	2 716	3 721	6 437	35
	Babadag	4 832	3 380	8 212	46
	Baklan	2 737	5 703	8 440	23
	Bekilli	3 931	6 646	10 577	43
	Beyagaç	2 789	4 543	7 332	40
	Bozkurt	4 191	7 671	11 862	33
	Buldan	13 986	13 008	26 994	54
	Çal	4 926	28 006	32 932	38
	Çivril	13 749	48 959	62 708	43
	Güney	6 277	7 441	13 718	26
	Honaz	7 442	17 091	24 533	49
	Kale	7 189	14 201	21 390	32
	Sarayköy	17 760	18 735	36 495	88
	Tavas	11 700	48 969	60 669	38
AYDIN	Merkez	143 267	65 074	208 341	332
	Bozdogan	8 300	26 890	35 190	42
	Buharkent	7 074	5 910	12 984	127
	Çine	17 867	35 903	53 770	59
	Germencik	11 596	34 225	45 821	113
	Incirliova	17 548	23 185	40 733	190
	Karacasu	5 915	16 065	21 980	28
	Karpuzlu	2 318	10 889	13 207	52
	Koçarli	8 927	28 240	37 167	80
	Kös k	8 349	16 972	25 321	173
	Kuyucak	7 282	23 812	31 094	192
	Nazilli	105 665	40 298	145 963	220
	Söke	62 384	75 355	137 739	143
	Sultanhisar	6 256	16 539	22 795	97
	Yenipazar	7 006	8 486	15 492	80
MUGLA	Kavaklidere	3 432	9 116	12 548	39
	Yatagan	16 007	30 245	46 252	52

Social State

Educational state is given in Table 2.2; Employment according to economical acitivities is given in Table 2.3.

Table 2.2 Educational State of Provinces

	Afyon	Usak	Denizli	Aydin	Mugla
Total population	714 510	289 682	762 924	860 345	652 374
Non-reader & writers	83 841	36 096	79 552	108 017	47 385
% Non-reader & writers	11,7	13	10,4	12,6	7,3
Readers & writers	630 606	253 578	683 366	752 298	604 887
% readers & writers	88,3	87,5	89,6	87,4	92,7
Primary education	373 937	151 885	412 647	443 653	353 267
Secondary education	81 997	31 767	84 879	89 828	92 717
Higher education	24 494	11 229	36 755	41 815	46 932
Non-graduates	149 917	58 659	149 055	176 957	111 927

Table 2.3 Employement According to Economical Activities

	Afyon	Usak	Denizli	Aydin	Mugla
Total employement	366 277	139 909	423 500	449 981	393 701
Agriculture	256 793	84 152	226 729	278 750	216 621
% agriculture	70,1	60,1	53,5	61,9	55
Industry	23 463	20 858	80 376	33 908	23 436
% industry	6,4	14,9	19,0	7,5	6,0
Construction	12 551	4 763	16 319	19 054	19 329
% construction	3,4	3,4	3,9	4,2	4,9
Service	73 255	30 059	99 927	118 129	133 560
% service	20,0	21,5	23,6	26,3	33,9
Undescribed	215	77	149	140	755
% undescribed	0,1	0,1	0,0	0,0	0,2

2.1.7 Tourism

There are numerous of archeological sites in the basin. The most significance of those are Aphrodisias Antique City located on Aydin-Denizli border, Pamukkale-Hierapolice Antique City, Apollon Temple located at Didim and Priene Antique City located near Soke. In addition to these there are many other excavated and/or underexcavation areas such as, Magnesia, Nysa, Tralleis. Besides those, some archeologic works left from Bizantium and Selcuks are very significant in Afyon.

One of the most important touristic site is Pamukkale Travertines in Denizli. In addition to this health tourism is another significant attraction in the basin due to very famous natural hot springs which are around 40-80 °C.
Kusadasi of Aydin Province is very important coastal area of the region and the country. This place is gainintouristic importance.

2.1.8 Mining

Varios mines existing in the region; there is mercury (Hg) deposits between Usak-Banaz. There are significant cement raw material and important sulphur reserves in and around Denizli. Rich emery reserves are very common especially in Aydin-Bozdogan, Karacasu, Söke, Germencik, Denizli-Güney, Buldan and Mugla-Yatagan. Aydin-Sahnali, Dalama, Nazilli, Küçükçavdar, Söke, Denizli-Çivril, Kale and Mugla-Yatagan are the major lignite areas in the basin. In addition feldispad and quvars minnings existing in Aydin and Mugla.

Some uranium reserves are encountered at Aydin-Söke and Usak-Esme regions. Region is very rich in geotermal resources; somesignifican sources are located at Afyon-Sandikli, Aydin-Buharkent, Aydin-Germencik, Aydin-Sultanhisar and Denizli-Sarayköy.

2.1.9 Agriculture and Stockbreeding

Büyük Menderes Basin has wide aluvial plains with high agricultural potential.

Main products are vegetables, pulse, foods for cattles, industrial plants as cotton, corn, sunflower, peanut, sessame and tobacco. In addition to these fruit production (citrus fruits ,fig, apple, chesstnut, olive, strawberry etc.) and stockbreeding are also important activities. Land use state of the basin and agricultural land use tables according to provinces are given in Table 2.4 and Table 2.5 respectively.

Table 2.4 Land use state according to provinces

	Afyon		Usak		Denizli		Aydin		Mugla	
Type od land	**Size (ha)**	**Ratio (%)**	**Size (ha)**	**Ratio (%)**	**Size (ha)**	**Ratio (%)**	**Size (ha)**	**Ratio (%)**	**Size (ha)**	**Ratio (%)**
Available for agriculture	639 131	45	242 114	45,5	376 738	31,8	395 494	47,50	260 516	20
Meadow, pasture	235 825	17	36 837	7,0	58 316	4,9	47 466	5,70	52 982	4,0
Forest and shrub-land	209 140	15	236 678	44,0	521 959	44,0	298 000	35,80	811 522	61,0
Others	338 904	23	18 771	3,5	229 787	19,3	90 940	11	199 680	15,0
TOTAL	1 423 000	100	534 400	100	1 186 800	100.0	831 900	100	1 324 700	100

Table 2.5 Agricultural land use

(%)	Aydin	Denizli	Usak	Afyon	Mugla
Cereals	10	47,0	68	73	30
Industrial plants	28	29,5	11,8	23	8
Vegetables	4	3,7	3,2	1,0	10
Olive and fruits	50	13,0	10	2,0	45
Others	8	6,8	7	1,0	7

The main irrigated agricultural products of the upper catchment area are sugar beet, cereals and animal food comes first. Although the crop pattern of lower catchment changes thorugh years (cotton, cereals, corn, vegetables), % 75 of the irrigated lands is used for cotton cultivation. At the coastal Aegean side of the basin there are citrus and olive are common.

For the irrigated cotton production usually level border irrigation is using. Whereas in Aydin plain around % 25 is controlled furrow irrigation. At he upper parts of basin sugar beet and sun flower cultivations are common in total of 4000 ha with sprinkler irrigation system and this system getting popular in recent years. Futhermore, at Akçay right and Sultanhisar regions there are 738 ha of drop irrigation areas exist. In these regions common products are strawberry, citru and vegetables.

2.1.10 Industry

The intense industrial activities in the basin are; textile, leather, ceramic, sugar, faience, vegetable oil, food (strach), brick-rooftile industry in Usak province; textil, food (flour), animal food, marble and plastic industry in Afyon province; textile, food, paper, concrete, marble processing, fruit juice processing in Denizli province; textile, vegetative oil, agricultural tools, machine and chemical, leather processing, cement, meat products, animal food and mining industries in Aydin province. Mugle province cover a little part in the basin in which there is an thermal powr plant at Yatagan county.

2.2 Characterisation of surface waters

Sectoral distribution of surface waters in the basin:

- Total surface water potential: 3800 hm^3/year;
- Provided drinking and usage water: 106,93 hm^3/year;
- Provided irrigation water: 1846 hm^3/year;

These waters characterisedas follows:

1. Natural waters bodies;
2. Heavily modified water bodies;
3. Artificial water bodies;

The water important bodies and their characterisations are given in Figure 2.3.

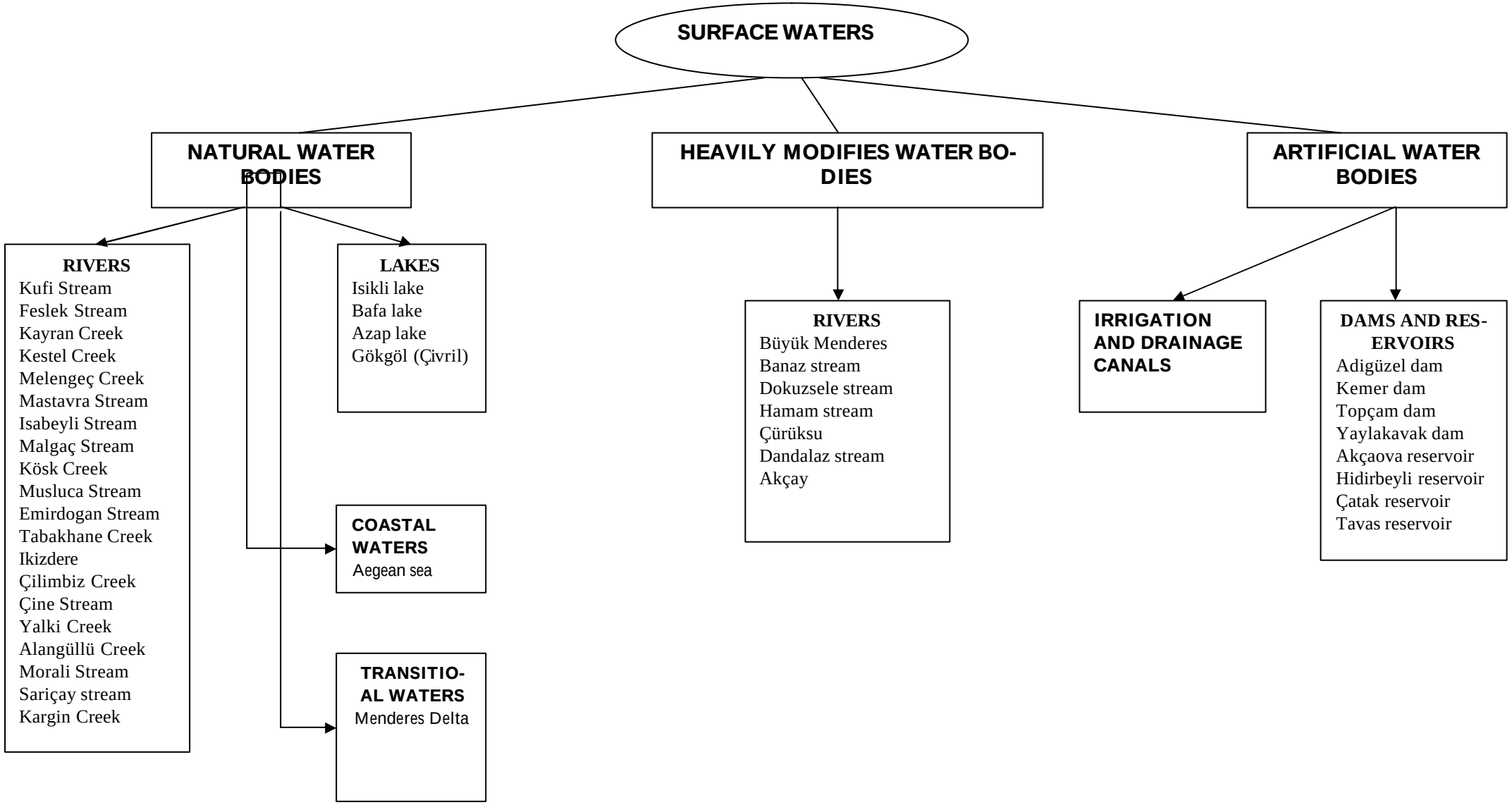


Figure 2.3 Characterisation of surface waters

2.2.1 Natural water bodies

The rivers, creeks, streams, lakes, coastal and transitional water which are significant importance regarding their flow regime and water volume, having no reservoir structure, no distortion in water quality due to discharges and any polluter are considered as natural water bodies.

2.2.1.1 Rivers

Table 2.6 Some Natural Rivers Found in the Basin and Their Properties

Name of river	Altitute (m)	Geology	Catchment area (km^2)	Average flow (hm^3/year)	Flow regime	WFD type
Kayran Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Kestel Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Melengeç Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Mastavra Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Isabeyli Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Malgaç Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Kösk Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	33,113	Sometimes dry	Sometimes dry source
Musluca Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Emirdogan Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Tabakhane Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	12,173	Sometimes dry	Sometimes dry source
Cilimbiz Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	3,974	Sometimes dry	Sometimes dry source
Yalki Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	3,910	Sometimes dry	Sometimes dry source
Alangüllü Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Morali Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Narrow (< 100 km^2)	-	Sometimes dry	Sometimes dry source
Feslek Stream	High(>500 m)	Paleozoic- Neogen-Quaterner	Middle (100-1000 km^2)	-	Sometimes dry	Sometimes dry source
Ikizdere	High(>500 m)	Paleozoic- Neogen-Quaterner	Middle (100-1000 km^2)	70,009	Sometimes dry	Sometimes dry source
Çine Stream	High(>500 m)	Neogen-Quaterner	Wide (> 1000 km^2)	290,131	Permenant flow	**Permenant flow source**
Sariçay	High(>500 m)	Neogen-Quaterner	Middle (100-1000 km^2)	31,378	Sometimes dry	Sometimes dry source
Kargin Stream	High(>500 m)	Neogen	Narrow (< 100 km^2)	6,938	Sometimes dry	Sometimes dry source
Kufi Stream	High(>500 m)	**Paleozoic-Metamorphic-Quaterner**	Wide (> 1000 km^2)	-	Permenant flow	Permenant flow source

2.2.1.2 Lakes

Table 2.7 Natural Lakes in the Basin and some of Their Properties

Name of lake	Coordinates	Altitude (m)	Depth (m)	Area (ha)	Precipita-tion area (km^2)	Geology
Isikli Lake	29^0 55'-30^0 05' East 38^0 15'-$38^0$25' North	-	6,55	6586	2,727	Clay stone silt-sand
Gökgöl	30^0 00'-30^0 05' East $38^0$27'-$38^0$25' North	821	Ave. 2	566	-	Mesozoic limestone
Azap Lake	37^0,40' North $27^0$28' East	-	-	123	-	Gneiss, Alluvion
Bafa Lake	$37^0$29' North $27^0$28' East	10	2-21 Ave. 10	6708	315	Gneiss, Recrystalli-zed limes-tone, Allu-vion

2.2.1.3 Coastal Water Bodies

The shore line of the basin is composed of Güzelçamli and Davutlar Towns of Kusadasi District belonging to Aydin City and of Söke District where Menderes River meets with Aegean Sea. The towns mentioned above have shores near Aegean Sea.

Table 2.8 Some Properties of Aegean Sea

	Aaegean sea
latitude	37^0 45'- 37^0 30' North
longitude	27^0 15'- 27^0 10' East
salinity	55.000 µmhos/cm
wave length	The tide level, which is 30 cm in Aegean Sea, reaches sometimes 40 cm in North Aegean and 30cm in South Aegean.

2.2.1.4 Transition water bodies

Table 2.9 Some Properties of Transition Water Bodies in the Basin

	Büyük menderes river delta	Bafa lake
coordinates	27^0 21'- 27^0 30' East 37^0 30' North	$37^0$29' North $27^0$28' East
width	30-50 m	6-8 km
length	4-5 km.	14-16 km
****salinity**	2280-15600 µmhos/cm (groundwater)	6 021-15 000 µmhos/cm

2.2.2 Heavily Modified Water Bodies

In the classification of the surface water bodies as heavily modifies water bodies:

- this classification of water bodies is made according to the criteria taken place in Quality Criteria for Classified Inland Water Sources found in Water Pollution Control Regulation which is come into force by being published in Official Gazette with law number 19919 and date 4/9/1988 in accordance with the Environmental Law with law number 2872. This classification is based on the parameter values obtained in observation studies, which are performed periodically in critical 27 observation points by State Hydraulic Works during 2002 in the basin and the results of these studies are given in Part 3.2 Table 1;
- the water flow regime and the morphology of the rivers are taken into consideration.

The water bodies included in this classification and some of their characteristics are given in Table 2.1

Table.2.10 Heavily Modified Water Bodies in the Basin and Their Properties

Name of river	Flow condition	Altitu-de of field	Catchment area	Average flow (hm^3/year)	Geology
Büyük Menderes River	Continuous flow	Low (<200m)	Wide (>1000km^2)	3800	Quaternary-Neocene
Banaz Stream	Continuous flow	High (>500m)	Wide (>1000km^2)	100,978	Neocene
Dokuzsele Stream	Continuous flow	High (>500m)	Middle (100-1000 km^2)	-	Neocene
Hamam Stream	Continuous flow	High (>500m)	Wide (>1000km^2)	-	Paleozoic-Metamorphic-Neocene
Çürüksu Stream	Continuous flow	Middle 200-500m	Small (<100km^2)	271,840	Neocene-Quaternary
Dandalaz Stream	Continuous flow	High (>500m)	Small (<100km^2)	71,902	Neocene-Paleozoic
Akçay	Continuous flow	High (>500m)	Wide (>1000km^2)	183,6	Quaternary-Neocene

The interventions (changes) had been done to the above mentioned heavily modified water bodies are given in detail below.

Banaz, Dokuzsele and Hamam Streams

Adigüzel Dam is constructed over these streams and their branches for irrigation, flood control and energy production purposes and this dam is in operation at present. For this reason, the flow regimes and the morphologies of these 3 streams are modified, and the amount of water coming to their riverbed shows a change with respect to the condition in which no dam was constructed.

Besides this, domestic wastewaters coming from Usak city and the other small residential places together with the industrial wastewaters produced from the same region are discharged into these streams without any treatment. In the same way, the drainage waters turned from irrigation as a result of agricultural activities in the region are also mixed with these streams and these drainage waters are known to be highly contaminated with agricultural chemical substances and fertilizers. For this reason, the quality of streams are deteriorated and these streams are classified as 3rd or 4th class water bodies due to parameters like organic materials and heavy metal contents.

Çürüksu Stream
To this stream, the industrial wastewaters produced from textile industry and other industrial plants that are in activity in Denizli city and domestic wastewaters are discharged without treatment. Drainage waters contaminated with agricultural substances and fertilizers that are used in agricultural activities are also mixed with this stream. Consequently, water quality of Çürüksu Stream is considered to take place in 2nd, 3rd or 4th class water standards from various water quality parameters point of view.

Dandalaz Stream
Although there are wastewater treatment plants constructed to treat wastewaters produced from leather industry enterprises taken place in the neighborhood of Karacasu, these wastewaters are discharged into the Dandalaz Stream without treatment due to economical reasons. Also, there is a contamination with respect to the domestic wastewaters from small residential areas and wastewaters resulting from agricultural activities. In the same way, the water of this stream is classified as 2nd, 3rd or 4th class water from the organic material, heavy metal content and bacteriological parameter points of view.

Akçay River
By constructing Kemer Dam on this river for irrigation, flood control and energy purposes, the natural flow regime of the river is changed. This river's water is in the quality of 2nd or 3rd class water quality due to the parameters affected from contaminators resulting from agricultural activities and domestic wastewaters produced from small residential areas.

Büyük Menderes River
The river is highly contaminated by the domestic wastewaters produced from nearly all residential areas taken place along the basin and by the industrial wastewaters produced from industrial plants that are in operation in Usak and Denizli discharged to the river and to its branches without any treatment.

The wastewater of geothermal plant located in Denizli-Sarayköy-Kizildere Region together with the water rich with boron element produced from Tekke hot spring located in left shore of the same region is discharged into the river causing a boron contamination in the basin.

In addition, the contamination caused from agricultural activities is of concern along the whole river basin and especially in middle and lower part of the Büyük Menderes basin. For this reason, water of Büyük Menderes River is classified as 2nd, 3rd and 4th class water due to physical, chemical and bacteriological parameters.

2.2.3 Artificial water bodies

2.2.3.1 Irrigation and Drainage Channels

The current irrigational water distribution schemes, under operation, in the basin and as mentioned in Table 2.11 are consist of; the Open constructed concrete coated main irrigation canals concomitantly with new concrete coated spare (standby) and tarsier irrigation canals or small canals used in the irrigation of arable fields. Furthermore, open constructed and uncoated (canals excavated directly in the land) main drainage canals together with spare (standby), tarsier canals and covered (closed system) farm irrigation systems are in use in the entire irrigation area for the reasons of; discharging the extra water used in irrigation togethger with rain water, to discharge the extra w ater exceeding the field capacity (after the entire porous medium of the soil profile is being filled over with water), and finally to clean the lands from the extra salts and sodium. Thus the current irrigation system (kilometers of irrigation and drenage channels) under operation in the entire area , is evaluated as an artificial water bodies.

The fact that both the underground and the surface water bodies are connected to each others (especially in the case of the uncoated drainage canals) has carried an important factor from the point of establishing a balance in the basin ecological system. It is possible to consider the ground water in the basin being negatively affected by the bad quality water in these canals, especially when we take into consideration the problems associated with the accumulation of sediments, the plants exist in these canals and some similar factors that create slow flow regimes or sometimes completely terminated flow conditions in these canals. At the same time, these water bodies (canals) adversely affect the quality of the surface water bodies in the entire area of the basin since they are connected to the river of Buyuk Menderes and to the sub branches of the river. The irrigation systems constructed by the DSI are given in the Table 2.11.

Table.2.11 Irrigations in Operation Constructed by State Hydraulic Works in the Basin

Name	Location	Total Irrigation Area (ha)
Akçay Right & Left Shore Irrigation	Aydin	Gross 18493 Net 14900
Topçam Irrigation	Aydin	Gross 4983 Net 4300
Nazilli Right & Left Shore Irrigation	Aydin	Gross 21135 Net 17500
Söke Plain Irrigation	Aydin	Gross 29135 Net 26000
Aydin Plain Irrigation	Aydin	Gross 16400 Net 14500
Yenice-Sarayköy Right Shore Irrig.	Denizli	Gross 2523 Net 2050
Yenice-Sarayköy Left Shore Irrig.	Denizli	Gross 8059 Net 6195
Çürüksu-Left Shore Irrigation	Denizli	Gross 800 Net 610
Isikli Irrigation	Denizli	Gross 2703 Net 1650
Gümüssu Pumping Irrigation	Denizli	Gross 2200 Net 1600
Bereket Irrigation	Denizli	Gross 6300 Net 4690
Gökpinar Irrigation	Denizli	Gross 2219 Net 1712
Pamukkale Irrigation	Denizli	Gross 10556 Net 8593
Baklan Right Shore Irrigation	Denizli	Gross 9120 Net 7500
Baklan Left Shore Pumping Irrigation	Denizli	Gross 18276 Net 17180
Irgilli Sütlaç Irrigation	Denizli	Gross 8410 Net 5720
Çal Irrigation	Denizli	Gross 1840 Net 1730
Karpuzlu Irrigation	Aydin	Gross 2486 Net 2300
Kahvederesi Pond Irrigation	Aydin	Gross 32 Net 27
Bayir Irrigation	Mugla	Gross 680 Net 640
Germencik-Hidirbeyli Pond Irrigation	Aydin	Gross 273 Net 230
Çine-Akçaova Pond Irrigation	Aydin	Gross 337 Net 294
Bayir Kazan Pond Irrigation	Mugla	Gross 518 Net 487
Denizli Tavas Pond Irrigation	Denizli	Gross 240 Net 225
Çatak Pond Irrigation	Aydin	Gross 160 Net 147
Total		Gross **167 872 Net 140 780**

2.2.3.2 Dams and Ponds

Havzada; sulama ve içme suyu temini, taskin kontrolü ve elektrik enerjisi üretimi amaci ile insaa edilen baraj ve göletler yapay su kütleleri olarak degerlendirilmis ve bu yapilar DSI 2002 yili sonu verilerine göre Tablo 2.12'de verilmistir.

Table 2.12 Dams and Ponds in the Basin and Some Properties of these Storage Structures

Name of lake	Location	Purpose	Phase	Area of lake (ha)	Volume of lake (reserve) (hm^3)	Max. water depth (m)	Geology
Isikli Lake Storage	Denizli-Çivril	Irrigation	In operation	6586	248,2	6,55	Clay stone, Silt-sand
Adigüzel Dam Lake	Denizli-South	Energy, Flood control, Irrigation	In operation	2590	1076,00	90,00	Schist, marble
Kemer Dam Lake	Aydin-Bozdogan	Energy, Flood control, Irrigation	In operation	1158	358,50	101,45	Schist, clay stone, siltstone
Topçam Dam Lake	Aydin-Çine	Flood control, Irrigation	In operation	418	97,70	54,15	Gneiss
Yaylakavak Dam Lake	Aydin-Karpuzlu	Irrigation	In operation	99	31,42	68,50	Gneiss
Akçaova Pond	Çine	Irrigation	In operation	34	2,33	27,50	Gneiss
Hidirbeyli Pond	Aydin	Irrigation	In operation	37,2	3,211	25,50	Siltstone, gravel, sandstone
Çatak Pond	Çine	Irrigation	In operation	160	1,9	25,80	Gneiss
Tavas Pond	Denizli	Irrigation	In operation	32,4	2,0	26,40	Gravel, schist
Cindere Dam	Denizli South	Energy, Irrigation	Under construction	282	84,27	73,70	Schist
Akbas Dam	Denizli Honaz	Energy, Irrigation	Investment program	114,0	35,0	68,25	Gravel
Gökpinar Dam	Denizli Center	Drinking water Irrigation	Under construction	197,9	28,20	41,20	Siltstone, gravel, marl
Karacasu Dam	Aydin Karacasu	Irrigation	Under construction	35,0	17,20	48,50	Marl, clay stone, siltstone
Yenidere Dam	Denizli Tavas	Irrigation	Under construction	650	65,00	40,62	Gravel
Bayir Dam	Mugla Yatagan	Irrigation	Under construction	45,0	7,12	40,50	Siltstone, clay stone, gravel
Girme Dam	Mugla Yatagan	Irrigation	Investment program	84,0	12,75	64,70	Schist, limestone
Yatagan Dam	Mugla Yatagan	Irrigation	Planning Study	-	13,80	-	Schist, gravel and siltstone
Hayirli Dam	Mugla Yatagan	Irrigation	Investment program	285,0	43,10	39,50	Gneiss
Çine Dam	Aydin Çine	Energy, Flood control and Irrigation	Under construction	934	360,00	115,00	Gneiss
Gökbel Dam	Aydin Çine	Energy, Irrigation	Final Project Study Complete	68,0	13,00	37,10	Gneiss

Name of lake	Location	Purpose	Phase	Area of lake (ha)	Volume of lake (reserve) (hm^3)	Max. water depth (m)	Geology
Ikizdere Dam	Aydin Incirliova	Drinking water, Irrigation	Under construction	555,0	194,96	99,14	Gneiss, mikoschist
Oyuk Dam	Aydin Germencik	Irrigation	FinalProject Study Complete	256,0	56,25	76,00	Gneiss
Nesetiye Dam	Aydin Germencik	Drinking water	In examination phase	-	21,20	-	Gravel, sandstone, siltstone
Sariçay Dam	Aydin Söke	Drinking water	Planning Study	149,0	41,35	82,90	Gneiss
Besparmak Dam	Aydin Söke	Drinking water	Planning Study	242,0	39,50	33,35	Gneiss
Ataköy Pond	Aydin Karacasu	Irrigation	Under construction	17,7	1,34	24,40	Schist
Gölcük Pond	Aydin Karacasu	Irrigation	Planning	29	2,30	26,36	Schist
Karacaören Pond	Aydin Koçarli	Animal Drinking water	Under construction	10	0,500	16,75	Gneiss
Çavdarköy Pond	Aydin Söke	Irrigation	Pre-investigation	-	0,450	-	Gneiss
Ibrahim Kavagi Pond	Aydin Çine	Irrigation	Pre-investigation	-	0,820	-	Gneiss
Gökçeburun Pond	Aydin Karacasu	Irrigation	Pre-investigation	-	3	-	Kuvarsit, clay stone
Kazan Pond	Mugla	Irrigation	In operation	30,7	2,853	28,50	Siltstone, sandstone
Çardak-Beylerli Pond	Denizli Çardak	Irrigation	Under construction	21,4	2,51	41,50	Clay stone, siltstone
Inceler Pond	Denizli Bozkurt	Irrigation	Planning	-	6,00	-	Clay stone
Tavas-Kavaklar Pond	Denizli Tavas	Irrigation	Pre-investigation	-	3,85	-	Gravel, schist
Eziler Pond	Denizli South	Irrigation	Pre-investigation	-	2,2	-	Gneiss
Bogaziçi Pond	Denizli Baklan	Irrigation	Pre-investigation	-	1,0	-	Gravel
Gerali Pond	Denizli Sarayköy	Irrigation	Pre-investigation	-	8,5	-	Marl, claystone, sandstone
Duacili Pond	Denizli Sarayköy	Irrigation	Pre-investigation	-	2,19	-	Marl, claystone, sandstone
Sarayköy-Beylerli Pond	Denizli Sarayköy	Irrigation	Pre-investigation	-	1,80	-	Marl, claystone, sandstone

2.3 Characterization of ground water

Potential safe yield reserve: 451 hm^3/year.

Allocation

Drinking and domestic use	:	147.40 hm^3/year;
Irrigation	:	179.30 hm^3/year;
Industry	:	10.00 hm^3/year;
Remaining potential safe yield:		114.30 hm^3/year.

The changes in the groundwater level in the basin during the 10 years period (1992-2002) are expected to be within the range of 0.5-5 meter. Taking into account the dry conditions (less rainfall) in the region during the same period, the declination of the ground water level is thought to be directly related to the amount of precipitation causes nourishment to the groundwater. DSI has already put in use enough number of groundwater wells in order to cover the activities taking place in the basin such as; residential area needs, agricultural, industrial and tourism activities needs, for this reason DSI is not giving any compromise to open any new well. However, DSI did not drawback or restricted opening new private wells or hindered any well under operation. It is within the authority of DSI to restrict or to limit the use of the wells in the region in case of perceiving any considerable decrease in the groundwater in the region.

The main source that supplying the groundwater aquifers in the basin is the total amount of precipitation in the region. Therefore both the groundwater and surface water bodies are in a way related to each other and from time to time both bodies are being fed by each other. (groundwater from the surface water and vice versa).

Certificated ground water wells opened in the basin until the end of year 2001:

Aydin	2656 wells;
Denizli	1451 wells;
Mugla	1046 wells;
Total	5153 wells.

Quality problems are seen in the wells taken place in the regions in the neighborhood of the geothermal areas and in some regions near the sea, and yields of wells differ from region to region. The exact number of wells opened without license is not known. However, it is supposed that the wells without license are more than the wells that are opened with certificates.

2.3.1 Aquifer location and main physical characteristics

2.3.1.1 Aquifer Location and Main Physical Characteristics

Lower Büyük Menderes Basin

The lower B.M. plain is a graven formed by two great faults from west to east.

It is filled with large quaternary alluvium cones at the mouth of streams, and sandy-gravely levels of Neocene. These are aquiferous formations. The alluvium cones are observed on the northern border of the plain from the east up to Germencik.

Middle Büyük Menderes Basin
In relation with intricate geology and morphology, there are few extensive and rich aquifers in middle basin.

Quaternary alluvial aquifer of lower Emir River and Büyük Menderes (Sarayköy basin):
- nogen formation, adjacently in the south of the quaternary aquifer, but with lower productivity;
- neocene limestone situated in the north of the quaternary aquifer, also with medium-low productivity;
- quaternary alluvial plain of Tavas, with very heterogeneous sedimentary deposits on water bearing limestone;
- miocene limestone and Oligocene sandstone situated in the west of Tavas plain have a good productivity.

Upper Büyük Menderes Basin
The main extensive and productive aquifers of this area are located in the upstream part:
- Usak-Banaz-Sivasli alluvial plain;
- Sandikli- Dinar alluvial plain;
- Çivril alluvial plain.

Alluvium thickness is small: Only 20-30 m in Usak-Banaz area. The basement of the alluvium is generally limestone sometimes karstified or fractured, Miocene conglomerates and sandstone.

The map showing the aquifer places in the basin is given in Figure 2.4.

2.3.1.2 Ground Water Resources and Productivity

Lower Büyük Menderes Basin
In the B.M. plain, the transmissibility ranges between 500 to 3000 m^3/day/m. It increases up to 13800 m^3/day/m in the alluvial cones, such as well number 16016-B at Gireniz, but the transmissibility is only 200 to 1500 m^3/day/m for the alluvium of the Çine plain.

The favorable area for ground water exploitation in the lower B.M. plain is a belt, 4 to 10 km wide, between Horsunlu and Söke. The area covered with alluvium in Çine Plain is also favorable for groundwater exploitation.

There are various springs in the lowest pert of the B.M. basin, the most important of them emerge from Paleozoic limestone formation between Söke and the Aegean sea.

Table.2.13 Main Springs In Lower Büyük Menderes Basin

Spring name	Altitude (m)	Geological formation	Temperature (ºC)	Yields (L/s)
Balikli	0	Paleozoic limestone		100
Yavansu-Bataklik-Dönak	3	Paleozoic limestone		150-170
Akçapinar	8	Paleozoic limestone		70
Degirmendere	300	Paleozoic limestone	18-20	50
Tirha	100-110	Neocene marly limestone	18-20	10
Sarlak	25	Paleozoic limestone	24-26	150
Gümüsköy	60	Travertin	30-40	3
Alangüllü	200	Paleozoic gneiss	60	2

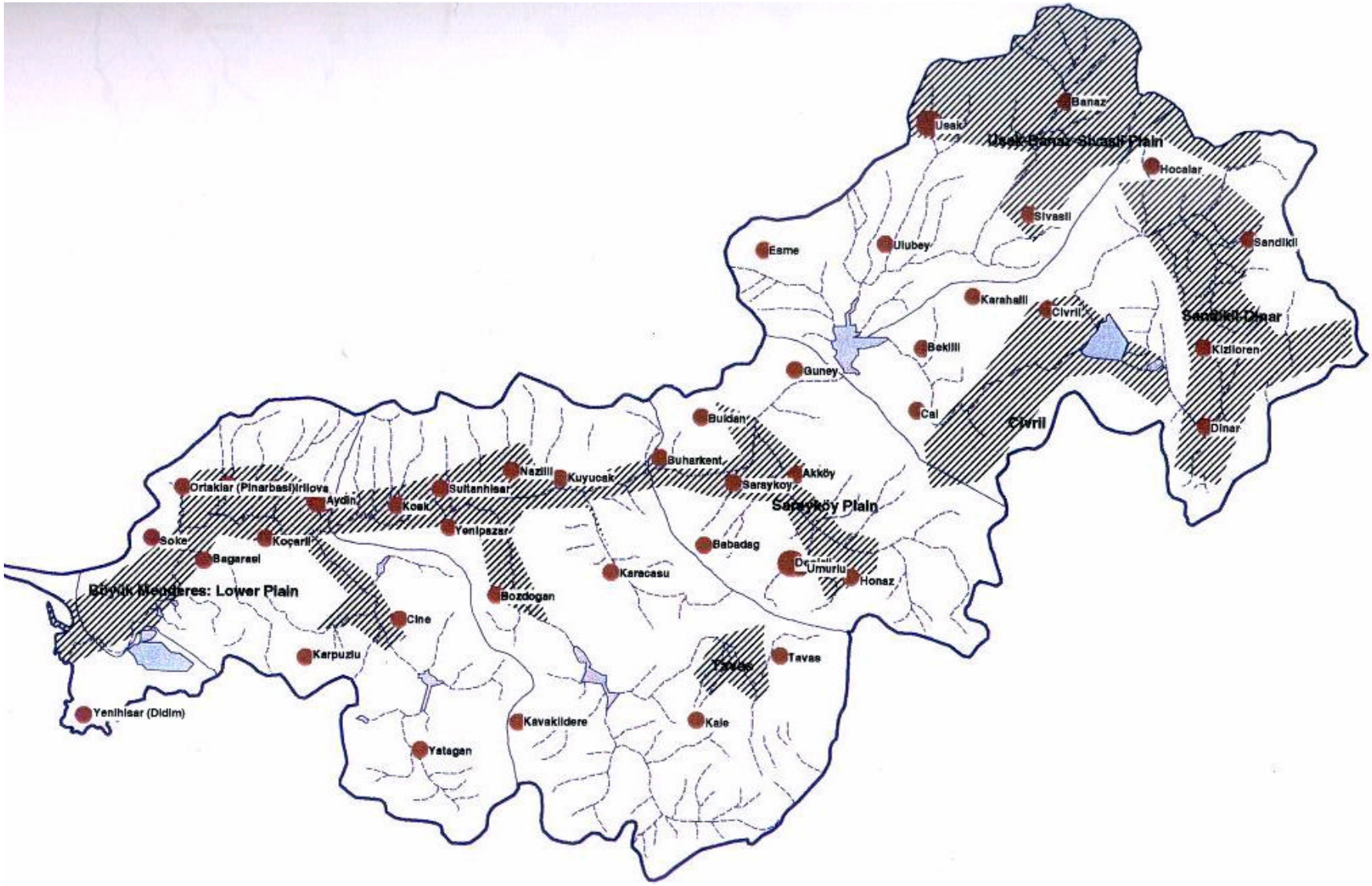


Figure 2.4 Map Showing Locations of Aquifers in the Basin

Moreover, two of the most important geothermal fields of Turkey were discovered in that area, Germencik (Aydin) geothermal field and Salavatli (Aydin) geothermal field:

- on Germencik field, depth and temperature of the reservoirs change between 285m (conglomerate)- 1500 m (gneiss and 200-231^{0}C respectively. It is planned to build a 25 MW electricity production plant. The total potential of this geothermal field is estimated up to 100 MW;
- on Salavatli field, tests are made4 to determine the suitable uses of this 162-171^{0}C reservoir.

Middle Büyük Menderes Basin
From what we have seen, no synthesis document on groundwater resources is available for this middle Büyük Menderes basin, even if a lot of data is available (more than 150 authorized wells in Denizli-Merkezarea for example) and although some groundwater resources seem to be the matter of use conflicts (Pamukkale thermal water).

Kizildere (Denizli) geothermal field is the first geothermal field suitable for electricity production: a geothermal power plant of 20 MW is working. The depth and temperature of the reservoirs range respectively between 450-1,100 m. and 198-212 ^{o}C. Development studies and reinjection tests in wells are continued: water is currently discharged in surface water.

Upper Büyük Menderes Basin
In Us ak-Banaz-Sivasli plain, it seems that there is no deep groundwater: superficial alluvium is the main productive formation (transmissibility is 130-300 m^3/day/m or 1,5-3,6 E-0,3m^2/s).

In Çivril plain, the productivity ranges from 150 to 4500 m^3/day/m (1,7 E-03 to E-02 m^2/s) in the northern part of the plain, but much smaller anywhere else.

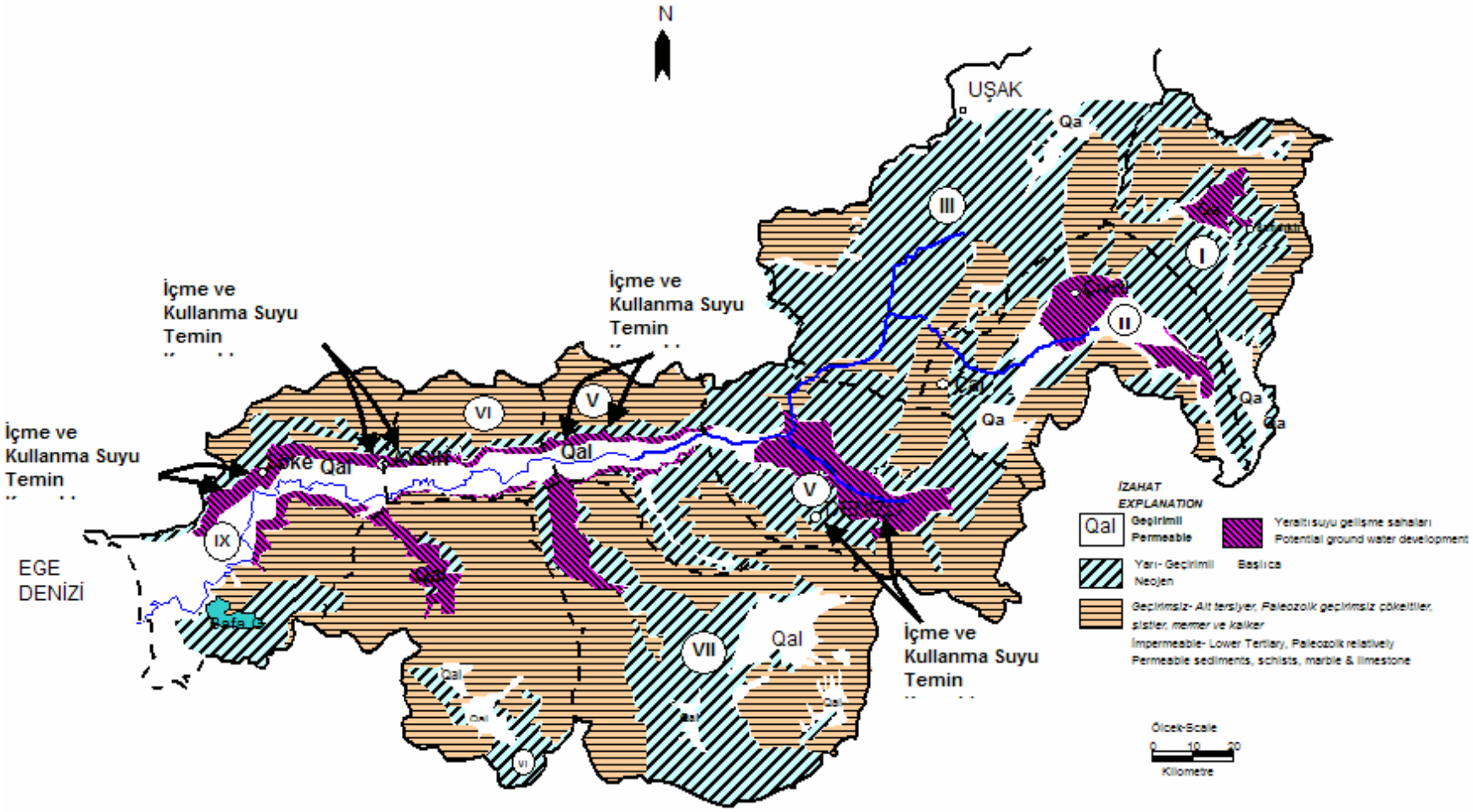
Important springs are mentioned in Usak-Banaz plain.

- Sivasli and Pinarbasi springs: 400-550 L/s;
- Gürpinar springs: 150-175 L/s.

The map showing groundwater development zones in the basin is given in Figure. 2.5.

2.3.1.3 Well Capacities

Lower Büyük Menderes Basin
Well yield ranges mainly from 15 to 50L/s (54 to 180 m^3/h), even up to 70-80 L/s (250-290 m^3/s) near Atça and Nazilli where aguiferous alluvial cones are important. Dynamic level is mainly between 25 and 40 m deep, but sometimes deeper, up to 50 m.



Şekil 2.6 Büyük Menderes Havzası Yeraltısuyu Haritası (DSİ,1967).

Figure 2.5 Map Showing Groundwater Development Zones in the Basin

Middle Büyük Menderes Basin
Well yields range from a few liters per second to some 70 L/s (for some wells of Tavas cooperative for example); specific yield can reach up to 20 or 30 L/s, particularly when the well taps water from alluvium and underlined limestone or sandstone.

Boreholes drilled in travertine or conglomerate can have a high productivity: yield up to 90 L/s with, sometimes, very small drawdown (boreholes n° 34 554 and 37 126) but often mineralized water (EC about 2000 micromhos/cm).

Upper Büyük Menderes Basin
In Usak-Banaz-Sivasli Plain, well discharge is in between a few liter per second up to some 20 L/s (specific capacity up to 17 L/s/m).

In Sandikli-Dinar Plain, little information is available: one well (n° 26817) has an excellent yield (63 L/s) with very little drawdown (0,55 m), otherwise have minor characteristics is available.

In Çivril Plain, a lot of wells have good yield (32 to 80 L/s) with middle to good specific capacity (up to 45 L/s/m).

2.3.1.4 Water Quality

Lower Büyük Menderes Basin
The ground water of the lower B.M. Plain is mostly of good quality and favorable for irrigation (C2S1 and C3S1 irrigation water class). The dug well waters generally have electrical conductivity ranging between 300 and 1900 micromhos/cm, expect in the south of Germencik and in Söke plain where waters are salty. Poor quality ground water are encountered in the south of Söke, where the influence of the sea water can be observed, and, to due to absence of drainage, poor quality waters can also be encountered from place to place.

Middle Büyük Menderes Basin
From the data available, it seems that water quality is generally good to excellent (EC ranging from 550 to 750 micromhos/cm) in alluvial formations and limestone.

Upper Büyük Menderes Basin
Generally, quality of groundwater is classified in C2S1 and C3S1 irrigation water class, or even C1S1 water class (EC ranges from 230 to 850 micromhos/cm).

2.3.1.5 Main Abstraction Areas and Ground Water Fluctuations

Lower Büyük Menderes Basin
Main pumping areas for irrigation in lower B.M. plain are exposed in the following.

Table.2.14 Irrigation Co-Operatives In Lower Büyük Menderes Basin

Co-operatives name	Irrigated surface (ha)	Number of wells	Depth of wells (m)	Range of Yields (L/s)	Total discharge (Mm^3/year)
1.Sultanhisar	500	14	75-100	30	3,44
2.Atça	470	19	97-112	20-70	4,66
3.Yöre	140	3	97-100	50	1,17
4.Ataeymir	240	6	150	30-50	1,74
5.Palamutçuk	150	2	150	60	1,22
6.Horsunlu	80	4	120	15	0,5
7.Nazilli-Feslek		34	100	30-80	8,8

The volume pumped from aquifers by irrigation co-operatives is only 21.5 Mm^3/year. Even if ground water is used also trough wells scattered all over the plain, it seems that ground water is not overpumped in lower B.M. plain: ground water exploitation represents a small part of the ground water budget, which is estimated about 400 Mm^3/year.

Middle Büyük Menderes Basin
Main pumping areas for irrigation in the middle Büyük Menderes Basin are exposed in the following table.

Table.2.15 Irrigation Co-Operatives In Middle Büyük Menderes Basin

Co-operatives name	**Irrigated surface (ha)**	**Number of wells**	**Depth of wells (m)**	**Range of Yields (L/s)**	**Total discharge (Mm^3/year)**
Karateke	125	2	100	60-70	1,0
Ovacik	125	2	100	60-70	1,0
Kizilyer	750	16	100-150	20-60	5,56
Mentes	340	4	100-150	20-50	2,9
Honaz	250	5	100	60	2,42
Kizilcabölük	280	6	150	45-50	2,17
Tavas	320	7	170	40-60	2,52
Sapaca	250	5	75	50	2,0
Çürüksu	-	52	80-150	25-80	35

Most of these irrigation areas are situated near Honaz (east from Denizli) and Tavas (south of Denizli). In Tavas area, no important inter-annual water level fluctuation was observed between 1994 and 1998, except a small water rise, probably due to more rain and less water pumped for irrigation.

Upper Büyük Menderes Basin
A lot of pumping areas of irrigation are concentrated near Çivril; they are exposed in the following table.

Table.2.16 Irrigation Co-Operatives In Upper Büyük Menderes Basin

Co-operatives name	Irrigated surface (ha)	Number of wells	Depth of wells (m)	Range of Yields (L/s)	Total discharge (Mm^3/year)
Emirhisar I	347	6	130	80	2,72
Gümüssu I.II,III	519	13	80-100	40-67	4,37
Isikli I,II	410	7	80-150	35-81	3,02
Igdir	280	5	90-100	40-75	2,16
Kizilcasögüt	350	5	100	50-58	1,98
Koçak	280	5	110-114	50-56	2,16
Yesilyaka I	277	4	120	37-57	1,51
Mentes	230	5	142-175	21-35	1,38
Ömerli	260	4	100	50	1,56
Yuvaköy	175	3	175	50	1,03
Yeniköy	240	5	175	21-46	1,95

2.4 Geothermal resources

In Büyük Menderes Grabeni, approximately 20 geothermal areas are found. The geothermal areas in the region have periodic geothermal system features, and in these systems meteoric waters leak under the ground along the fault lines and tectonic cracks. Leaching waters are heated with the effect of magma that comes near the surface due to graben tectonic. As a result of convectional heat flows occurring due to density differences in the liquids, heated waters rise under the ground and reach to the surface along the tectonic lines.

The chambers of geothermal systems are composed of cracked rocks like gneiss and cuvars schist which are among the Menderes massive metamorphic rocks, carstik marbles and of neocene old gravels in some areas.

Geothermal areas taken place in the cities located in the basin and their properties are given in Table 2.17.

Table.2.17 Geothermal Areas in the Basin and Their Properties

City	Area of the source	Property	Temperature of chamber (^{0}c)	Bor content* (mg/l)	Type
AFYON	Sandikli				
DENIZLI	Kizildere	High temperature	210	29,7	Sodium bicarbonate
	Tekke hamami	High temperature	115	19	Sodium sulfate
	Gölemezli	High temperature	200	-	Sodium, calcium, sulfate
	Pamukkale	Low temperature	90	-	Calcium bicarbonate
	Yenice-Kamara	Low temperature	130 140	-	Sodium-calcium bicarbonate and sulfate
AYDIN	Germencik-Ömerbeyli-Bozköy-Çamur	High temperature	231 231 59 90	71	Sodium bicarbonate chloride, high boron content
	Salavatli	High temperature	172	54	Sodium bicarbonate
	Ilicabasi-Imamköy	Low temperature	38,5	0	Sodium bicarbonate, chloride
	Gümüsköy (Ortaklar)-Sazliköy (Söke)	Low temperature	35	-	Calcium magnesium bicarbonate
	Davutlar	Low temperature	100-130	-	Sodium chloride, bicarbonate

* *Bor contents are from 1996 MTA data.*

2.5 Characterization of protection zones

2.5.1 *Drinking water protection zones*

2.5.1.1 Surface waters providing drinking water

According to the Water Pollution Control Regulation enforced by being published in Official Gazette with date 04.09.1988 and law number 19919 in accordance with the Environmental Law with law number 2872; activities that will cause contamination in and around the drinking and usage water reservoirs are prohibited to avoid water pollution in inland surface waters where drinking and usage water is obtained, unloading waste and rubble to these resources, using boat, motor and similar vehicles working with liquid fuel, and fishing is forbidden. So, protection zones for surface waters are defined as;

The ABSOLUTE PROTECTION ZONE, from the maximum water level, 300 meters in width zone used to cover the potable and usable water needs.
The SHORT DISTANCE PROTECTION ZONE, is the zone starting from the borders of the absolute protected zone and having a width of 700 meters.
The MEDIUM DISTANCE PROTECTION ZONE, is the zone starting from the borders of the short distance protected zone and having a 1 km width.

The LONG DISTANCE PROTECTION ZONE, is the zone starting from the boarders of the medium distance protected zone and continue to cover the entire rainfall reservoir zone.

Total amount of drinking and usage water obtained from the surface waters in the basin is 106,93 hm3 /year.

The following dams are aimed at covering the potable water needs and they are all within the borders of the Büyük Menderes basin; the under operation dam Gökpinar, exist in the center of Denizli, the under construction dam of Ikizdere exist within the borders of Aydin Incirliova, the under study dam of Nesetiye that exist within the boarders of Aydin-Germencik, the dams of Sariçay and Besparmak, with completed planning studies, exist within the boarders of the Aydin-Söke district. It was assigned to the DSI the duty of preparing a topographical map with 1/25 000 scale in which all these dams and the corresponding protected zones are to be shown on. All these dams are to conform the absolute protected zone distances, however in respect to the short, medium and long protected zones distances these dams are considered to have some infractions and some problems in protecting them.

2.5.1.2 Groundwater resources for drinking

According to the Water Pollution Control Regulation which is enforced by being published in Official Gazette with date 04.09.1988 and law number 19919 in accordance with the Environmental Law with law number 2872; the authority and responsibility to use and protect inland ground waters where drinking and usage water is supplied is given to the General Directorate of State Hydraulic Works. The total safe groundwater reserve in the basin is 451 hm^3/year, and the amount water supplied from this reservoir as drinking and usage water is 147,40 hm^3/year.

No constructions, solid and liquid discharges, and transitions are allowed in the distances less than 50 m to the wells, springs and infiltration galleries from where groundwaters are obtained for drinking water supply purposes. To take the required protection steps, the neighboring 50 m distance from the groundwater resource is surrounded by barbed wire. In addition, similar restrictions as in surface water protection are applied in the protection of these areas.

Although the usage of ground waters for drinking purposes is very common in the basin, some problems occur in the protection of these sites. The groundwater areas whose safe reserve is endangered due to excessive drawdowns, groundwater drawdown is restricted in some periods in order to apply the protection measures.

2.5.2 Nature protection areas

Dilek Peninsula Büyük Menderes Delta National Park

Status

Delta National Park is "A Class Wetland" consisting of a lot of lagoon and marsh. This park has international characteristics.

Coordinates

It is in 37 ^{0}34' North- 27^0 13' East coordinates, and lies in Aydin city borders.

History
With the addition of Büyük Menderes Delta located in the south of the Peninsula in 31.03.1994 to the Dilek Peninsula National Park, which is declared as National Park in 19.05.1966; the borders of the National Park reached an area of 27,675 ha. In this area, antique remains from Tebai City and Panionion Antique City, which is a political union of 12 Ionia cities in BC. 9th century, are found. Together with these, Panagia Monastery near Panayir Hill and Harap Church, sapel and churches carrying Rum and Turkish architectural elements in Old Doganbey Village are seen.

Importance
The region is under protection since it is characterized as a wetland having international properties with a lot of lagoons and marshes showing richness in flora and fauna. This region meets almost all of the young fish need of the fish farm found in Aegean Region. In accordance with the provisions of Water Products Circulars of 34/1 belonging to 2000-2002 hunting period and of 35/1 belonging to 2002-2004 hunting period, which are published by Ministry of Agriculture and Rural Affairs, "Young fish collection is forbidden in shore sites like lagoons, crawls, and in mouths of all kinds of rivers where sea fishes come to breed and feed."

General condition
The highest point of Dilek Peninsula having average elevation of 650 m. is the Dilek (Mykale) Hill with 1237 m. The peninsula has beaches and small bays showing different surface shapes with valleys and canyons.

Büyük Menderes Delta comprises a wide area between the old and the new mouth of Büyük Menderes River. Büyük Menderes River has low level, very little sloped bottom fields that face floods. The soil is salty having sodium. The soil is usually heavy and medium constituted whereas sometimes low constituted soil is seen. In most of the area, agriculture is not made. Partially, cotton agriculture can be performed.

In the crawls and lagoons taken place in the delta, significant water products are produced like grey mullet, seabream and sole. For this reason, 3 water products cooperative having approximately 350 partners are in operation in the region.

As well as sea sports, the guests can perform wildlife photography,walking, rock climbing, bicycling in the arranged tracks.

Biodiversity

Fauna
National park is found only in Turkey and it is the last place where Anatolian Panther (*Panthera pardus tulliana*), which is assumed to be extinct, lives. The important animal species are wild boar, lynx, wolf, jackal, fox, rabbit,wild horse and wild ox. In Büyük Menderes Delta, around 250 bird species are detected and 70 of these species brood in the delta. Water birds, the number of which ranges from 50,000 to 100,000, use the delta for breeding, feeding and passing the winter. The biggest third colony of Crested Pelican (*Pelecanus crispus*) in the world broods here. This species is endangered in the entire world and 3000 individuals are alive at present.

Together with Dwarf Cormorant (*Phalacrocorax pigmeus*), the Mediterranean Fox (*Monachus monachus*), which is one of the 10 rare mammals of the world, and also turtles have the chance to live and breed in the shoreline of the National Park.

Flora
Different and various physical characteristics of Dilek Peninsula and of the Büyük Menders Delta, make the plant cover be different and various in short distances. In this area, 804 plant species are determined. Among these species, 6 of them are found only in this National Park and the area has 18 species that are endemic species for Turkey.

Families of Legüminosae, compositae, gramineae, Umbellifera and Labiate are widespread in the region and the richness of Orchidacae family is significant. The healthiest examples of species are found in the region as well as all types of plant species of the Mediterranean maquis flora. It is the only place where Anatolian Chestnut (*Castanea sativa*), which is special to North Anatolian forests, is found at the most south place in Turkey. It is the only park where Guelder Rose (*Viburnum lantana*), Finike Juniper (*Juniperus phoenicia*), Pirnal Oak (*Quercus ilex*) and Dalli Cypress (*Cupressus arizonica*) grow by forming small groups.

National Park is important since it consists of the Mediterranean flora region and Euro-Siberian flora region elements at international levels. For that reason, the National Park is determined as "Flora Biogenetic Reserve" Area among the Europe Biogenetic Reserves by the European Council.

Bafa Lake

Status
This lake is taken under protection and declared as a Natural Park in 08.07.1994. Although it can be characterized as an A class wetland, it is not classified separately since it is an integrated part of the Delta.

Coordinates
It is 37 ^{0}29' North- 27^{0}28' East coordinates, and lies in Aydin city borders.

History
Bafa Lake is formed by closure of the Latmos Bay, which was a bay of Aegean Sea formerly, by the alluvion carried by Menderes River and by the filling up of an approximately 300 km^{2} of bay. In the foot of the Bes parmak Mountains, which lie perpendicular to the lake, antique Herakleia City is located. In the antique city, Athena Temple that characterizes the period in which it is constructed, Council building, agora, bath, theatre, fountain and Endymion Temple are found.

Importance
The area is important from the plant cover, wild life and landscape values points of view. It has also touristic importance due to its camping, fishing, and daily usage opportunities leading to recreational potential and due to the effect of antique city.

General condition
Bafa Lake having approximately 312 km ^{2} precipitation basin has 6,708 ha of surface area and 693 hm^3 of water volume at the normal water elevation of 2,00 m. The natural park of Bafa Lake has a total area of 12,281 ha. The feeding of lake is made by precipitation to the lake basin, seasonal rivers, springs coming out of shores, bottom springs and by the connection canal with the Menderes River. The lake having around 2 m. average depth at the north, has a depth of 21 m. in the middle. Over the lake, 4 islands are located having antique remains. From the lake, water products are obtained. For this purpose, 2 water products cooperative are in operation that has around 140 partners.

Biodiversity

Fauna
Before the establishment of flood control barrier between Menderes River and the lake, fish production of 300 tons per year is decreased as a result of decreasing levels of water, drying of marshes, and deteriorated ecological balance. In the lake, carp, sheatfish, yellow fish, rudd, eel, and grey mullet species are found.

The lake is very rich from bird existence point of view. Besides 256 bird species, the lake has endangered species of Crested Pelican (*Pelecanus crispus*), Dwarf Cormorant (*Phalacrocorax pigmeus*) and whitetailed eagle (*Haliaetus albicilla*) which brood. In winter periods, the lake is used as feeding and sheltering place by lots of ducks and water birds.

Flora
The lake, which is known to be highly nutritious (eutrophic) from ecological point of view, has reed beds at southwest, tamarisks, willow, and kindira together with reed beds at northwest. In addition, tamarisk (*Tamarix germenica*), olive (*Olea europea*) and red pine (*Pinus brutia*) plantation are found around the lake.

Pamukkale

Status
It is declared as Special Environment Protection Area in 1990.

Location
It is located in 20 km northwest of Denizli City. It is located at an elevation of 150 m from Çürüksu plain, which is found near Büyük Menderes River flowing into Aegean Sea, and at an elevation of 360 m. from the sea.

History
Pamukkale is a very important center with its original natural structure and historical values. The area of 44 km^2 is composed of travertiens and ruins of antique Hierapolis City. Although the information about the foundation of Pamukkale (Hierapolis) is scarce, it is known that it is founded by people of Bergama in BC. 2nd century. The main historical foundations are Apollon Temple, theatre, St. Philip Martyrium, churches, necropol, city walls, water canals, basilica and bath.

Importance
Pamukkale is the only example in the world, formed by thermal waters coming from limestone layers in front of the crystal structure found in a travertien plain located in the south side of Çökelez Mountain. In accordance with the World Cultural and Natural Heritage Protection Protoc ol by UNESCO, Pamukkale has a place in the list of World Heritage with its unique natural structure and historical values. In addition, Karahayit settlement is developing as an important health and tourism place with its healing w aters.

General condition
Pamukkale Region is located in a transition area which is under the effect of Aegean, Middle Anatolian and the Mediterranean climates. The visible natural plant cover in the plateau Hierapolis is composed of oleander (Nerium oleander), Ficus inur and Vitex agnus castus groups. Natural plant cover is seen mostly near creek sides, shore lines staying in between agricultural fields, village, grove, pasture, and hills that are not suitable for agriculture. Maquis and wide forest vegetation are found in the high hills located in northeast of the plateau.

Işikli Lake

Status
A Class Wetland (in accordance with RAMSAR agreement).

Coordinates
29^0,55'-30^0,05' East 38^0 15'-$38^0$25' North

History
The lake is used as a storage plant for irrigation purposes since 1950 with the nationalization and arrangement studies of State Hydraulic Works.

Importance
Stored water is used for irrigation of agriculture areas found in Denizli and Aydin each year.

General condition
The lake is located in Denizli City Çivril District, its max reservoir volume is 248,20 hm^3, average water depth is 6,55 m., and lake su rface area is 6586 ha. The geology of the lake is composed of clay, silt and sand.

Honaz Mountain National Park

Status
Honaz Mountain is declared as a National Parkwith the decision given by Council of Ministers which is published in Official Gazette in 21 April 1995 with law number 98/6717.

Location
It is located in Denizli City, Honaz District.

History
In Aegean Region where the important city remains are found, it takes its historical place in Denizli with timely famous and rich big city remains like Hierrapolis, Hones-Honas, Laodicai-Lodikya, Apolnya, Harekliya Sebestopilis, Amenya, Tripolis, which are remained from Iansens, Romans and Bizantians.

Importance
Honaz Mountain is such an important natural-cultural resource in Denizli Region with its forest quality, its geomorphologic feature that forms mountains, its dense plant cover, its springs, original topography and its historical quality.

Region's geomorphologic importance is the main origin value that forms the importance of Natural Park.

General condition
Natural Park is placed in the borders of Honaz District of Denizli Province. Its total area is 9219 ha. Borders of Natural Park pass through cracked zone, which separates Honaz Horst from Büyük Menderes Graven. In the west, border of Natural Park follows the road, which is in the east of Gökpinar Stream. Its south and east borders form Peaks Line.

Biodiversity

Flora
Geographical location, topography and its geological structure have important effects at Honaz Mountain Natural Park's floristic wealth. Furthermore Büyük Menderes River, which passes through north of Honaz Mountain Natural Park and wide Menderes Plain that lies through river, bring the Mediterranean climate and the Mediterranean vegetation components to Honaz Mountain. From inner Anatolia to west, river and plain bring Irano-Turan steppe flora. As a result Honaz Mountain forms the border where the Mediterranean plant and Inner Anatolia steppe plants are gathered. Because of this geographical situation, Honaz Mountain Flora has variations and especially has a lot of endemic species.

Honaz Mountain is rich with families of Campanulaceae, Caryophyllaceae, Compositae, Crassulacaea, Labiatae, Papilionaceae, Rubiaceae, Scrophulariaceae, Umbelliferae, Gramineae, Iridaceae, and Liliaceae.

Lamium microphyllum, Verbascum chrysorhacus, Crocus baytopiorum are endemic plants found in Honaz Mountain*, Drignum hypricifolium, Campanula michauxioides* are endemic plants found in Honaz Mountain and Babadag.

Fauna
Rich plant community of Honaz Mountain Natural Park provides various animal species. Because of insufficient observations and researches about animal population; Honaz Mountain Natural Park's animal existence is not known. But especially from wild animals; mountain goats are found. Wild pig, rabbit, fox, partridge, badger, marten and juniper bird can be come across with. It is possible to come across with a poisonous snake whose name is Dag Anasi.

Dinar Karakuyu Pond

Status
It is separated as a Wild Life Protection Area with the acceptation of Ministry of Forest in 22.09.1994 with law number 111.

Location
Karakuyu Lake and its surrounding is located in the 10th km after Dinar Junction in Ankara-Antalya Highway belonging to Dinar District, Afyon Province and is found in the middle of Burdur, Egirdir and Isikli Lakes.

History
This pond, which is composed of springs, was done by State Hydraulic Works in 1979 in order to irrigate agricultural lands. Water of Kocapinar and Leylek creeks pass through Karakuyu site and enter into waterfalls then get out into Dinar Plain and reach to Menderes River. After completing the project in 1990 water collection is initiated.

Importance
Karakuyu Lake is placed on Lakes Districts and it is on the migration road of birds. Because of this location, it becomes a living environment and shelter for birds that are endangered especially for ruddy duck (*Oxyura leucocephala*). Hundreds of birds take shelter in this pond because of its completely natural plant cover and being unfrozen during the winter months.

General condition
This site is completely state land and it is 1840,6 ha. Since 1994 it is forbidden to hunt in the border of site and its 300 m. near distance, and watchmen protect the site.

Biodiversity
Pond is located at the transition line from inner Aegean continental climate to the Mediterranean climate. So in the pond there are various plant species like rushes, rush mat grass, reed, water mint, water lily etc. and near its environs there are mullein, geven etc.

Because of being in Lakes District and located on migration road of birds; 173 units of bird species like mallard, coot, ruddy duck, pintail, heron, moorhen, purple gallinule, kingfisher, starling, goose, swan, crane, cormorant, partridge, pigeon are detected.

2.5.3 Beaches having blue flag

Blue Flag Project is one of the international projects executed in the coordination of Foundation of European Environmental Education (FEEE). Blue Flag is an international *environmental award* given to the Beaches and Marinas. (European Union has indicated microbiologic parameters determining the required water qualities for lakes and seas to be used for swimming purposes in its country, as guiding and obligatory provisions to be obeyed.) There are 22 member countries in Foundation of European Environmental Education. This project is initiated in our country in 7 cities in 1992 after the protocol made in 1989 between Ministry of Tourism and Ministry of Health.

The results of the analyses and the other criteria related to the beaches are evaluated each year by the National Jury, and application is made to Foundation of European Environmental Education, and at the end, Blue Flag is given to the candidate beaches.

In our city, for the year 2001 sea water samples are started to be taken from 17 points, 11 points of which are from Kusadasi District and 6 of which are from Didim District. In 2002, from 19 points seawater samples are collected, 13 points of which are from Kusadasi District and 6 of which are from Didim District.

In 2001 Aydin City deserved to take blue flag for 11 points taking into consideration the above-mentioned criteria as a result of blue flag campaign. Only 2 of the points are found in the borders of the basin. These points are Alaçay Beach and National Park Beach. In 2002, the same points remained as blue flag points and no additions are occurred.

3 Analysis of preassures ans impacts

3.1 Definition of users

The classification of the useres in the basin given in following Figure 3.1.

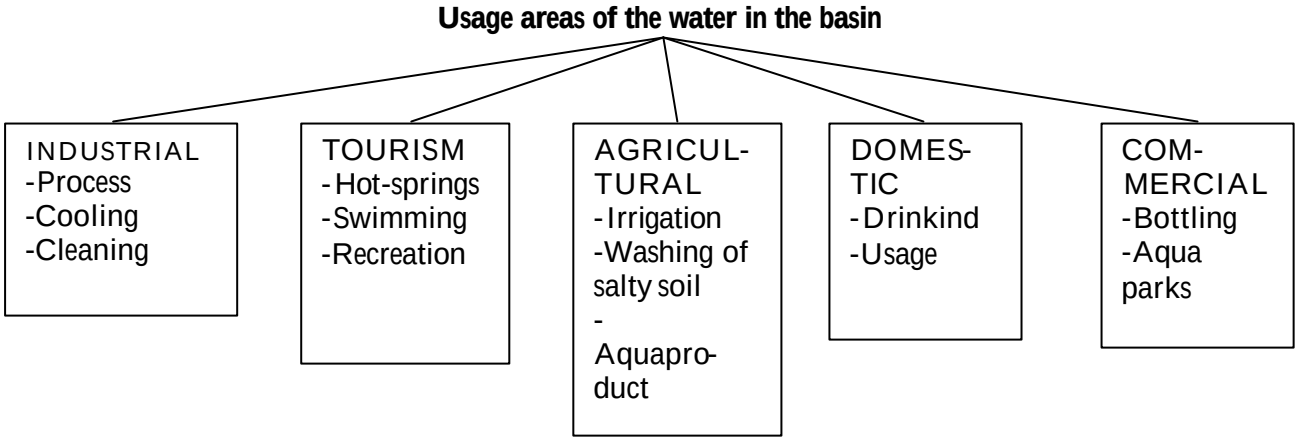


Figure 3.1 Classification of water users

Industrial use

Various types of industries use water for proccesing, cooling and cleanning. These waters supplied either from city network or from their own artesian wells. Water supplied from city network is priced by the municipality council according to amount of volume used. Whereas some municiplaites increases the prices after certain amount used.

For the use of artesian wells it is necessary to take licence from DSI to search for underground water and to abstract according to related law. To use undergorund water in the boundaries of a municiplaity it is necessary to show/documet approved by DSI, that water from city network is not sufficient for them. Unfortunately the lack of any limitation or pricing system for the abstraction of groundwater leads to over abstraction, and consequently increased discharge.

Tourism

The main types of touristic use of water are hot-springs, swimming pools and recreation. For swimming pools and recreation water is usually supplied from city network and/or from private artesian wells. The licensing for the use of artesian wells is the same as industrial use as mentioned previously. For the hot-springs water supplied from geotermal souces after having operational licence from Ministry of Health. In addition to this there are some small enterprises operating without licence (turkish baths, small hotels, pansions etc...).

Agricultural use
Irrigation, washing of salty soil and aquaproducts are the main ways of agricultural water use. Water is provided through DSIs' water constructions (reservoirs, dams, etc.) anddistributed to irrigation unions via irrigational canals. Farmers gets water from irrigation unions or cooperatives that they are belongs to. If farmers documents and approves by DSI and irrigation unions that they are not getting sufficient water, they can get undergorund water after having required permissions/licences from DSI.

Irrigation unions and cooperatives determines water prices through couincil or general committe meeting and applies it after approved by DSI.

5 different ways of pricing is applying in the region:
- once in a year; per hektar, type of plant (TL/ha./year);
- once in a year; per hektar, not considering plant type (TL/ha./year);
- according to number of irrigation applied without considerin plant type (TL/# irrigation);
- per hour of use without considering plant type (TL/hour);
- for undergorund water; per hour by irrigation cooperatives(TL/hour).

Domestic use
Municipalites supplies are responsible from supplying water in the boundaries of municipality. In villages GDRS is responsible from supplying water by artesian wells. The pricing is done by related municipality or village authorities. Price is charged not only for use but also for discharge according to amount of wate used.

In some cases there are unlicenced/un-authorised artesians using. If it is detect by municipality related laws applied for the user.

Energy use
As shown in part 2 Table 2.12, some of the dams exist in the basin are used for energy production purposes. Following the construction of the dam, according to agreement the responsability of DSI to operate the electrical production unit is being transferred to the Turkish Electrical Production Anonymous Company (TEAS). The generation of energy by hydroelectric means is considered to be environmentally sound without any nuisance to the environment.

Furthermore, part of the jeo-thermal sources mentioned in part 2.4 are used for, electrical energy production together with purposes of heating the dwellings and the greenhouses used for agricultural activities. However the usage of jeo-thermal in this way have to be associated with some restrictions not to discharge its water to the surface water bodies since the boron elements and some other toxic elements present in the structure of the jeo-thermal units have adverse effects on the agricultural production activities.

Commercial use
Ministry of Healt give the licence for bottling. The enterprises has to pay to the owner of water source according to amount used.

In addition in coastal touristic areas water for recreatinoal use supplied through city network system or artesians.

3.2 Pressure : point sources

The main types of point sources are domestic wastewater discharge, industrial discharge and geotermal dicharge containing bor. The map of point sources is given in Figure 3.2. The results of periodic monitoring of 2002 carried out by DSI at 27 stations is given on Table 3.1; and map of water pollution monitoring stations is given at Figure 3.3 in a scale of 1/1 000 000.

3.2.1 Domestic wastewater discharge

The all domestic discharges, septic tanks collected thorugh sewarege systmes and discharged directly or indirectly to the river and/or its turribitaries without any treatment due to the lack of or insufficiency of treatment plants. The septic tanks are collected and again discharged to the river.

The main important non-point source is the domestic wastewater discharges. The existing infrastructure of cities and data on their state is given in Table 3.2.

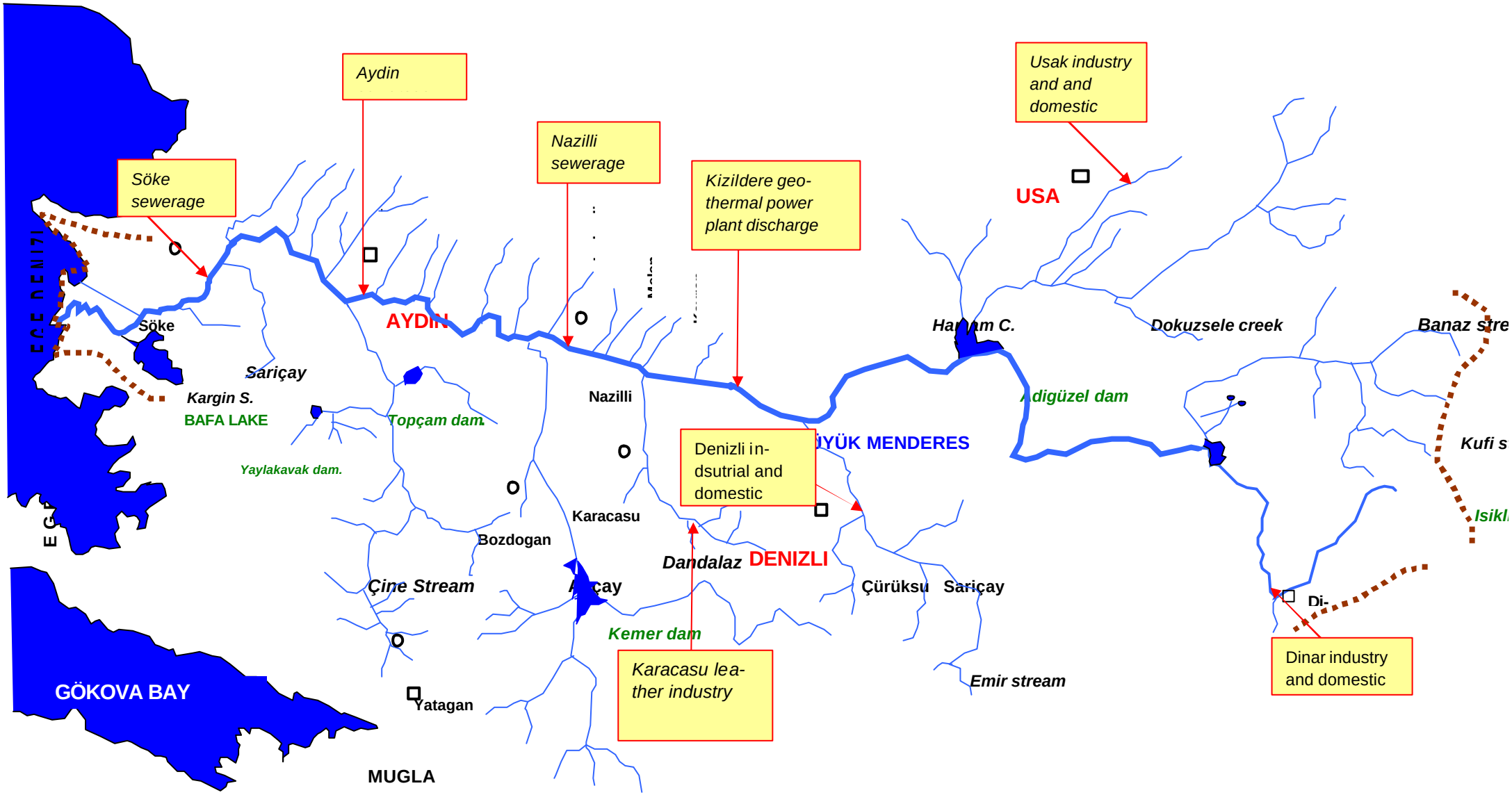


Figure 3.2 *Map of point pollution sources*

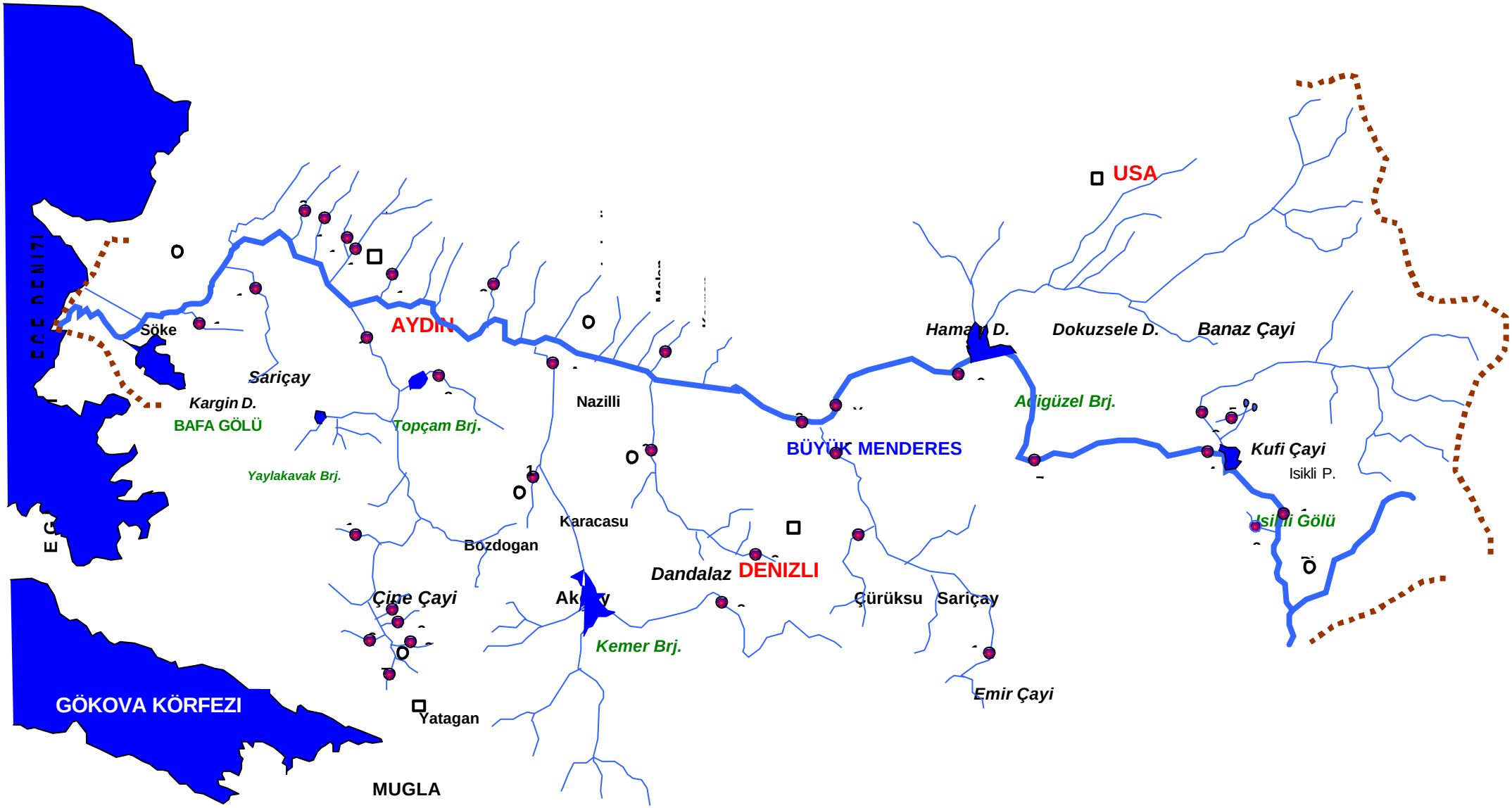


Figure 3.3 *Map of 1/1 000 000 scaled water quality monitoring station*

Table .3.1. 2002 Monitoring data

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location: Büyük Menderes Yenice Regülatörü

Station number : 07 21 00 032

NO	Symbol	PARAMETERS	UNIT	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	Q	Flow	m^3/s				0,789		14,600		52,000		1,136		
2	T	Temperature	° C				20		21		29		22		
3	pH	PH					7,9		7,9		7,9		7,7		
4	EC	Electrical conductivity	mmhos/cm				580		860		720		860		
5	TDS	Total dissolved solids	mg/l				370		550		460		550		
6	SS	Suspended solids	mg/l				2,3		2,5		2,0		1,2		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				235		280		240		330		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				31,9		63,8		56,7		70,9		
13	NH_3 -N	Amonia	mg/l				0,0		0,3		0,2		0,0		
14	NO_2 -N	Nitrit	mg/l				0,04		0,05		0,20		0,00		
15	NO_3 -N	Nitrate	mg/l				1,75		1,50		0,75		1,75		
16	TKN	Total Kjeldahl Nitrate	mg/l				1,8		1,2		1,0		1,2		
17	DO	Dissolve oxygen	mg/l				7,5		9,1		9,5		8,5		
18	pV	Organic matter	mg/l				3,8		3,2		2,5		1,3		
19	BOD_5	Biological oxygen demand	mg/l				4,7		3,3		5,2		3,2		
20	COD	Chemical oxygen demand	mg/l				28		32		28		24		
21	TH	Total hardness	mg/l $CaCO_3$				260		335		290		350		
22	o-PO_4	Ortho- Phosphate	mg/l				0,00		0,05		0,08		0,00		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				22,0		64,0		86,5		43,2		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				13,3		50,7		48,8		48,6		
29	K	Photasium	mg/l				2,3		7,0		5,1		7,2		
30	Ca	Calcium	mg/l				60,1		70,1		52,1		80,2		
31	Mg	Magnezium	mg/l				26,8		38,9		38,9		36,5		
32	T-Coli	Total Choliform	EMS/100 ml				1000								
33	F-Strp	Fecal Streptekok	EMS/100 ml				300								

34	E-Coli	Esh,Koliform	EMS/100 ml				500								
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,2			0,0		

REGION :DSI 21, Regional Director-
ate,AYDIN
Name of station and location : Büyük Menderes Söke Milas Karayolu Köprüsü
Station number : 07 21 00 096

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		3,800		8,500		3,450		Göllenme		3,500		3,800
2	T	Temperature	° C		23		20		25		32		22		15
3	pH	PH			8,1		7,7		8,1		8,0		8,1		7,5
4	EC	Electrical conductivity	mmhos/cm		1250		1110		1700		1480		1700		1050
5	TDS	Total dissolved solids	mg/l		800		710		1100		950		1100		670
6	SS	Suspended solids	mg/l		1,6		2,3		2,2		2,6		2,5		1,1
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		300		250		325		370		440		310
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		0,0
12	Cl	Clorur	mg/l		109,9		124,1		212,7		212,7		148,9		85,1
13	NH_3 -N	Amonia	mg/l		0,64		0,50		0,00		0,47		0,20		0,50
14	NO_2 -N	Nitrit	mg/l		0,05		0,04		0,00		0,02		0,01		0,01
15	NO_3 -N	Nitrate	mg/l		3,00		2,00		0,00		0,00		2,75		2,25
16	TKN	Total Kjeldahl Nitrate	mg/l		2,2		1,9		2,2		1,8		1,7		1,8
17	DO	Dissolve oxygen	mg/l		8,4		7,7		7,0		8,1		7,1		9,4
18	pV	Organic matter	mg/l		2,4		4,3		4,0		2,0		2,9		5,6
19	BOD_5	Biological oxygen demand	mg/l		3,4		4,6		4,6		6,2		4,2		6,7
20	COD	Chemical oxygen demand	mg/l		28		44		44		32		32		36
21	TH	Total hardness	mg/l $CaCO_3$		550		425		550		500		690		400
22	o-PO_4	Ortho- Phosphate	mg/l		0,14		0,28		0,00		0,22		0,51		0,11

23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		190,0		88,0		398,6		190,0		321,8		148,0
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,070		
27	Mn	Manganese	mg/l										0,011		
28	Na	Sodium	mg/l		38,2		44,0		222,0		157,6		135,2		87,6
29	K	Photasium	mg/l		3,0		3,4		25,2		9,0		13,8		7,2
30	Ca	Calcium	mg/l		100,2		138,2		80,2		62,1		106,2		72,1
31	Mg	Magnezium	mg/l		73,0		60,8		84,4		83,9		103,4		53,5
32	T-Coli	Total Choliform	EMS/100 ml		1000		1500		3000						1000
33	F-Strp	Fecal Streptekok	EMS/100 ml		50		50		5						50
34	E-Coli	Esh,Koliform	EMS/100 ml		500		500		500						500
35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,009		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,064		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,082		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l		0,0		0,0		0,0		1,0		0,2		0,0

REGION :DSI 21, Regional Director-
ate,AYDIN
Name of station and location : Büyük Menderes Söke Regülatörü
Station number : 07 21 00 006

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		36,700		62,000		19,000		35,500		42,000		
2	T	Temperature	° C		23,0		20,0		25,0		32,0		22,0		
3	pH	PH			8,0		7,7		8,1		8,1		8,0		
4	EC	Electrical conductivity	mmhos/cm		1460		670		1400		980		1600		
5	TDS	Total dissolved solids	mg/l		940		430		900		630		1020		
6	SS	Suspended solids	mg/l		1,9		2,8		2,3		1,2		3,3		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		380,0		225,0		350,0		350,0		430,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		

12	Cl	Clorur	mg/l		99,3		49,6		141,8		63,8		124,1		
13	NH_3 -N	Amonia	mg/l		1,07		0,43		0,00		0,00		0,20		
14	NO_2 -N	Nitrit	mg/l		0,080		0,090		0,040		0,080		0,070		
15	NO_3 -N	Nitrate	mg/l		3,00		1,50		0,00		1,25		3,75		
16	TKN	Total Kjeldahl Nitrate	mg/l		1,4		2,0		1,4		1,8		1,5		
17	DO	Dissolve oxygen	mg/l		8,3		7,5		8,3		8,3		7,1		
18	pV	Organic matter	mg/l		2,0		3,8		4,4		1,8		2,7		
19	BOD_5	Biological oxygen demand	mg/l		2,8		4,5		4,6		3,5		2,7		
20	COD	Chemical oxygen demand	mg/l		24,0		40,0		40,0		28,0		32,0		
21	TH	Total hardness	mg/l $CaCO_3$		655,0		290,0		500,0		480,0		675,0		
22	o-PO_4	Ortho- Phosphate	mg/l		1,14		0,40		0,00		0,25		0,42		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		212,0		44,0		296,0		170,0		341,0		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,540		
27	Mn	Manganese	mg/l										0,130		
28	Na	Sodium	mg/l		43,4		22,0		150,0		57,4		132,2		
29	K	Photasium	mg/l		3,0		2,6		22,8		5,8		12,0		
30	Ca	Calcium	mg/l		104,2		70,1		90,2		68,1		136,3		
31	Mg	Magnezium	mg/l		96,1		28,0		66,9		75,4		81,5		
32	T-Coli	Total Choliform	EMS/100 ml		1000		9000		23000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		100		50		50						
34	E-Coli	Esh,Koliform	EMS/100 ml		500		1000		10500						
35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,015		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,016		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,117		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l		0,3		0,0		0,0		0,2		0,2		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Sariçay Baraj Aksi
Station number : 07 21 00 094

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		0,420		1,450								1,450
2	T	Temperature	° C		23		22								15
3	pH	PH			8,1		7,9								7,1
4	EC	Electrical conductivity	mmhos/cm		250		200								180
5	TDS	Total dissolved solids	mg/l		160		130								120
6	SS	Suspended solids	mg/l		1,0		0,9								0,6
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		60		60								55
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0								0,0
12	Cl	Clorur	mg/l		24,8		21,3								17,7
13	NH_3 -N	Amonia	mg/l		0,34		0,38								0,34
14	NO_2 -N	Nitrit	mg/l		0,14		0,01								0,00
15	NO_3 -N	Nitrate	mg/l		0,0		0,5								0,0
16	TKN	Total Kjeldahl Nitrate	mg/l		1,2		2,4								1,8
17	DO	Dissolve oxygen	mg/l		8,7		7,6								9,8
18	pV	Organic matter	mg/l		2,4		9,1								12,8
19	BOD_5	Biological oxygen demand	mg/l		4,0		12,0								7,8
20	COD	Chemical oxygen demand	mg/l		20		56								56
21	TH	Total hardness	mg/l $CaCO_3$		100		90								85
22	o-PO_4	Ortho- Phosphate	mg/l		0,00		0,05								0,00
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		27,4		20,0								27,4
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		7,1		6,0								10,5
29	K	Photasium	mg/l		1,6		1,2								3,5
30	Ca	Calcium	mg/l		36,1		20,5								18,0
31	Mg	Magnezium	mg/l		2,4		9,7								9,7
32	T-Coli	Total Choliform	EMS/100 ml		700		2200								1760
33	F-Strp	Fecal Streptekok	EMS/100 ml		40		20								500

34	E-Coli	Esh,Koliform	EMS/100 ml		50		100								1120
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,0		0,0								0,0

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Büyük Menderes Sarayköy Köprüsü
Station number : 07 21 00 002

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		11,197		6,525		8,749		35,517		9,184		
2	T	Temperature	° C		23		20		26		29		22		
3	pH	PH			7,8		7,6		7,7		8		7,6		
4	EC	Electrical conductivity	mmhos/cm		2090		1890		2100		930		2020		
5	TDS	Total dissolved solids	mg/l		1340		1210		1350		600		1290		
6	SS	Suspended solids	mg/l		3,2		2,7		3,8		3,4		2,2		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		425		400		410		305		500		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		141,8		159,5		212,7		92,2		206,5		
13	NH_3 -N	Amonia	mg/l		1,28		1,62		2,80		0,30		0,85		
14	NO_2 -N	Nitrit	mg/l		0,10		0,36		0,16		0,20		0,47		
15	NO_3 -N	Nitrate	mg/l		3,5		2,0		2,0		1,5		5,0		
16	TKN	Total Kjeldahl Nitrate	mg/l		2,2		2,8		3,1		2,2		2,2		
17	DO	Dissolve oxygen	mg/l		6,9		5,6		5,5		8,2		4,4		
18	pV	Organic matter	mg/l		4,0		6,6		11,2		3,7		3,2		
19	BOD_5	Biological oxygen demand	mg/l		4,1		40,0		106,0		3,8		64,0		
20	COD	Chemical oxygen demand	mg/l		40		148		156		52		180		
21	TH	Total hardness	mg/l $CaCO_3$		990		800		735		355		875		
22	o-PO_4	Ortho- Phosphate	mg/l		1,14		1,14		1,28		1,43		0,57		
23	Top,P	Total phosphour	mg/l												

24	SO_4	Sulphate	mg/l		524		340		454		67		464		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		70,8		82,8		206,0		66,2		152,8		
29	K	Photasium	mg/l		3,8		4,2		15,8		12,2		9,0		
30	Ca	Calcium	mg/l		160,3		160,3		140,3		62,1		180,4		
31	Mg	Magnezium	mg/l		143,5		97,3		93,6		48,6		103,4		
32	T-Coli	Total Choliform	EMS/100 ml		340000		140000		21000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		8000		28000		3300						
34	E-Coli	Esh,Koliform	EMS/100 ml		123000		42000		6500						
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,3		0,2		0,3		0,4		0,0		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Çürüksu Yukari Samli Köprüsü
Station number : 07 21 00 018

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		9,357		5,600		2,008		1,256		7,500		
2	T	Temperature	° C		23		20		26		29		22		
3	pH	PH			7,9		7,7		7,7		8,0		7,7		
4	EC	Electrical conductivity	mmhos/cm		2090		2120		3600		3100		2300		
5	TDS	Total dissolved solids	mg/l		1340		1360		2300		1980		1470		
6	SS	Suspended solids	mg/l		2,9		3,7		2,6		3,8		2,1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		410		400		550		520		490		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		141,8		177,3		531,8		326,1		191,4		

13	NH_3 -N	Amonia	mg/l		1,30		4,80		3,40		1,00		0,70		
14	NO_2 -N	Nitrit	mg/l		0,30		0,20		0,20		0,40		0,30		
15	NO_3 -N	Nitrate	mg/l		3,00		1,80		0,80		3,30		2,80		
16	TKN	Total Kjeldahl Nitrate	mg/l		2,1		2,8		3,8		2,4		2,3		
17	DO	Dissolve oxygen	mg/l		6,9		6,5		2,9		5,4		4,5		
18	pV	Organic matter	mg/l		2,4		8,0		16,0		7,4		3,5		
19	BOD_5	Biological oxygen demand	mg/l		4,7		30,0		126,0		390,0		56,0		
20	COD	Chemical oxygen demand	mg/l		28,0		152,0		160,0		480,0		140,0		
21	TH	Total hardness	mg/l $CaCO_3$		925		900		1025		1175		975		
22	o-PO_4	Ortho- Phosphate	mg/l		1,2		1,0		2,0		1,7		0,6		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		440		420		640		780		638		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		74		81		406		266		190		
29	K	Photasium	mg/l		3,4		3,4		21,8		19,4		8,6		
30	Ca	Calcium	mg/l		160,3		180,4		176,4		164,3		196,4		
31	Mg	Magnezium	mg/l		127,7		109,4		142,3		186,0		118,0		
32	T-Coli	Total Choliform	EMS/100 ml		280000		190000		440000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		4700		34000		46000						
34	E-Coli	Esh,Koliform	EMS/100 ml		82000		43000		180000						
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,0		0,0		0,4		0,3		0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Germencik-Oyuk Baraj Aksi

Station number : 07 21 00 107

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s					0,280		0,006		3,250			
2	T	Temperature	° C					24,0		24,0		24,0			
3	pH	PH						8,1		7,6		7,4			
4	EC	Electrical conductivity	mmhos/cm					740		1430		350			
5	TDS	Total dissolved solids	mg/l					480		920		230			
6	SS	Suspended solids	mg/l					1,6		2,4		1,2			
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$					300		525		145			
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$					0,0		0,0		0,0			
12	Cl	Clorur	mg/l					42,5		184,3		14,2			
13	NH_3 -N	Amonia	mg/l					0,0		0,6		1,4			
14	NO_2 -N	Nitrit	mg/l					0,04		0,02		0,09			
15	NO_3 -N	Nitrate	mg/l					0,50		0,25		0,25			
16	TKN	Total Kjeldahl Nitrate	mg/l					0,9		0,6		1,5			
17	DO	Dissolve oxygen	mg/l					8,6		6,8		9,5			
18	pV	Organic matter	mg/l					1,6		3,4		7,5			
19	BOD_5	Biological oxygen demand	mg/l					3,0		4,0		7,5			
20	COD	Chemical oxygen demand	mg/l					20		48		52			
21	TH	Total hardness	mg/l $CaCO_3$					290		355		135			
22	o-PO_4	Ortho- Phosphate	mg/l					0,00		0,00		0,05			
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l					56,4		62,4		34,0			
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l									0,530			
27	Mn	Manganese	mg/l									0,045			
28	Na	Sodium	mg/l					51,2		211,0		17,9			
29	K	Photasium	mg/l					7,3		15,0		11,1			
30	Ca	Calcium	mg/l					40,1		54,1		28,1			
31	Mg	Magnezium	mg/l					46,2		53,5		15,8			
32	T-Coli	Total Choliform	EMS/100 ml					1200				4900			
33	F-Strp	Fecal Streptekok	EMS/100 ml					5				480			
34	E-Coli	Esh,Koliform	EMS/100 ml					50				2500			

35	Cr	Crom	mg/l									<0,005			
36	Cu	Copper	mg/l									0,015			
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l									0,060			
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l									0,049			
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l									<0,005			
43	B	Boron	mg/l					0,9		3,5		0,0			

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Büyük Menderes Nazilli Köprüsü
Station number : 07 21 00 003

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		22,500		31,000		6,000		30,300		20,400		
2	T	Temperature	° C		23		17		11		32		22		
3	pH	PH			7,9		7,5		7,8		7,9		7,8		
4	EC	Electrical conductivity	mmhos/cm		2090		1550		2060		1250		2130		
5	TDS	Total dissolved solids	mg/l		1340		990		1320		800		1360		
6	SS	Suspended solids	mg/l		3,7		3,4		2,2		1,4		2,1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		530		350		400		355		450		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		141,8		106,4		141,8		120,5		160,0		
13	NH_3 -N	Amonia	mg/l		1,1		0,5		0,2		0,3		0,7		
14	NO_2 -N	Nitrit	mg/l		0,05		0,20		0,05		0,01		0,20		
15	NO_3 -N	Nitrate	mg/l		3,75		3,25		3,75		1,75		5,50		
16	TKN	Total Kjeldahl Nitrate	mg/l		1,8		2,1		2,0		2,1		2,3		
17	DO	Dissolve oxygen	mg/l		7,9		7,1		8,4		8,6		6,6		
18	pV	Organic matter	mg/l		2,8		3,8		4,0		1,8		4,0		
19	BOD_5	Biological oxygen demand	mg/l		4,9		4,4		4,6		4,1		4,4		
20	COD	Chemical oxygen demand	mg/l		24		32		40		24		40		
21	TH	Total hardness	mg/l $CaCO_3$		950		715		710		450		925		
22	o-PO_4	Ortho- Phosphate	mg/l		1,5		0,7		0,6		0,0		0,6		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		468		340		468		192		600		

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		85,2		53,0		170,0		110,2		159,2		
29	K	Photasium	mg/l		6,2		5,0		25,8		11,0		12,6		
30	Ca	Calcium	mg/l		170,3		136,3		140,3		88,2		168,3		
31	Mg	Magnezium	mg/l		127,7		91,2		87,6		55,9		122,8		
32	T-Coli	Total Choliform	EMS/100 ml		28000		140000		24000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		400		1600		50						
34	E-Coli	Esh,Koliform	EMS/100 ml		8000		37000		3000						
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,3		0,2		0,4		0,4		0,3		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : B.Menderes Koçarli Köprüsü
Station number : 07 21 00 005

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		37,800		72,000		15,000		41,400		38,000		
2	T	Temperature	° C		23		20		25		32		22		
3	pH	PH			8,0		7,7		8,1		8,1		8,0		
4	EC	Electrical conductivity	mmhos/cm		1460		730		1400		880		1700		
5	TDS	Total dissolved solids	mg/l		940		470		900		560		1090		
6	SS	Suspended solids	mg/l		2,0		2,4		2,1		1,2		2,7		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		375		210		360		260		470		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		99,3		42,5		106,4		56,7		120,5		
13	NH_3 -N	Amonia	mg/l		1,10		0,50		0,60		0,00		0,20		
14	NO_2 -N	Nitrit	mg/l		0,10		0,10		0,10		0,05		0,30		

15	NO_3 -N	Nitrate	mg/l		2,75		2,00		0,50		1,25		4,25		
16	TKN	Total Kjeldahl Nitrate	mg/l		2,0		1,8		1,9		2,0		1,6		
17	DO	Dissolve oxygen	mg/l		8,6		7,5		7,1		8,2		7,2		
18	pV	Organic matter	mg/l		2,8		3,8		2,8		1,7		3,0		
19	BOD_5	Biological oxygen demand	mg/l		3,8		4,1		3,8		3,6		4,1		
20	COD	Chemical oxygen demand	mg/l		24		32		36		24		32		
21	TH	Total hardness	mg/l $CaCO_3$		655		310		550		380		725		
22	o-PO_4	Ortho- Phosphate	mg/l		0,9		0,5		0,3		0,2		0,6		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		274,0		88,0		320,0		168,1		297,8		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,540		
27	Mn	Manganese	mg/l										0,130		
28	Na	Sodium	mg/l		54,4		24,8		130,0		51,0		105,0		
29	K	Photasium	mg/l		4,2		2,4		25,2		6,2		12,6		
30	Ca	Calcium	mg/l		104,2		40,1		100,2		58,1		120,2		
31	Mg	Magnezium	mg/l		96,1		51,1		73,0		57,2		103,4		
32	T-Coli	Total Choliform	EMS/100 ml		8000		22000		22000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		700		100		100						
34	E-Coli	Esh,Koliform	EMS/100 ml		6000		2000		8000						
35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,008		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,031		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,155		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l		0,3		0,0		0,0		0,2		0,2		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Akçay-Kemer Baraji Dipsavak Çikisi

Station number : 07 21 00 046

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s					10,000		45,000		5,750			
2	T	Temperature	° C					21		24		24			
3	pH	PH						8,1		7,8		7,9			
4	EC	Electrical conductivity	mmhos/cm					500		550		730			
5	TDS	Total dissolved solids	mg/l					320		350		470			
6	SS	Suspended solids	mg/l					1,2		1,7		1,4			
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$					250		275		380			
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$					0,0		0,0		0,0			
12	Cl	Clorur	mg/l					21,3		31,8		28,4			
13	NH_3 -N	Amonia	mg/l					0,3		0,6		0,0			
14	NO_2 -N	Nitrit	mg/l					0,01		0,07		0,01			
15	NO_3 -N	Nitrate	mg/l					0,50		0,75		0,50			
16	TKN	Total Kjeldahl Nitrate	mg/l					0,6		0,9		1,2			
17	DO	Dissolve oxygen	mg/l					10,5		6,7		7,4			
18	pV	Organic matter	mg/l					2,0		3,3		1,4			
19	BOD_5	Biological oxygen demand	mg/l					4,7		3,3		2,7			
20	COD	Chemical oxygen demand	mg/l					20		24		20			
21	TH	Total hardness	mg/l $CaCO_3$					275		290		380			
22	o-PO_4	Ortho- Phosphate	mg/l					0,00		0,02		0,00			
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l					23,2		23,2		27,4			
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,120		
27	Mn	Manganese	mg/l										0,011		
28	Na	Sodium	mg/l					9,3		18,1		25,6			
29	K	Photasium	mg/l					1,4		1,7		2,9			
30	Ca	Calcium	mg/l					40,1		34,1		52,1			
31	Mg	Magnezium	mg/l					42,6		49,0		60,8			
32	T-Coli	Total Choliform	EMS/100 ml												
33	F-Strp	Fecal Streptekok	EMS/100 ml												
34	E-Coli	Esh,Koliform	EMS/100 ml												

35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,011		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,029		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,202		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l					0,0		0,0		0,0			

REGION :DSI 21, Regional Director-
ate,AYDIN
Name of station and location : Büyük Menderes Yenipazar
Köprüsü
Station number : 07 21 00 033

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		26,0		34,5		8,8		64,0		25,7		30,1
2	T	Temperature	° C		23,0		17,0		11,0		32,0		22,0		14,0
3	pH	PH			7,8		7,8		7,9		8,0		7,9		7,4
4	EC	Electrical conductivity	mmhos/cm		2090		1190		2060		930		1810		1720
5	TDS	Total dissolved solids	mg/l		1340		760		1320		600		1160		1100
6	SS	Suspended solids	mg/l		3		3,4		2,4		1,1		2,2		1,8
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		400,0		375,0		410,0		350,0		465,0		450,0
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		0,0
12	Cl	Clorur	mg/l		141,8		99,3		163,1		56,7		124,1		124,1
13	NH_3 -N	Amonia	mg/l		0,85		0,28		1,07		0,00		0,00		1,28
14	NO_2 -N	Nitrit	mg/l		0,050		0,190		0,040		0,010		0,060		0,040
15	NO_3 -N	Nitrate	mg/l		5,50		2,25		2,75		0,75		4,50		4,25
16	TKN	Total Kjeldahl Nitrate	mg/l		2,0		2,0		1,8		1,8		1,8		2,2
17	DO	Dissolve oxygen	mg/l		9,1		7,0		7,0		8,3		6,2		8,9
18	pV	Organic matter	mg/l		2,8		4,2		4,2		1,6		4,3		6,8
19	BOD_5	Biological oxygen demand	mg/l		6,5		4,4		4,8		3,8		4,8		6,9
20	COD	Chemical oxygen demand	mg/l		24,0		32,0		40,0		24,0		40,0		40,0
21	TH	Total hardness	mg/l $CaCO_3$		860,0		550,0		700,0		395,0		825,0		790,0
22	o-PO_4	Ortho- Phosphate	mg/l		1,00		0,34		0,57		0,25		0,42		0,28

23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		400,0		108,0		406,0		86,5		441,9		341,0
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		73,2		36,2		166,0		47,2		127,8		90,0
29	K	Photasium	mg/l		5,2		3,4		20,2		5,2		10,8		11,2
30	Ca	Calcium	mg/l		160,3		100,2		126,3		60,1		148,3		156,3
31	Mg	Magnezium	mg/l		111,9		73,0		93,6		59,6		110,7		97,3
32	T-Coli	Total Choliform	EMS/100 ml		31000		63000		29000						101000
33	F-Strp	Fecal Streptekok	EMS/100 ml		150		2800		50						9100
34	E-Coli	Esh,Koliform	EMS/100 ml		3000		16000		13000						36000
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,3		0,3		0,4		0,3		0,4		0,3

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : 37658 No'lu Kuyu Denizli-Kaklik
Station number : 07 21 10 050

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s						0,055		0,055				
2	T	Temperature	° C						29		27				
3	pH	PH							6,9		6,9				
4	EC	Electrical conductivity	mmhos/cm						1850		1900				
5	TDS	Total dissolved solids	mg/l						1180		1220				
6	SS	Suspended solids	mg/l												
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$						550		500				
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$						0,0		0,0				
12	Cl	Clorur	mg/l						63,8		70,9				

13	NH_3 -N	Amonia	mg/l						0,0		0,0				
14	NO_2 -N	Nitrit	mg/l						0,0		0,0				
15	NO_3 -N	Nitrate	mg/l						0,0		0,0				
16	TKN	Total Kjeldahl Nitrate	mg/l												
17	DO	Dissolve oxygen	mg/l												
18	pV	Organic matter	mg/l						0,0		1,4				
19	BOD_5	Biological oxygen demand	mg/l												
20	COD	Chemical oxygen demand	mg/l						8,0		16,0				
21	TH	Total hardness	mg/l $CaCO_3$						1105		1100				
22	o-PO_4	Ortho- Phosphate	mg/l						0,0		0,0				
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l						489,9		523,5				
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l						10,4		12,4				
29	K	Photasium	mg/l						2		2				
30	Ca	Calcium	mg/l						144,3		320,6				
31	Mg	Magnezium	mg/l						181,2		73,0				
32	T-Coli	Total Choliform	EMS/100 ml												
33	F-Strp	Fecal Streptekok	EMS/100 ml												
34	E-Coli	Esh,Koliform	EMS/100 ml												
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l						0,0		0,0				

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : 44178 No'lu Kuyu Denizli-Honaz-Kizilyer

Station number : 07 21 10 105

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s						0,034		0,033				
2	T	Temperature	° C						27		29				
3	pH	PH							7,2		7,3				
4	EC	Electrical conductivity	mmhos/cm						1630		1680				
5	TDS	Total dissolved solids	mg/l						1040		1080				
6	SS	Suspended solids	mg/l												
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$						225		200				
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$						0,0		0,0				
12	Cl	Clorur	mg/l						127,6		74,4				
13	NH_3 -N	Amonia	mg/l						0,0		0,0				
14	NO_2 -N	Nitrit	mg/l						0,0		0,0				
15	NO_3 -N	Nitrate	mg/l						0,0		0,5				
16	TKN	Total Kjeldahl Nitrate	mg/l												
17	DO	Dissolve oxygen	mg/l												
18	pV	Organic matter	mg/l						1,6		0,0				
19	BOD_5	Biological oxygen demand	mg/l												
20	COD	Chemical oxygen demand	mg/l						20		4				
21	TH	Total hardness	mg/l $CaCO_3$						980		1000				
22	o-PO_4	Ortho- Phosphate	mg/l						0,05		0,00				
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l						586,0		710,8				
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,050		
27	Mn	Manganese	mg/l										<0,005		
28	Na	Sodium	mg/l						6,4		11,8				
29	K	Photasium	mg/l						1,4		2,0				
30	Ca	Calcium	mg/l						286,6		278,6				
31	Mg	Magnezium	mg/l						100,9		86,3				
32	T-Coli	Total Choliform	EMS/100 ml												
33	F-Strp	Fecal Streptekok	EMS/100 ml												
34	E-Coli	Esh,Koliform	EMS/100 ml												

35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,005		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,016		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										<0,005		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l						0,0		0,4				

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Büyük Menderes Kabakli Regülatörü
Station number : 07 21 00 020

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				3,884		2,077		1,856		2,837		
2	T	Temperature	° C				19,0		21,0		29,0		19,0		
3	pH	PH					7,6		7,9		7,5		7,7		
4	EC	Electrical conductivity	mmhos/cm				500		500		500		480		
5	TDS	Total dissolved solids	mg/l				320		320		320		310		
6	SS	Suspended solids	mg/l				1		1,8		1		1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				240,0		235,0		245,0		230,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				14,2		24,8		17,7		10,6		
13	NH_3 -N	Amonia	mg/l				1,07		2,50		0,38		0,47		
14	NO_2 -N	Nitrit	mg/l				0,060		0,070		0,180		0,050		
15	NO_3 -N	Nitrate	mg/l				0,80		0,30		1,30		1,30		
16	TKN	Total Kjeldahl Nitrate	mg/l				1,7		2,0		1,4		1,0		
17	DO	Dissolve oxygen	mg/l				8,8		9,2		6,7		7,8		
18	pV	Organic matter	mg/l				6,2		4,8		2,6		2,4		
19	BOD_5	Biological oxygen demand	mg/l				6,7		5,1		2,7		3,2		
20	COD	Chemical oxygen demand	mg/l				100,0		80,0		44,0		36,0		
21	TH	Total hardness	mg/l $CaCO_3$				240,0		240,0		255,0		225,0		
22	o-PO_4	Ortho- Phosphate	mg/l				0,20		0,34		0,30		0,42		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				4,0		4,4		12,8		8,8		

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				6,4		8,5		7,9		8,0		
29	K	Photasium	mg/l				1,9		2,4		2,0		1,9		
30	Ca	Calcium	mg/l				76,2		62,1		66,1		70,1		
31	Mg	Magnezium	mg/l				12,2		20,7		21,9		12,2		
32	T-Coli	Total Choliform	EMS/100 ml				100000								
33	F-Strp	Fecal Streptekok	EMS/100 ml				10000								
34	E-Coli	Esh,Koliform	EMS/100 ml				11500								
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Büyük Menderes Isikli Gölü Su Alma Yapisi

Station number : 07 21 00 021

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				21,000		4,480		4,200		8,650		
2	T	Temperature	° C				19,0		21,0		29,0		19,0		
3	pH	PH					7,9		8,0		8,2		8,0		
4	EC	Electrical conductivity	mmhos/cm				450		360		300		430		
5	TDS	Total dissolved solids	mg/l				290		230		190		280		
6	SS	Suspended solids	mg/l				1,1		1,3		0,8		1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				200,0		170,0		120,0		210,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				17,7		17,7		21,3		21,3		
13	NH_3 -N	Amonia	mg/l				0,64		0,00		0,14		0,43		
14	NO_2 -N	Nitrit	mg/l				0,010		0,000		0,020		0,000		

15	NO_3 -N	Nitrate	mg/l				0,00		1,00		0,00		0,00		
16	TKN	Total Kjeldahl Nitrate	mg/l				1,5		1,4		0,6		1,0		
17	DO	Dissolve oxygen	mg/l				10,9		7,1		7,7		8,4		
18	pV	Organic matter	mg/l				6,0		3,8		2,1		4,2		
19	BOD_5	Biological oxygen demand	mg/l				7,2		4,0		3,3		5,0		
20	COD	Chemical oxygen demand	mg/l				60,0		36,0		36,0		32,0		
21	TH	Total hardness	mg/l $CaCO_3$				220,0		160,0		130,0		180,0		
22	o-PO_4	Ortho- Phosphate	mg/l				0,00		0,00		0,00		0,00		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				25,6		14,8		21,2		4,8		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				10,0		18,6		17,0		24,0		
29	K	Photasium	mg/l				2,4		4,0		2,6		3,8		
30	Ca	Calcium	mg/l				60,1		40,1		20,0		30,1		
31	Mg	Magnezium	mg/l				17,0		14,6		19,5		25,5		
32	T-Coli	Total Choliform	EMS/100 ml				100								
33	F-Strp	Fecal Streptekok	EMS/100 ml				5								
34	E-Coli	Esh,Koliform	EMS/100 ml				50								
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0								

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Ikizdere Baraj Aks Yeri (Menba)

Station number : 07 21 00 037

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s			1,650			1,300				4,300		2,000
2	T	Temperature	° C			22			25				22		15
3	pH	PH				7,9			7,9				7,6		7,8
4	EC	Electrical conductivity	mmhos/cm			410			460				570		350
5	TDS	Total dissolved solids	mg/l			260			290				360		220
6	SS	Suspended solids	mg/l			1,2			0,8				2,4		0,5
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$			175			210				230		250
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$			0,0			0,0				0,0		0,0
12	Cl	Clorur	mg/l			14,2			17,7				28,4		21,3
13	NH_3 -N	Amonia	mg/l			0,00			0,00				0,34		0,14
14	NO_2 -N	Nitrit	mg/l			0,08			0,00				0,02		0,01
15	NO_3 -N	Nitrate	mg/l			1,3			0,5				0,5		1,5
16	TKN	Total Kjeldahl Nitrate	mg/l			0,8			0,8				1,0		0,8
17	DO	Dissolve oxygen	mg/l			8,7			8,0				8,4		9,9
18	pV	Organic matter	mg/l			3,8			0,5				1,4		3,5
19	BOD_5	Biological oxygen demand	mg/l			5,7			2,2				3,5		3,7
20	COD	Chemical oxygen demand	mg/l			24			4				16		20
21	TH	Total hardness	mg/l $CaCO_3$			200			215				255		185
22	o-PO_4	Ortho- Phosphate	mg/l			0,0			0,0				0,0		0,0
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l			33,0			25,2				44,0		19,2
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										1,430		
27	Mn	Manganese	mg/l										0,305		
28	Na	Sodium	mg/l			6,5			16,9				21,4		9,2
29	K	Photasium	mg/l			2,0			4,7				5,8		4,3
30	Ca	Calcium	mg/l			40,1			40,1				56,1		42,1
31	Mg	Magnezium	mg/l			24,3			28,0				28,0		19,5
32	T-Coli	Total Choliform	EMS/100 ml			2400			1300						200
33	F-Strp	Fecal Streptekok	EMS/100 ml			70			250						20
34	E-Coli	Esh,Koliform	EMS/100 ml			900			800						100

35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,012		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,081		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,026		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l			0,0			0,0				0,0		0,0

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Ilçayi Hidirbeyli Göleti Aks Yeri
Station number : 07 21 00 091

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s					0,025		0,220		6,500			
2	T	Temperature	° C					24		24		24			
3	PH	PH						8,0		7,9		7,4			
4	EC	Electrical conductivity	mmhos/cm					1640		1220		320			
5	TDS	Total dissolved solids	mg/l					1050		780		210			
6	SS	Suspended solids	mg/l					1,8		1,8		2,2			
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$					485		390		110			
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$					0,0		0,0		0,0			
12	Cl	Clorur	mg/l					212,7		159,5		21,3			
13	NH_3 –N	Amonia	mg/l					0,28		1,07		3,00			
14	NO_2 –N	Nitrit	mg/l					0,04		0,09		0,09			
15	NO_3 –N	Nitrate	mg/l					0,50		1,75		1,50			
16	TKN	Total Kjeldahl Nitrate	mg/l					0,9		0,6		1,5			
17	DO	Dissolve oxygen	mg/l					8,0		8,5		9,5			
18	PV	Organic matter	mg/l					2,4		4,0		7,5			
19	BOD_5	Biological oxygen demand	mg/l					2,8		4,9		7,5			
20	COD	Chemical oxygen demand	mg/l					44		48		52			
21	TH	Total hardness	mg/l $CaCO_3$					375		320		110			
22	o-PO_4	Ortho- Phosphate	mg/l					0,0		0,3		0,1			
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l					106,0		86,5		23,2			

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,600		
27	Mn	Manganese	mg/l										0,054		
28	Na	Sodium	mg/l					223,0		164,0		18,4			
29	K	Photasium	mg/l					17,2		11,4		9,6			
30	Ca	Calcium	mg/l					60,1		50,1		28,1			
31	Mg	Magnezium	mg/l					54,7		47,4		9,7			
32	T-Coli	Total Choliform	EMS/100 ml					2200				200			
33	F-Strp	Fecal Streptekok	EMS/100 ml					120				5			
34	E-Coli	Esh,Koliform	EMS/100 ml					200				100			
35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,016		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,034		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,054		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l					7,5		3,2		0,0			

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : B.Menderes Feslek Regülatörü

Station number : 07 21 00 055

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		20,600		28,500		16,500		52,500		15,500		20,400
2	T	Temperature	° C		23		17		11		32		22		20
3	pH	PH			8,0		7,9		7,8		7,9		7,7		7,5
4	EC	Electrical conductivity	mmhos/cm		1880		1900		1930		1140		2300		2170
5	TDS	Total dissolved solids	mg/l		1200		1220		1250		730		1470		1390
6	SS	Suspended solids	mg/l		2,8		4,2		2,9		2,2		2,2		3,0
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		300		425		490		285		598		520
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		0,0
12	Cl	Clorur	mg/l		124,1		159,5		159,5		109,9		166,6		141,8
13	NH_3 -N	Amonia	mg/l		0,64		2,00		1,07		0,00		0,43		3,10
14	NO_2 -N	Nitrit	mg/l		0,06		0,14		0,10		0,07		0,28		0,06

15	NO_3 -N	Nitrate	mg/l		5,00		2,25		2,75		1,50		5,00		6,50
16	TKN	Total Kjeldahl Nitrate	mg/l		2,4		2,1		2,1		2,0		2,1		2,4
17	DO	Dissolve oxygen	mg/l		8,1		7,0		8,7		8,0		6,2		8,8
18	pV	Organic matter	mg/l		2,6		3,4		4,4		1,6		4,8		6,4
19	BOD_5	Biological oxygen demand	mg/l		4,8		4,6		5,7		3,5		5,2		6,6
20	COD	Chemical oxygen demand	mg/l		28		44		52		36		56		52
21	TH	Total hardness	mg/l $CaCO_3$		805		825		665		440		1000		1000
22	o-PO_4	Ortho- Phosphate	mg/l		0,57		0,34		0,57		0,17		0,28		0,34
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		490,0		320,0		320,0		212,0		619,2		417,9
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		72,4		75,2		174,0		89,2		175,2		75,0
29	K	Photasium	mg/l		5,2		5,6		10,4		8,8		11,0		13,6
30	Ca	Calcium	mg/l		100,2		160,3		120,2		84,2		220,4		170,3
31	Mg	Magnezium	mg/l		135,0		103,4		88,8		55,9		109,4		139,8
32	T-Coli	Total Choliform	EMS/100 ml		74000		200000		24000						320000
33	F-Strp	Fecal Streptekok	EMS/100 ml		900		700		300						4100
34	E-Coli	Esh,Koliform	EMS/100 ml		50000		13000		9000						57000
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,8		0,6		0,6		0,8		0,6		0,9

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Dokuzsele (Demirler) Çayi

Station number : 07 21 00 060

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				1,546		0,589		0,308		0,633		
2	T	Temperature	° C				19,0		21,0		23,0		19,0		
3	pH	PH					7,5		7,8		7,7		7,6		
4	EC	Electrical conductivity	mmhos/cm				1590		3480		4900		1140		
5	TDS	Total dissolved solids	mg/l				1020		2250		3140		730		
6	SS	Suspended solids	mg/l				2,6		3,6		4,0		3,8		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				330,0		810,0		1050,0		375,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				276,5		659,4		943,0		141,8		
13	NH_3 -N	Amonia	mg/l				11,00		50,00		85,00		4,30		
14	NO_2 -N	Nitrit	mg/l				0,02		0,00		0,00		0,09		
15	NO_3 -N	Nitrate	mg/l				0,00		0,50		0,00		0,30		
16	TKN	Total Kjeldahl Nitrate	mg/l				3,40		6,20		4,20		5,40		
17	DO	Dissolve oxygen	mg/l				2,6		1,4		2,5		2,4		
18	pV	Organic matter	mg/l				25,6		51,2		50,6		21,6		
19	BOD_5	Biological oxygen demand	mg/l				106		380		140		170		
20	COD	Chemical oxygen demand	mg/l				220		520		368		400		
21	TH	Total hardness	mg/l $CaCO_3$				470		400		475		330		
22	o-PO_4	Ortho- Phosphate	mg/l				0,2		2,3		2,2		0,3		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				20,0		128,0		190,0		86,5		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				114,8		619,0		970,0		135,0		
29	K	Photasium	mg/l				9,8		63,0		74,0		18,9		
30	Ca	Calcium	mg/l				90,2		90,2		120,2		80,2		
31	Mg	Magnezium	mg/l				59,6		42,6		42,6		31,6		
32	T-Coli	Total Choliform	EMS/100 ml				2200000						1010000		
33	F-Strp	Fecal Streptekok	EMS/100 ml				38000						11000		
34	E-Coli	Esh,Koliform	EMS/100 ml				720000						50000		

35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Dandalas Çayi Basaran-Azizabat Köprüsü
Station number : 07 21 00 074

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		1,550		1,850		0,420		0,120		1,250		1,750
2	T	Temperature	° C		23		17		11		32		22		14
3	pH	PH			8,1		7,7		7,9		7,9		7,9		7,7
4	EC	Electrical conductivity	mmhos/cm		820		740		1720		1350		1120		920
5	TDS	Total dissolved solids	mg/l		520		470		1100		860		720		590
6	SS	Suspended solids	mg/l		1,8		1,4		2,6		2		1,3		0,8
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		300		240		375		290		300		325
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		0,0
12	Cl	Clorur	mg/l		39,0		42,5		120,5		88,6		70,9		28,4
13	NH_3 -N	Amonia	mg/l		0,64		0,00		0,00		0,00		0,00		0,30
14	NO_2 -N	Nitrit	mg/l		0,06		0,06		0,02		0,04		0,07		0,07
15	NO_3 -N	Nitrate	mg/l		3,50		0,75		0,50		1,00		2,00		2,00
16	TKN	Total Kjeldahl Nitrate	mg/l		1,2		1,8		2,2		1,8		1,4		1,4
17	DO	Dissolve oxygen	mg/l		8,1		9,4		8,9		10,9		8,2		11,4
18	pV	Organic matter	mg/l		1,6		2,0		4,2		1,5		2,4		7,7
19	BOD_5	Biological oxygen demand	mg/l		2,0		2,3		4,5		5,7		4,2		8,8
20	COD	Chemical oxygen demand	mg/l		24		40		52		24		28		48
21	TH	Total hardness	mg/l $CaCO_3$		400		360		750		620		525		450
22	o-PO_4	Ortho- Phosphate	mg/l		0,0		0,0		0,0		0,0		0,0		0,0
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		8,5		94,0		468,0		398,6		235,3		148,0

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		10,9		9,2		126,4		82,8		43,2		20,9
29	K	Photasium	mg/l		1,8		2,0		19,8		13,0		6,0		7,5
30	Ca	Calcium	mg/l		50,1		100,2		132,3		110,4		120,2		106,2
31	Mg	Magnezium	mg/l		66,9		26,8		102,1		83,9		54,7		45,0
32	T-Coli	Total Choliform	EMS/100 ml		7000		14000		21000						37000
33	F-Strp	Fecal Streptekok	EMS/100 ml		50		50		50						1200
34	E-Coli	Esh,Koliform	EMS/100 ml		1000		500		11000						6000
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,8		0,0		0,3		0,4		0,0		0,0

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Büyük Menderes Çubukdag Köprüsü

Station number : 07 21 00 030

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		20,600		28,500		16,500		52,500		15,500		20,400
2	T	Temperature	° C		23		17		11		25		22		14
3	pH	PH			7,8		7,7		7,7		7,9		7,6		7,5
4	EC	Electrical conductivity	mmhos/cm		2190		1900		1900		1300		2230		2230
5	TDS	Total dissolved solids	mg/l		1400		1220		1220		830		1430		1430
6	SS	Suspended solids	mg/l		3,4		4,3		3,1		1,3		2,6		2,6
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		450		480		390		300		520		526
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		0,0
12	Cl	Clorur	mg/l		141,8		113,4		163,1		107,7		163,1		163,1
13	NH_3 -N	Amonia	mg/l		1,20		2,40		1,07		0,00		0,90		3,60
14	NO_2 -N	Nitrit	mg/l		0,06		0,20		0,09		0,08		0,25		0,12

15	NO_3 -N	Nitrate	mg/l		5,50		1,75		2,75		1,50		1,75		6,25
16	TKN	Total Kjeldahl Nitrate	mg/l		2,2		2,1		2,0		1,8		3,2		2,6
17	DO	Dissolve oxygen	mg/l		7,0		7,0		7,0		7,3		3,2		8,8
18	pV	Organic matter	mg/l		2,8		3,4		4,8		2,0		4,1		6,4
19	BOD_5	Biological oxygen demand	mg/l		4,5		5,0		5,0		3,4		90,0		6,6
20	COD	Chemical oxygen demand	mg/l		28		28		52		40		140		48
21	TH	Total hardness	mg/l $CaCO_3$		1025		995		625		545		1000		1030
22	o-PO_4	Ortho- Phosphate	mg/l		1,00		0,45		0,57		0,20		0,71		0,28
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		548,0		340,0		440,0		296,0		562,0		465,9
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		75,0		72,4		204,0		89,6		158,0		94,0
29	K	Photasium	mg/l		5,8		5,0		20,4		8,6		11,6		12,0
30	Ca	Calcium	mg/l		200,4		160,3		100,2		84,2		180,4		190,4
31	Mg	Magnezium	mg/l		127,7		105,8		91,2		81,5		133,8		135,0
32	T-Coli	Total Choliform	EMS/100 ml		120000		140000		29000						280000
33	F-Strp	Fecal Streptekok	EMS/100 ml		750		5000		2400						1300
34	E-Coli	Esh,Koliform	EMS/100 ml		43000		64000		12000						61000
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,6		0,4		0,8		0,4		0,6		0,9

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location: Çine Çayi - Eski Çine Köprüsü

Station number : 07 21 00 035

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				8,200		2,560		0,380		4,750		
2	T	Temperature	° C				18,0		26,0		32,0		23,0		
3	pH	PH					7,6		7,9		8,1		8,0		
4	EC	Electrical conductivity	mmhos/cm				380		500		470		520		
5	TDS	Total dissolved solids	mg/l				240		320		300		330		
6	SS	Suspended solids	mg/l				2,4		1,1		1,3		1,1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				150,0		210,0		200,0		260,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				17,7		39,0		39,0		21,3		
13	NH_3 -N	Amonia	mg/l				0,20		0,00		0,00		0,00		
14	NO_2 -N	Nitrit	mg/l				0,030		0,010		0,000		0,010		
15	NO_3 -N	Nitrate	mg/l				1,30		1,50		0,30		1,50		
16	TKN	Total Kjeldahl Nitrate	mg/l				1,6		1,2		0,9		1,5		
17	DO	Dissolve oxygen	mg/l				10,1		7,1		9,5		7,1		
18	pV	Organic matter	mg/l				4,2		2,7		1,0		2,5		
19	BOD_5	Biological oxygen demand	mg/l				5,0		3,1		5,6		3,0		
20	COD	Chemical oxygen demand	mg/l				36,0		32,0		8,0		28,0		
21	TH	Total hardness	mg/l $CaCO_3$				190,0		235,0		225,0		250,0		
22	o-PO_4	Ortho- Phosphate	mg/l				0,05		0,00		0,22		0,00		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				40,0		22,0		33,6		24,0		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,100		
27	Mn	Manganese	mg/l										0,055		
28	Na	Sodium	mg/l				6,2		24,0		24,6		20,8		
29	K	Photasium	mg/l				1,4		3,8		4,0		3,1		
30	Ca	Calcium	mg/l				60,1		52,1		46,1		77,5		
31	Mg	Magnezium	mg/l				9,7		25,5		26,8		14,6		
32	T-Coli	Total Choliform	EMS/100 ml				14000						18800		
33	F-Strp	Fecal Streptekok	EMS/100 ml				440						390		
34	E-Coli	Esh,Koliform	EMS/100 ml				1100						3600		

35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,010		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,014		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,041		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Yatagan-Bayir Baraj Aksi
Station number : 07 21 00 130

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s					0,017							
2	T	Temperature	° C					21					23		
3	pH	PH						7,8					7,6		
4	EC	Electrical conductivity	mmhos/cm					530					650		
5	TDS	Total dissolved solids	mg/l					340					420		
6	SS	Suspended solids	mg/l					1,2					1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$					230					335		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$					0,0					0,0		
12	Cl	Clorur	mg/l					34,8					31,9		
13	NH_3 -N	Amonia	mg/l					0,00					0,00		
14	NO_2 -N	Nitrit	mg/l					0,01					0,00		
15	NO_3 -N	Nitrate	mg/l					0,00					0,25		
16	TKN	Total Kjeldahl Nitrate	mg/l					0,6					1,3		
17	DO	Dissolve oxygen	mg/l					8,0					7,1		
18	pV	Organic matter	mg/l					0,5					2,6		
19	BOD_5	Biological oxygen demand	mg/l					3,8					4,0		
20	COD	Chemical oxygen demand	mg/l					20					24		
21	TH	Total hardness	mg/l $CaCO_3$					250					350		
22	o-PO_4	Ortho- Phosphate	mg/l					0,0					0,0		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l					17,0					24,0		

25	CO_2	Carbondioxite	mg/l											
26	Fe	Iron	mg/l									0,130		
27	Mn	Manganese	mg/l									0,663		
28	Na	Sodium	mg/l					9,7				19,1		
29	K	Photasium	mg/l					1,1				5,3		
30	Ca	Calcium	mg/l					80,2				104,2		
31	Mg	Magnezium	mg/l					12,2				21,9		
32	T-Coli	Total Choliform	EMS/100 ml					1500						
33	F-Strp	Fecal Streptekok	EMS/100 ml					50						
34	E-Coli	Esh,Koliform	EMS/100 ml					75						
35	Cr	Crom	mg/l									<0,005		
36	Cu	Copper	mg/l									0,006		
37	CN	Cyanide	mg/l											
38	Pb	Lead	mg/l									0,070		
39	As	Arsenic	mg/l											
40	Zn	Zinc	mg/l									0,012		
41	Hg	Mercury	mg/l											
42	Cd	Cadmium	mg/l									<0,005		
43	B	Boron	mg/l					0,0				0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Banaz Çayi (Dokuzsele) Karismadan

Station number : 07 21 00 061

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				1,546		0,589		0,308		0,633		
2	T	Temperature	° C				19,0		21,0		23,0		19,0		
3	pH	PH					7,6		7,2		7,0		7,4		
4	EC	Electrical conductivity	mmhos/cm				710		750		830		800		
5	TDS	Total dissolved solids	mg/l				450		480		530		510		
6	SS	Suspended solids	mg/l				1,9		1,8		1,8		3,2		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				325		335		350		350		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				24,8		35,5		28,4		31,9		
13	NH_3 -N	Amonia	mg/l				0,3		0,2		0,5		0,4		
14	NO_2 -N	Nitrit	mg/l				0,01		0,00		0,01		0,00		

15	NO_3 -N	Nitrate	mg/l				1,5		1,3		2,3		2,3		
16	TKN	Total Kjeldahl Nitrate	mg/l				2,1		1,6		1,1		1,0		
17	DO	Dissolve oxygen	mg/l				10,5		7,7		7,6		8,0		
18	pV	Organic matter	mg/l				3,0		1,6		0,8		2,2		
19	BOD_5	Biological oxygen demand	mg/l				5,1		2,3		2,9		3,6		
20	COD	Chemical oxygen demand	mg/l				52		44		52		48		
21	TH	Total hardness	mg/l $CaCO_3$				375		365		340		375		
22	o-PO_4	Ortho- Phosphate	mg/l				0,00		0,05		0,00		0,34		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				50,4		34,0		44,0		52,8		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				8,9		23,6		34,2		25,6		
29	K	Photasium	mg/l				1,4		3,8		5,0		5,0		
30	Ca	Calcium	mg/l				86,2		78,2		62,1		90,2		
31	Mg	Magnezium	mg/l				38,9		41,3		45,0		36,5		
32	T-Coli	Total Choliform	EMS/100 ml				14000						20000		
33	F-Strp	Fecal Streptekok	EMS/100 ml				50						150		
34	E-Coli	Esh,Koliform	EMS/100 ml				4600						500		
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Büyük Menderes Balat-Tuzburgazi Karayolu Köprüsü

Station number : 07 21 00 040

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		4,5		9,5						4,0		4,6
2	T	Temperature	° C		23,0		20,0				32,0		22,0		15,0
3	pH	PH			7,8		7,7				7,9		8,0		7,3
4	EC	Electrical conductivity	mmhos/cm		2090		2450				2000		2070		2870
5	TDS	Total dissolved solids	mg/l		1340		1570				1280		1320		1840
6	SS	Suspended solids	mg/l		3,6		1,5				1,9		3,4		2,6
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		425,0		300,0				457,6		485,0		325,0
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0				0,0		0,0		0,0
12	Cl	Clorur	mg/l		301,3		471,5				340,3		248,2		723,2
13	NH_3 -N	Amonia	mg/l		0,90		0,30				0,60		0,80		0,50
14	NO_2 -N	Nitrit	mg/l		0,050		0,030				0,090		0,010		0,030
15	NO_3 -N	Nitrate	mg/l		5,00		2,30				0,30		2,80		1,80
16	TKN	Total Kjeldahl Nitrate	mg/l		1,8		2,0				1,7		1,7		2,0
17	DO	Dissolve oxygen	mg/l		8,6		6,9				6,7		7,1		9,6
18	pV	Organic matter	mg/l		2,0		3,8				2,4		3,3		5,4
19	BOD_5	Biological oxygen demand	mg/l		3,6		4,4				5,2		4,4		6,0
20	COD	Chemical oxygen demand	mg/l		28,0		44,0				32,0		28,0		36,0
21	TH	Total hardness	mg/l $CaCO_3$		920,0		800,0				605,0		725,0		630,0
22	o-PO_4	Ortho- Phosphate	mg/l		0,30		0,30				0,90		0,40		0,10
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		290,0		148,0				249,8		297,8		148,0
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,070		
27	Mn	Manganese	mg/l										0,010		
28	Na	Sodium	mg/l		98,8		155,2				224,0		190,4		412,0
29	K	Photasium	mg/l		4,4		4,8				10,4		13,4		11,4
30	Ca	Calcium	mg/l		160,3		90,2				64,1		104,2		86,2
31	Mg	Magnezium	mg/l		126,5		139,8				108,2		113,1		100,9
32	T-Coli	Total Choliform	EMS/100 ml		1000		6000								1000
33	F-Strp	Fecal Streptekok	EMS/100 ml		50		50								150
34	E-Coli	Esh,Koliform	EMS/100 ml		500		500								500

35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										0,005		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,041		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,023		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l		0,0		0,0				0,4		0,2		0,0

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : B.Menderes Aydin Köprüsü
Station number : 07 21 00 004

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		33,600		53,000		12,500		56,000		33,500		
2	T	Temperature	° C		23,0		18,0		25,0		32,0		22,0		
3	pH	PH			7,9		7,6		8,0		8,1		7,9		
4	EC	Electrical conductivity	mmhos/cm		1880		1040		1800		930		1650		
5	TDS	Total dissolved solids	mg/l		1200		670		1150		600		1060		
6	SS	Suspended solids	mg/l		2,3		2,7		2		1,2		1,8		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		400		270		375		290		485		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		141,8		152,4		141,8		60,3		124,1		
13	NH_3 -N	Amonia	mg/l		1,07		0,43		0,50		0,00		0,00		
14	NO_2 -N	Nitrit	mg/l		0,08		0,10		0,01		0,01		0,09		
15	NO_3 -N	Nitrate	mg/l		2,5		2,5		0,5		1,3		3,8		
16	TKN	Total Kjeldahl Nitrate	mg/l		2,0		2,0		2,1		2,0		2,1		
17	DO	Dissolve oxygen	mg/l		9,3		7,1		7,9		8,3		6,8		
18	pV	Organic matter	mg/l		1,4		4,5		2,4		2,1		3,4		
19	BOD_5	Biological oxygen demand	mg/l		5,1		4,6		2,9		4,0		3,6		
20	COD	Chemical oxygen demand	mg/l		20		40		36		28		36		
21	TH	Total hardness	mg/l $CaCO_3$		800		480		590		440		725		
22	o-PO_4	Ortho- Phosphate	mg/l		1,0		0,6		0,2		0,2		0,6		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		320,0		88,0		468,0		192,1		211,3		

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		64,4		38,2		212,0		53,2		73,6		
29	K	Photasium	mg/l		4,6		3,2		29,8		5,8		12,6		
30	Ca	Calcium	mg/l		140,3		80,2		106,2		76,2		130,3		
31	Mg	Magnezium	mg/l		109,4		68,1		79,0		60,8		97,3		
32	T-Coli	Total Choliform	EMS/100 ml		13000		33000		25000						
33	F-Strp	Fecal Streptekok	EMS/100 ml		1000		50		50						
34	E-Coli	Esh,Koliform	EMS/100 ml		200		7000		5500						
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,3		0,0		0,3		0,2		0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Büyük Menderes Akkent-Bekilli Köprüsü

Station number : 07 21 00 066

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s				19,985		3,723		3,420		6,350		
2	T	Temperature	° C				19,0		21,0		23,0		19,0		
3	pH	PH					7,8		7,9		8,2		7,8		
4	EC	Electrical conductivity	mmhos/cm				500		520		600		500		
5	TDS	Total dissolved solids	mg/l				320		330		380		320		
6	SS	Suspended solids	mg/l				1,3		1,6		1,5		2,4		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				230		240		225		205		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				21,3		28,4		42,5		21,3		
13	NH_3 -N	Amonia	mg/l				0,1		0,0		1,3		0,4		
14	NO_2 -N	Nitrit	mg/l				0,01		0,00		0,01		0,00		

15	NO_3 -N	Nitrate	mg/l				0,3		0,5		0,5		1,0		
16	TKN	Total Kjeldahl Nitrate	mg/l				2,0		1,5		0,9		1,4		
17	DO	Dissolve oxygen	mg/l				9,6		8,2		9,0		7,4		
18	pV	Organic matter	mg/l				6,0		3,2		2,8		3,0		
19	BOD_5	Biological oxygen demand	mg/l				6,8		3,7		3,1		3,4		
20	COD	Chemical oxygen demand	mg/l				56		48		40		32		
21	TH	Total hardness	mg/l $CaCO_3$				240		245		205		180		
22	o-PO_4	Ortho- Phosphate	mg/l				0,00		0,05		0,00		0,00		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				25,6		34,0		54,0		28,8		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				13,8		11,5		57,8		32,8		
29	K	Photasium	mg/l				2,3		3,8		4,2		3,8		
30	Ca	Calcium	mg/l				56,1		34,1		26,1		50,1		
31	Mg	Magnezium	mg/l				24,3		38,9		34,0		13,4		
32	T-Coli	Total Choliform	EMS/100 ml				45000						11000		
33	F-Strp	Fecal Streptekok	EMS/100 ml				800						50		
34	E-Coli	Esh,Koliform	EMS/100 ml				1400						500		
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

REGION :DSI 21, Regional Directorate,AYDIN

Name of station and location : Gökpinar Çayi-Akhan Regülatörü

Station number : 07 21 00 001

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		0,957		0,750		0,275		0,59		0,925		
2	T	Temperature	° C		23		20		26		29		22		
3	pH	PH			8,1		7,8		8,2		8		7,5		
4	EC	Electrical conductivity	mmhos/cm		1250		1340		2700		1020		1220		
5	TDS	Total dissolved solids	mg/l		800		860		1730		650		780		
6	SS	Suspended solids	mg/l		2		2		1		2,2		2,4		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$		450		410		550		390		425		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l		92,2		78		482,1		56,7		88,6		
13	NH_3 -N	Amonia	mg/l		2,9		3,2		0,9		6,0		12,8		
14	NO_2 -N	Nitrit	mg/l		0,04		0,00		0,00		0,60		0,00		
15	NO_3 -N	Nitrate	mg/l		0,00		0,00		0,00		1,75		0,00		
16	TKN	Total Kjeldahl Nitrate	mg/l		4,6		5,3		4,6		2,6		4,6		
17	DO	Dissolve oxygen	mg/l		4,1		3,1		0,8		2,4		1,2		
18	pV	Organic matter	mg/l		7,6		30,4		37,1		11,7		13,9		
19	BOD_5	Biological oxygen demand	mg/l		40,0		240,0		120,0		330,0		280,0		
20	COD	Chemical oxygen demand	mg/l		120,0		296,0		304,0		360,0		320,0		
21	TH	Total hardness	mg/l $CaCO_3$		400,0		425,0		275,0		360,0		350,0		
22	o-PO_4	Ortho- Phosphate	mg/l		2,3		1,7		2,4		2,0		1,5		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		68		148		190		68		88		
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l		108,1		104,4		502,0		86,0		117,2		
29	K	Photasium	mg/l		5,8		6,6		24,8		6,4		14,4		
30	Ca	Calcium	mg/l		90,2		70,1		32,1		80,2		60,1		
31	Mg	Magnezium	mg/l		42,6		60,8		47,4		38,9		48,6		
32	T-Coli	Total Choliform	EMS/100 ml		4400000		1600000								
33	F-Strp	Fecal Streptekok	EMS/100 ml		500		190000								
34	E-Coli	Esh,Koliform	EMS/100 ml		1000000		290000								

35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l		0,0		0,0		0,4		0,3		0,4		

REGION :DSI 21, Regional Directorate,AYDIN
Name of station and location : Adigüzel Baraji Dipsavak Çikisi
Station number : 07 21 00 054

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s						32,000		58,017				
2	T	Temperature	° C				19,0		21,0		29,0		19,0		
3	pH	PH					7,6		8,0		7,5		7,8		
4	EC	Electrical conductivity	mmhos/cm				910		660		800		1020		
5	TDS	Total dissolved solids	mg/l				580		420		510		650		
6	SS	Suspended solids	mg/l				1,5		1,9		1,8		1		
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$				300,0		225,0		250,0		310,0		
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$				0,0		0,0		0,0		0,0		
12	Cl	Clorur	mg/l				63,8		49,6		56,7		53,2		
13	NH_3 -N	Amonia	mg/l				0,64		0,00		1,20		1,28		
14	NO_2 -N	Nitrit	mg/l				0,080		0,002		0,090		0,060		
15	NO_3 -N	Nitrate	mg/l				1,8		1,5		0,3		0,5		
16	TKN	Total Kjeldahl Nitrate	mg/l				2,6		1,8		1,2		1,1		
17	DO	Dissolve oxygen	mg/l				10,2		8,6		7,4		8,2		
18	pV	Organic matter	mg/l				4,0		1,0		3,2		2,6		
19	BOD_5	Biological oxygen demand	mg/l				4,1		2,6		3,4		3,0		
20	COD	Chemical oxygen demand	mg/l				60,0		28,0		52,0		44,0		
21	TH	Total hardness	mg/l $CaCO_3$				295,0		260,0		305,0		410,0		
22	o-PO_4	Ortho- Phosphate	mg/l				0,05		0,00		0,00		0,42		
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l				106,0		34,0		137,0		148,0		

25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l												
27	Mn	Manganese	mg/l												
28	Na	Sodium	mg/l				56,6		34,3		66,8		62,3		
29	K	Photasium	mg/l				5,1		6,8		8,2		6,8		
30	Ca	Calcium	mg/l				100,2		50,1		56,1		110,2		
31	Mg	Magnezium	mg/l				31,6		32,8		40,1		32,8		
32	T-Coli	Total Choliform	EMS/100 ml				3600						1300		
33	F-Strp	Fecal Streptekok	EMS/100 ml				50						5		
34	E-Coli	Esh,Koliform	EMS/100 ml				100						50		
35	Cr	Crom	mg/l												
36	Cu	Copper	mg/l												
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l												
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l												
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l												
43	B	Boron	mg/l				0,0		0,0		0,0		0,0		

Name of station and location: 33279 No'lu Kuyu Denizli Kaklik

Station number : 07 21 10 047

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s						0,098		0,094				
2	T	Temperature	° C						27		29				
3	pH	PH							6,9		6,9				
4	EC	Electrical conductivity	mmhos/cm						2200		2200				
5	TDS	Total dissolved solids	mg/l						1410		1410				
6	SS	Suspended solids	mg/l												
7	Set,S	Sinkable solids	ml/l												
8	Turb	Tirbudity	NTU												
9	Col	Color	Pt-Co												
10	M-Al	Total alkalinity	mg/l $CaCO_3$						560		560				
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$						0,0		0,0				
12	Cl	Clorur	mg/l						124,1		95,7				
13	NH_3 -N	Amonia	mg/l						0		0,00				
14	NO_2 -N	Nitrit	mg/l						0,0		0,0				
15	NO_3 -N	Nitrate	mg/l						0,0		0,8				

16	TKN	Total Kjeldahl Nitrate	mg/l												
17	DO	Dissolve oxygen	mg/l												
18	pV	Organic matter	mg/l						1		0,4				
19	BOD_5	Biological oxygen demand	mg/l												
20	COD	Chemical oxygen demand	mg/l						12,0		4,0				
21	TH	Total hardness	mg/l $CaCO_3$						1250		1285				
22	o-PO_4	Ortho- Phosphate	mg/l						0,05		0,00				
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l						638,8		682,0				
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										<0,05		
27	Mn	Manganese	mg/l										<0,005		
28	Na	Sodium	mg/l						37,2		37,6				
29	K	Photasium	mg/l						5,6		6,2				
30	Ca	Calcium	mg/l						290,6		304,6				
31	Mg	Magnezium	mg/l						127,7		127,7				
32	T-Coli	Total Choliform	EMS/100 ml												
33	F-Strp	Fecal Streptekok	EMS/100 ml												
34	E-Coli	Esh,Koliform	EMS/100 ml												
35	Cr	Crom	mg/l										<0,005		
36	Cu	Copper	mg/l										<0,005		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										<0,005		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										<0,005		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										<0,005		
43	B	Boron	mg/l						0,5		0,4				

Name of station and location : Gümüşçay Ortaklar Söke Karayolu Köprüsü

Station number : 07 21 00 092

NO	Symbol	PARAMETERS	UNIT	JAN	FEBR	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	Q	Flow	m^3/s		0,350		0,300		0,220				1,400		0,650
2	T	Temperature	° C		23,0		20,0		25,0				22,0		15,0
3	pH	PH			7,9		7,6		7,9				8,1		6,9
4	EC	Electrical conductivity	mmhos/cm		2090		1730		1900				2550		2740
5	TDS	Total dissolved solids	mg/l		1340		1110		1220				1630		1750
6	SS	Suspended solids	mg/l		2,3		2		2,2				3,5		2,3

7	Set,S	Sinkable solids	ml/l											
8	Turb	Tirbudity	NTU											
9	Col	Color	Pt-Co											
10	M-Al	Total alkalinity	mg/l $CaCO_3$		480,0		450,0		465,0				625,0		660,0
11	P-Al	Phenolftalein Alkalinity	mg/l $CaCO_3$		0,0		0,0		0,0				0,0		0,0
12	Cl	Clorur	mg/l		361,6		319,1		319,1				471,5		496,3
13	NH_3 -N	Amonia	mg/l		0,64		0,73		0,64				0,94		6,00
14	NO_2 -N	Nitrit	mg/l		0,310		0,090		0,160				0,010		0,020
15	NO_3 -N	Nitrate	mg/l		3,00		1,00		0,75				0,25		0,50
16	TKN	Total Kjeldahl Nitrate	mg/l		2,3		2,8		2,9				3,1		5,4
17	DO	Dissolve oxygen	mg/l		8,4		6,9		7,0				2,0		3,2
18	pV	Organic matter	mg/l		1,4		2,4		2,8				5,8		39,2
19	BOD_5	Biological oxygen demand	mg/l		4,4		2,8		3,2				68,0		140,0
20	COD	Chemical oxygen demand	mg/l		24,0		28,0		40,0				140,0		320,0
21	TH	Total hardness	mg/l $CaCO_3$		850,0		550,0		475,0				490,0		500,0
22	o-PO_4	Ortho- Phosphate	mg/l		0,22		0,22		0,42				0,85		0,71
23	Top,P	Total phosphour	mg/l												
24	SO_4	Sulphate	mg/l		108,0		44,0		44,0				44,0		88,0
25	CO_2	Carbondioxite	mg/l												
26	Fe	Iron	mg/l										0,070		
27	Mn	Manganese	mg/l										0,166		
28	Na	Sodium	mg/l		112,8		165,6		212,0				356,0		392,0
29	K	Photasium	mg/l		9,4		9,0		50,2				37,0		60,0
30	Ca	Calcium	mg/l		110,2		90,2		100,2				114,2		120,2
31	Mg	Magnezium	mg/l		139,8		79,0		54,7				49,9		48,2
32	T-Coli	Total Choliform	EMS/100 ml		42000		14000		19000						43000
33	F-Strp	Fecal Streptekok	EMS/100 ml		200		150		50						200
34	E-Coli	Esh,Koliform	EMS/100 ml		7000		2000		12000						500
35	Cr	Crom	mg/l										< 0,005		
36	Cu	Copper	mg/l										0,007		
37	CN	Cyanide	mg/l												
38	Pb	Lead	mg/l										0,060		
39	As	Arsenic	mg/l												
40	Zn	Zinc	mg/l										0,017		
41	Hg	Mercury	mg/l												
42	Cd	Cadmium	mg/l										< 0,005		
43	B	Boron	mg/l		2,9		2,5		3,8				3,8		4,5

Table 3.2 Wasterwater discharge amounts of cities

Province	County	City population	Discharge amount (m^3/day)	State of infrastru cture (sewarage/septic)	Discharge locations	Treatment planttesisi (yes/no)	Discharge permission
AFYON	Dinar	35 424	7084,8	sewerage+septic	Büyük Menderes	Under con-stuction	
	Hocalar	2 646	529,2	sewerage+septic	Kuru dere	No	
	Kizilören	2 556	511,2	sewerage+septic	Kuru dere	No	
	Sandikli	37 804	7560,8	sewerage	Kuru dere	No	
	Sincanli	5 826	1165,2	sewerage+septic	Kuru dere	No	
USAK	Center	137 001	27400,2	sewerage	Dokuzsele Deresi	No	
	Banaz	16 212	3242,4	sewerage	Banaz Çayi	No	
	Esme	11 615	2323	sewerage	Esme, Avci ve Yaglar dereleri	No	
	Karahalli	5 243	1048,6	sewerage	Mezbaha Deresi	No	
	Sivasli	6 837	1367,4	Sewerage	Kocagöl Çayi	No	
	Ulubey	5 132	1026,4	Sewerage	Arazi	No	
DENIZLI	Center	275 480	55096	Sewerage	Çürük su çayi	Under con-struction	
	Akköy	2 716	543,2	Sewerage	-	Yes	No
	Babadag	4 832	966,4	Sewerage	Koz Çayi	No	
	Baklan	2 737	577,4	Sewerage	-	No	
	Bekilli	3 931	786,2	Sewerage	Kuru dere	No	
	Buldan	13 986	2797,2	Sewerage	Buldan deresi	No	
	Çivril	13 749	2749,8	Septic	-	No	
	Güney	6 277	1255,4	Sewerage	-	No	
	Honaz	7 442	1788,4	Sewerage	Dinama Çayi	No	
	Beyagaç	2 789	557,8	Septic	-	No	
	Kale	7 189	1437,8	Septic (sewerage undeer construction)	-	No	
	Sarayköy	17 760	3552	Sewerage	Büyük Menderes	No	
AYDIN	Center	143 267	28653,4	sewerage+septic	Büyük Menderes	Yes	No
	Bozdogan	8 300	1660	Septic	Büyük Menderes	No	
	Buharkent	7 074	1414,8	sewerage+septic	Büyük Menderes	No	
	Çine	17 867	3573,4	sewerage+septic	Çine Çayi	Under con-struction	
	Germencik	11 596	2319,2	sewerage+septic	Büyük Menderes	No	
	Incirliova	17 548	3509,6	Septic	Büyük Menderes	No	
	Karacasu	5 915	1183	Septic	Dandalaz Çayi	No	
	Karpuzlu	2 318	463,6	Septic	Karpuzlu Çayi	No	
	Koçarli	8 927	1785,4	Septic	Büyük Menderes	No	
	Kösk	8 349	1669,8	Septic	Büyük menderes	No	
	Kuyucak	7 282	1456,4	Septic	Büyük Menderes	No	
	Nazilli	105 665	21133	sewerage+septic	Büyük Menderes	Yes	No
	Söke	62 384	12476	sewerage+septic		Yes	Yes
	Sultanhisar	6 256	1251,2	Septic	Büyük Menderes	No	
	Yenipazar	7 006	1401,2	Septic	Büyük Menderes	No	
MUGLA	Kavaklidere	3 432	686,4	Septic	-	No	
	Yatagan	16 007	3201,4	Septic	-	No	

PS: Data only for provincial or county center. Amounts calculated from 200 lt/day per person amount of discharge.

In the coastal areas of the basin (Municipalities of Güzelçamli and Davutlar) holiday villages, hotels and motels wastewater is discharget at their own treatment plants or directly discharged to Aegean sea without ant tratment due to high electricity cost of treatmen. The domestic waste water state of these areas is given in Table 3.3.

Table 3.3 Domestic waste water state of second houses and touristic establishments

Location	Type of activity	Number	Amount of wastewater (m^3/year)	Treatment plant (number)	Discharge permission (number)
	II.Houses (holiday houses)	120	2 377 610	17	
Davutlar	Otel- Motel- Holiday village	20	146 000	3	
					8
	II.Houses	51	1 134 055	32	
Güzelçamli	Otel- Motel- Holiday village	22	790 955	7	15

* *Amounts; for II. Houses according to livin population, and for hotel, motel and holiday villages according to existing bed capacities; estimated according to 200 lt/day per person.*

3.2.2 Industrial pollution

Parallel to the settlement areas there is a significant industry in the basin. Another significant pollution source in the basin is the discharge of waster water used for the process in these industries. Some of these industries came together in organized industrial sites, some are single enterprises in different sized distributied along the basin and some of the very close to settlement areas. The sectoral distribution of ndustries given in Table 3.4, the information on organized industrial sites given in Table 3.5, and numbers of small industrial enterprises given in Table 3.6. In Table 3.4 there is also information on the electrical power plant locatedat Yatagan, Mugla, is included.

Table 3.4 Sectoral distribution of industry

Provinces / Sector	Afyon*	Denizli*	Usak*	Aydin	Mugla*
Food industry**	24	44	77	198	4
Plant oil industry	3	-	-	136	4
Textile and clothing industry	5	517	147	30	-
Paper, paper products and printing industry	-	10	-	22	-
Chemical and plastic products industry	3	59	5	27	-
Stone and soil related industry	-	4	22	30	-
Leather industry	-	11	300	12	-
Mechanical industry	1	107	1	50	-
Minning industry	6	43	43	29	13
Animal food industry	6	6	4	5	1
Total	**28**	**801**	**599**	**539**	**22**

* *data on table is belong to the counties of provinces located in the basin*

** *Slaughter house in meat industry included*

Table 3.5 Organised industrial sites (OIS)

Name of OIS	State (implementing/ underconstruction/ investigation/ nationalization)	Size (ha)	Treatment plant (yes/no)	Location
Mugla OIS	Investigation	120		Göller Mevkii
Yatagan OIS	Investigation	-		Yatagan
Aydin OIS	Implementing	105ha	Y	Umurlu –Aydin
ASTIM OIS	Implementing	100 ha	N	Aydin
ASTIM II. OIS	Investigation	150 ha		Aydin
Buharkent OIS	Establishment Protocol			
Çine OIS	Establishment protocol			
Kösk Sera OIS	Investigation	250 ha		Kösk
Nazilli OIS	Establishment pro-tocol approved	150 ha		Nazilli
Söke OIS	Nationalization			
Afyon-Merkez OIS	Implementing	500	N	Merkez
Afyon-Central II. (tevsi) OIS	Investigation	400		Merkez
Afyon-Central Besi OIS	Investigation	220		Merkez
Dazkiri OIS	Investigation	120		Dazkiri
Bolvadin OIS	Investigation	120		Bolvadin
Emirdag OIS	Investigation	222		Emirdag
Iscehisar OIS	Investigation	482		Iscehisar
Dinar OIS	Investigation	380		Dinar
Sandikli OIS	Investigation	300		Sandikli
Denizli OIS	Implementing	375	Y	Gürlek Köyü
Çardak OIS	Underconstruction	322.5	N	Çardak
Deri OIS	Investigation	235		
Acipayam OIS	Investigation	490		Acipayam
Tavas OIS	Investigation	230		Tavas
Usak OIS	Implementing		N	Merkez
Leather OIS	Underconstruction			Merkez

Table 3.6 Small organised sites and numbers

Province	Existing enterprises	Numbers planning
Usak	583	400
Denizli	2132	463
Aydin	2342	525
Mugla (only Yatagan county)	156	-

For the year 2010, 10 milion m^3/year of industrial discharge is forecasting.

Table 3.7 Information on industrial enterprises

Name of enterprise	Type of production	Location	Capacity	Treatment plant (yes/no)	Discharge point
Adil Boz Textile ind.	Plaster bandage	Center-USAK	571 960 number/year	N	Banaz stream
Aysan Textile and leather ind.	Pullower	Center -USAK	105 000 number/year	N	Banaz stream
Gördes Textile ind.	Synthetic fabric	Center -USAk	5 630 400 meter/year	N	Banaz stream
Nuri Sugar Usak Factory	Sugar	Center -USAK	1 400 ton/year	N	Banaz stream
Oktas	Concrete	Center -USAK	50 103 m^3/year	N	Banaz stream
Özdemirler Textile ind.	Printing	Center -USAK	4 164 480 m/year	N	Banaz stream
Pinar textile ind.	Straygan rope	Center -USAK	191 670 kg/year	N	Banaz stream
Saray Blancet textile	Blancet	Center -USAK	229 307 number/year	N	Banaz stream
Sesli Textile ind.	Blancet	Center -USAK	2 396 167 number/year	N	Banaz stream
Usak Aydinlar leather textile ind.	Zig leather	Center -USAK	2 700 tons/year	N	Banaz stream
Usak ceramic ind.	Wall-ground covering	Banaz-USAK	3 000 000m^2/year	N	Banaz stream
Denizli textile and dying ind.	Textile	Center - DENIZLI	2 500 000 m/month	Y	Gökpinar
Dentas paper	Paper ind.	Center - DENIZLI	81 000 tons/year	Y	Gökpinar
Gümüssu treatment ind.	Textile	Gümüsler-DENIZLI	-	Y	Gümüsçay
Küçüker Textile ind.	Textile	Center - DENIZLI	4 800 tons/year	Y	Çürüksu
AFZ Textile ind.	Textile	Pinarkent-DENIZLI	2 232 tons/year	Y	Sariçay
Menderes Textile ind.	Textile	Sarayköy-DENIZLI	174 000 m/day	Y	B. Menderes river
Konfrut concentrated fruit juice ind.	Fruit juice	Çal-DENIZLI	1 800 tons/day	Y	B. Menderes river
Oguzhan textile ind.	Textile	Center - DENIZLI	23 tons/day	Y	Kuru Dere river bed
Ugur cooling machines	Cooling weins	Nazilli-AYDIN	15 000 number/month	Y	Orchard irrigation
Aydin textile rope ind.	Textile	Center -AYDIN	5 045 664 m/year	N	Sewerage
V Vf Ege clothing ind.	Textile	Söke-AYDIN		Y	DSI drying canal
Yüksel ceramic ind.	Ceramic	Söke-AYDIN	3 400 000 tons/year	Y	DSI drying canal
Söktas cotton and agri. Products.	Textile	Söke-AYDIN	rope:6 tons/year fabric:35.5 km/year	Y	DSI drying canal
Sibas food (2 enterprises)	Fuit-vegi process	Söke-AYDIN		N	
Dalan oil ind.	Prina	Umurlu-AYDIN	17 520 m^3/year	N	
Sütman milk products	Milk products	Nazilli-AYDIN	17.2 tons/year	N	Nazilli sewerage
Ör koop Nazilli and surrounding agr. Development coop.	Milk products	Nazilli-AYDIN	cheese –Yoghurt: 88 629 kg/year Ayran:30580 package/year	N	DSI drying canal
Yatagan Thermic plant	Energy	Yatagan-MUGLA	3x210 MW/hours	Y	-

3.2.3 Geothermal Pollution

At the northern part of the basin, from Germencik to Denizli-Kizildere and through Pamukkale there are hotsprings along the tectonic crack belt. High content of boron in these waters cause to pollution on river. The 2 main sources of boron are Sarayköy Geothermal power plant and neighboring Tekke hotsprings.

DSI's periodic water pollution monitorings includes boron. In this concept flow regimes and boron concentrations measured in April 1998 is given Figure 3.4.

3.3 Pressures: common sources

3.3.1 Fertilisers, pesticides and herbicides used in irrigated agriculture

The uncontrolled using chemical fertilizers, pesticides and herbicides mixing with surface water then to groundwaters via irrigated agriculture. Via discharge of some amounts of this contaminated ground waters leads to pollution of surface waters. The detemined amount of fertilizers, pesticides and pesticides used in the basin determined by PDoARA is given in Table 3.8.

Table 3.8 Amounts of fertilizers, herbicides and pesticides used

Province	Year	Pesticides/herbicides (KG)	Chemical fertilisers (Tons)
Aydin	2000	688 310	825 271
	2001	811 126	81 095
	2002*	-	64 070
Denizli	2000	963 037	56 252
	2001	360 192	50 707
	2002*	-	46 762
Usak	2000	653 175	38 660
	2001	776 537	33 644
	2002*	-	20 076
Afyon	2000	288 174	65 125
	2001	245 062	60 085
	2002*	-	45 370
Mugla	2000	-	47 262
	2001	522 429	40 098
	2002*	-	34 432

* *data of 2002 covers only fisrt 6 months*

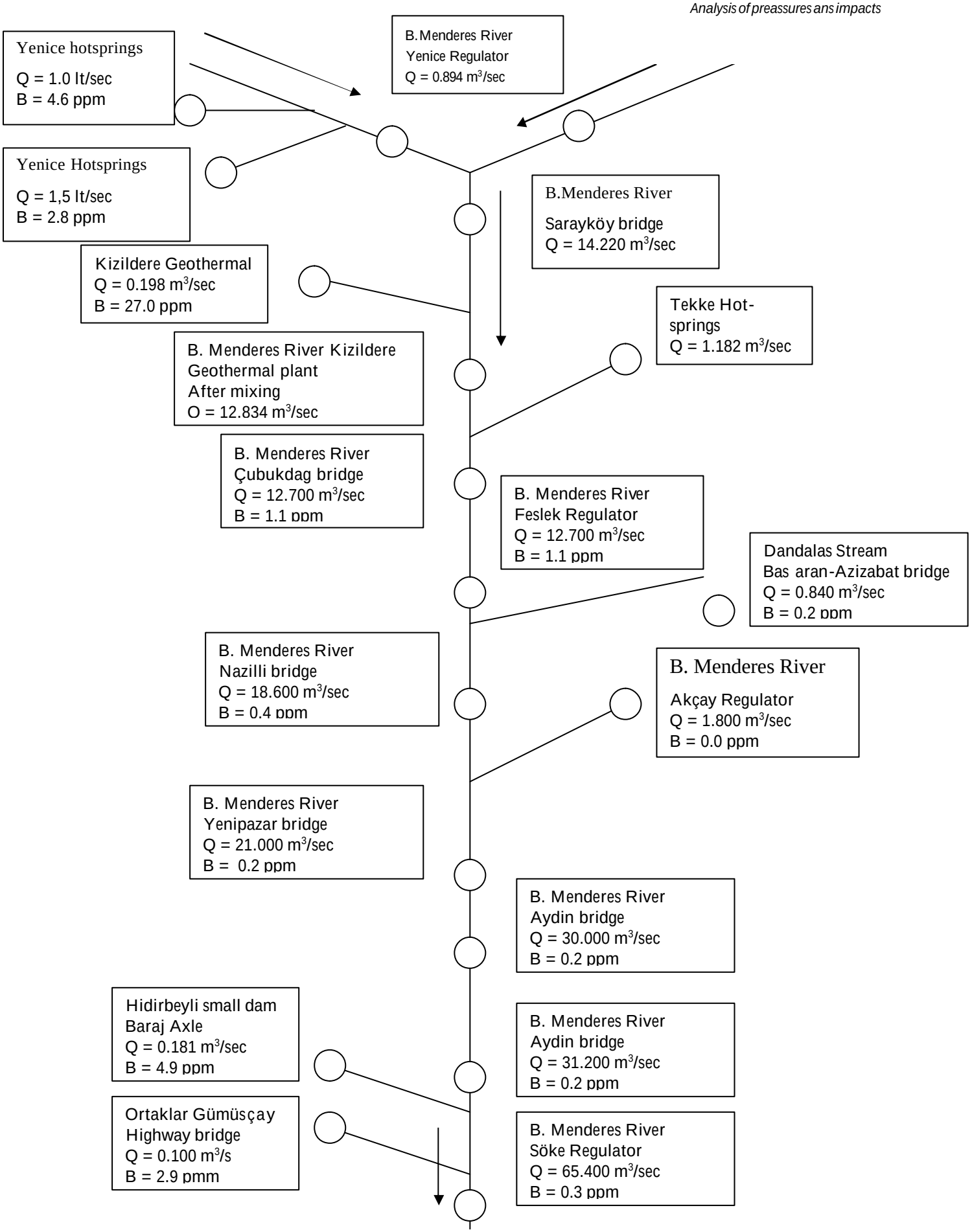


Figure 3.4 Changes in Boron amount between Yenice - Söke Regulators

3.3.2 Salty and sodium contained drainage waters returning from agriculture

Along the basin, especially where irrigated agriculture is practicing the water returning from irrigation and drainage water containing high amounts of salt and sodium causing pollution in Büyük Menderes River and tributaries. These waters are leaking to deeps of soil profile and mixing with groundwaters. These salty and sodium containing waters are draining to Büyük Menderes River and tributaries by open and closed drainage systems.

Especially when the irrigation water is not sufficient, farmers use these gorundwaters for irrigation. Consequently, both in land and surface waters where these waters are draining the pollution parameters are increasing.

These problems are increasing through upstream to low stream. Especially, Yenice-Sarayköy plain, Nazilli Akçay right and left shore plains and Söke plain are the points of high saltation and sodium. At Yenice-Sarayköy plain and Söke plain, farmers are washing the land before germination. This activity, as mentioned above, increases the saltines at surface waters.

3.4 flow regime and groundwater abstraction

The flow regime regulation is practicing to provide irrigation, drinking and domestic water supply, energy production and to control flooding. At all existing irrigation schemes, as seen in Figure 3.3, irrigation waters are released from storage areas to riverbeds, then via regulators transmitting to irrigation canals. After that transmitting to tertiary irrigation canals to fields. The water sources and storage constructions of the existing irrigation schemes are given at Table 3.9; the organizational responsibility of water flow according to water constructions are given in Table 3.5.

Table 3.9 Water resources and storage constructions of implementing irrigation systems

Irrigation systems	Resource and storage constructions
Isikli	Isikli springs
Irgilli	Büyük Menderes river, Isikli lake
Baklan and Çal	Isikli lake
Çürüksu	Çürüksu+ groundwater, Adigüzel and Gökpinar dams
Sarayköy and Gölemezli	Isikli lake+Adigüzel dam
Nazilli	Isikli lake+ Adigüzel dam
Akçay	Kemer dam
Aydin	Isikli lake+ Adigüzel dam+Kemer dam
Söke	Isikli lake+ Adigüzel dam+Kemer dam
Topçam	Topçam dam
Karpuzlu	Yaylakavak dam
Bayir-Kazan	Kazan small dam
Çine-Akçaova	Akçaova small dam
Germencik-Hidirbeyli	Hidirbeyli small dam
Denizli-Tavas	Tavas small dam

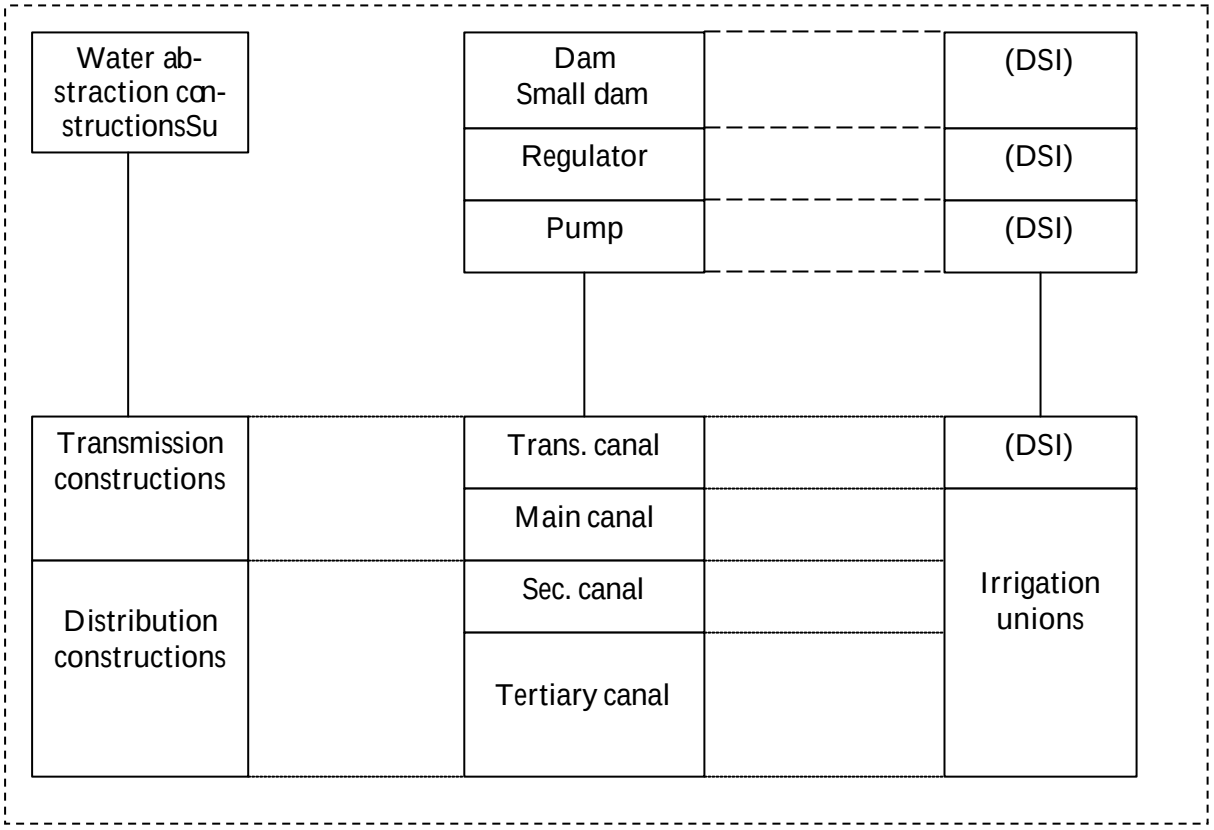


Figure 3.5 Responsibility of implementation-maintenance-management-organization at level of water constructions of irrigation networks (Koç, 1998)

As seen in Figure 3.5, the organization responsibility at the level of water constructions, which is dealt with water flow, is carried out by DSI and water storage constructions like dams, ponds and etc. in the basin, water receiving constructions like regulator and irrigation networks are constructed by DSI. The irrigation of agricultural lands in villages and towns is carried out by Rural Affairs and small reservoir volume ponds, which supply drinking water for villages and animals, are constructed also by Rural Affairs. Water planning and distribution throughout the basin is performed by DSI. Except for the small ponds, all the dams are operated by DSI. In this respect, irrigation waters are delivered to the foundations taking over the irrigation according to the irrigation program, at the beginning of the main canal. After that, transmission and distribution of the water is carried out by the previously mentioned foundations.

The operation-maintenance and repair services of the irrigations that begin operation are transferred to the foundations and institutions, which make use of these plants, on condition that their ownership remains in DSI.

Together with the irrigation; surface and deep drainage systems required for avoiding problems like high levels of groundwater, saltiness and sodium in the fields, and consequently for avoiding the decrease of yield potentials of fields, are established by DSI as open canals. The maintenance and repair of these canals are made by irrigation unions. The closed drainage systems required especially for improvement of fields with salt and sodium are founded by Rural Affairs and no units are found for the operation and maintenance of these plants.

Besides this, additional groundwater wells were opened and are being opened by DSI to reinforce irrigation water in the areas where surface waters are not sufficient in the basin. And these are transferred to the irrigation unions on condition that their ownership remains in DSI. In addition, for the groundwater cooperatives founded independently; wells, energy transfer lines and pumps are established by DSI and are transferred to groundwater cooperatives with the transfer agreement and thus are back paid.

The mission of drinking-usage water supply of residential units and industrial water supply is given to related municipalities and Bank of Provinces. In the framework of the law with law number 1053, which has come into force by being published in Official Gazette of date 16.07.1968 and number 12951, dealt with the Drinking, Usage and Industrial Water Supply in Ankara, Istanbul and in cities whose population is higher than 100,000; this mission is given to DSI by the approval of Council of Ministers and by the decision of town council related with the residents having population over 100,000. The list of dams that are constructed or are planned to be constructed in the basin for this purpose is given in Part 2.2 Table.2.12. Among these dams, the operation of the ones, which are used for drinking and usage purposes, is carried out by DSI; the ones constructed only for drinking purposes are transferred to the related municipalities. All the plants established for drinking-usage and irrigation purposes by Rural Affairs are operated by the users or their representative agents.

In addition, duties dealing with groundwaters such as examination, allotment, operation, protection and certification are under the authority of DSI in the framework of the law 167, which is in force. As seen in Table.3.9, in the basin additional groundwater wells are opened to reinforce irrigation water in Çürüksu region and some other areas. On condition that the ownership of some of the wells is remained in DSI, the operation of these wells is transferred to the irrigation cooperatives found in the region. Again throughout the basin, as mentioned in Part 2.3, many groundwater wells are opened for drinking-usage and irrigation purposes together with examination purpose. These wells are transferred to related foundations and judicial people.

There are certificated groundwater wells that are opened by the related municipality throughout the basin in order to supply drinking water and a lot of illegal (without certificate) groundwater wells that are opened for various purposes.

In order to make an effective and productive irrigation program, 37 flow observation stations are established by DSI throughout the basin. In these stations, flow rate measurements are performed daily.
The locations of the flow observation stations are shown in Figure 3.6, and the names of the sources being observed are given in Table 3.10.

3.4.1 Works for the distribution of existing irrigation water

By the DSI Irrigation Enterprises actually executing irrigation; crop pattern is determined, whose agriculture is to made in the irrigation areas that year, before the irrigation season generally in March and April. According to the water demand of these crops, a general irrigation plan is prepared and this plan is approved by the General Directorate of DSI through examination. The 21. Regional Directorate of DSI plans the amount of water to be spent for irrigation in the irrigation period according to the existing water amount found before irrigation period and water amount that is expected to come to the storage plants during the irrigation period, by taking into consideration water budget observed daily in the storage plants taken place in the basin. In this plan, water amounts that will be given from storage plants to irrigation are compared with the water demands coming from the enterprises, and if there is water deficit, restricted irrigation program will be applied in the basin.

Table 3.10 Flow monitoring stations

Detail no	Name of monitoring station	Number of station	Starting date of observation	Name of monitoring water body
1.	Isikli bridge	7-003	1958	Kufi stream
2.	Isikli Regulator outlet	7-004	1959	Büyük Menderes
3.	Böceli	7-007	1978	Çürüksu
4.	Akhan	7-008	1978	Gökpinar stream
5.	Çakirbeyli bridge	7-009	1962	Çine stream
6.	Irgilli Regulator outlet	7-010	1960	Dinar Suyu
7.	Dereagzi	7-014	1968	Ikizdere
8.	Aydin	7-015	1985	Tabakhane creek
9.	Irgilli irrigation l	7-026	1961	Dinar Suyu
10.	Mezeköy	7-030	1962	Kösk creek
11.	Nazilli bridge	7-032	1962	Büyük Menderes
12.	Alangüllü	7-039	1968	Kapizdere
13.	Irrigation canal	7-054	1964	Isikli springs
14.	Yukari Samli	7-059	1968	Çürüksu
15.	Besdegirmen	7-061	1968	Dandalaz
16.	Koçarli bridge	7-062	1968	Büyük Menderes
17.	Adigüzel	7-065	1968	Büyük Menderes
18.	Yukari Seyit	7-071	1969	Büyük Menderes
19.	Girme	7-079	1980	Girme creek
20.	Sarayköy bridge	7-081	1980	Büyük Menderes
21.	Kasar	7-082	1982	Madran stream
22.	Çaliköy bridge	7-083	1982	Yenidere
23.	Degirmen Bükü	7-093	1986	Korkoz creek
24.	Gevenez	7-096	1987	Gevenez creek
25.	Madanlar	7-097	1987	Elekçi creek
26.	Bayir	7-098	1987	Sirainler
27.	Alisar	7-099	1987	Alisar creek
28.	Kiriklar	7-100	1987	Delice creek
29.	Çalisli	7-103	1988	Sariçay
30.	Çambasi	7-106	1988	Emir stream
31.	Incirliova	7-107	1989	Cilimbiz creek
32.	Köprüalan	7-108	1989	Kargin creek
33.	Incirliova	7-109	1989	Yalki creek
34.	Kazandere	7-114	1990	Deliçay
35.	Yenice Regulator inlet	7-202	2000	Büyük Menderes
36.	Akçay Regulator outlet	7-200	2000	Akçay
37.	Pamukören	7-115	2000	Kayran creek

3.5 Morphological impacts

In order to supply drinking-usage or irrigation water in the basin, water storage constructions are established over the rivers or river is diverted from its source directly by an irrigation construction. This condition causes changes in the hydrology and morphology of the river basin. For example, changes in the flow rate of the riverbed water cause the usage condition of Büyük Menderes Delta, which is composed of sediments carried by the river and found in the mouth of the river, and its ecology to change. At the same time, the fish life together with the biological life in the lagoons produced at the areas where sea meets with the river is also negatively affected. When the storage is completed, regular water flow will be provided in Büyük Menderes Delta during summer months.

The decrease in the amount of water and sediment going to the delta increases the entrance of salty water in the mouth of the river and delta fields. The change in the hydrology of river affects flora and fauna significantly.

Before the establishment of the constructions defined above, sediment transportation was taking place in the river and streambeds due to the flood occurring in the heavy rain periods. However, with the construction completed, this condition has changed. Besides, riverbed improvements and similar studies made for flood control cause significant modifications in the natural morphology of the river and streambeds.

By Aydin Afforestation and Erosion Control Chief Engineering, erosion and sediment transportation control studies were carried out in an area of 45,000 ha composed of north side creeks between Buharkent and Sultanhisar. In the framework of these studies, terracing is performed over an area of 13,000 and red pine is planted in the terraces. Drywall structures are constructed in the side creeks and oak is planted over an area of 7,000 ha. In addition, pasture studies are completed in an area of 1,000 ha and studies are carried out dealt with erosion control and afforestation in upper basin and side creeks. The studies, which have been started at 1960, are still going on.

In the same way, in the framework of the missions and authorities given to DSI by the establishment law and since 1953, dams and barriers are constructed to prevent floods, improvement studies for rivers, creeks and side creeks are performed, a total of 350,000 m³ improvement terraces in 78 of creeks and side creeks to control flood and sediment transport over main creeks and rivers are made, 71 000 m³ sill wall, 650,000 covered seedling, 350,000 soil free seedling, 900,000 steel plantation, 120,000 m shore fortification, 80,000 m barbedwire hedge coverage is carried out throughout the Büyük Menderes Basin. In addition, terracing and afforestation studies are performed in precipitation basins of dams and ponds for erosion, sediment transport control and recreation purposes. All technical and cultural precautions to prevent erosion, and sediment transport and to control flood cause significant changes in the morphology of surface waters together with the precipitation basin.

Especially in arid periods, the flow rate of the river decreases, thus the pollution load of Büyük Menderes River and its branches increases due to the discharges of industrial and domestic wastewater that is not being treated before discharge. This condition affects the morphology of surface waters and thus decreases its quality as seen in Table 3.1.

3.6 Impacts on surface waters

As mentioned in Parts 3.2 and 3.3, industrial activities found throughout the basin and treatment plants to treat domestic wastewater coming from residential places are not established. Existing treatment plants are not operated due to economic or some other reasons very efficiently.

In addition, chemical substances used in irrigated agriculture intensively and agricultural fertilizer wastes together with the salty drainage waters returned from irrigation are mixed with the river and its branches.

Wastewater of Sarayköy Geothermal Power Plant, which consists of boron element in very high concentrations, and water of Tekke Springs in the same region are given directly to the Büyük Menderes River.

The pollution load sources mentioned above affect the water quality of Büyük Menderes River and its branches negatively and cause the water quality to decrease.

Throughout the Büyük Menderes River Basin, which has a great potential of water and soil resources, water quality monitoring studies are performed in total of 66 stations periodically by DSI since 1992 in the Büyük Menderes River, its branches, Bafa Lake and the existing groundwater wells found in the basin in the framework of Water Pollution Control Regulation in order to protect and improve water quality through determining the possible effects of existing and planned activities on the water quality. After that, the number of pollution observation stations is decreased annually according to the critical points where pollution load is high and currently as seen in Figure 3.3, studies are going on in 27 critical points where there are observation stations are found. In accordance with the results of these studies given in Table 3.1, the water quality of the Büyük Menderes River is summarized below according to the Inland Water Resources Classes.

In the upper Büyük Menderes Basin, the adverse effects of domestic and industrial wastewater (chemistry industry, flour, fodder, sack, PVC, fishing net, salt and thread factories) of Dinar are seen as a result of the measurements carried out in the Dinar-Suçikan and Kabakli Regulator, which constitutes the first observation stations over the Büyük Menderes River. For this reason, Isikli Lake as the first receiving environment is polluted by the polluted waters. Water of Isikli Lake is considered as 4th class due to its nitrite content, 3rd class due to its ammonia content, 2nd class due to its nitrate, chemical oxygen and total organic nitrogen content and as 4th class due to its biochemical oxygen demand.

Lake water of Adigüzel Dam, which is one of the most important water sources in the Büyük Menderes River Basin for the irrigation purpose, is polluted by the wastewater of Usak City produced from leather, textile, cotton fabric, thread and ceramic sectors discharged into the Dokuzsele and Banaz Streams without treatment. In Usak, the construction of Usak Organized Industrial Site working mainly on textile and Usak Leather Organized Industrial Site are in completion phase. With the completion of treatment plants in organized and small industrial sites, it is estimated that the pollution load will be lowered. Domestic wastewater of Usak is also given to the Dokuzsele Stream in the same way without treatment and after that, they reach to the Adigüzel Dam. By this way, the concentration of heavy metals like chromium, arsenic, lead and copper, of soluble solids and of ammonium, nitrite, chloride, sodium, phosphate, and sulfate is increased in the dam lake. These organic and heavy metal loads destroy the life in the dam and causes the gardens around Ulubey to dry. In the mouth of the river, the physical properties of the soil, which is irrigated by the waters mentioned above, are changed and the yields are getting lowered. Besides, distribution of pathogenic microorganisms to the environment affects the public health negatively. In the same way, the heavy metals mentioned above pass to the human structure by the food chain and threaten the human life.

Industrial wastewater produced from offices mainly working in the area of textile in Denizli together with the domestic wastewater of Denizli pollute Çürüksu and Büyük Menderes River.

However, in 1998, Denizli Organized Industrial Treatment Plant is constructed and started operation and this plant consists of physical, chemical and biological treatment and sludge dewatering units.

Geothermal waters of Sarayköy, Kizildere, cause the salt, sodium and boron content to increase in the Büyük Menderes River together with the increase in temperature. It is detected that boron and salt concentration of the soil is increased significantly after Sarayköy Geothermal Energy Power Plant started geothermal production (DSI, 1994). The concentration value of critical usage limit (0.30-3 mg/l) for boron, which is determined by Water Pollution Control Regulation, is exceeded in the irrigations made from the Büyük Menderes River. So as a result of irrigations made from Büyük Menderes River, citrus fruits are harmed, which are especially grown in Nazilli Region. The yields and qualities of these fruits also decrease significantly. Besides, the plants that are boron sensitive and are grown in the basin are affected negatively.

Agricultural richness of Aydin City provided an industry that is dependent on agriculture. An effective treatment cannot be applied due to the characteristics of black water caused from the olive oil factories of Aydin City, which are dispersed throughout the city. Treatment plants for other industries either are not found or existing treatment plants found are not operated effectively. Consequently, the wastewaters of the plants are discharged into the Büyük Menderes River causing the pollution load to increase. Besides this, Aydin-Umurlu Organized Industrial Wastewater Treatment Plant started operation and it is composed of physical and biological treatment units together with the sludge dewatering units.

Bafa Lake and Büyük Menderes Delta located in the mouth of the basin are affected negatively by Büyük Menderes River whose water quality is decreased significantly. The connection of Bafa Lake with Büyük Menderes River and the sea is provided by Dalyan Canal whose length is approximately 4 km. In spring months, baby fishes come from the sea to the lake for feeding and go from the lake to the sea back for wintering and breeding during fall months. Big fishes are caught in the Dalyan Canal by being trapped in the migration from lake to sea. Sufficient flows should exist via Dalyan Canal, either from Büyük Menderes River to the lake or from Bafa Lake to the river in required times in order to prevent the natural balance. For this reason, during arid periods when the required water level in the Büyük Menderes River does not exist, the Büyük Menderes Riverbed is closed by soil, the water level of the river is increased and thus the required flow conditions are supplied by DSI to reinforce water from the river to the lake. According to the studies carried out, in order to make fish production and biological life continue, the level of lake water should be 2 m higher than the level of seawater. For this reason, by DSI Left Shore Bafa Lake Protection Platform and Water Receiving Structure are constructed in order to prevent Büyük Menderes River floods, which contain sediment in the rainy periods and affect the life in the lake negatively, from entering the lake uncontrollably; to prevent fishes from being carried to the sea with the effect of the lake water level being higher than the optimum water level; and to protect the natural balance by supplying the water flows between the sea and the lake in a controllable way.

An inflatable sluice structure is being constructed in order to execute reinforcement of water from the Büyük Menderes River to the lake under modern conditions. Between the mouth of the sluice and the origin of it, one fish passageway is established to allow the fish passages.

3.7 Impacts on groundwaters

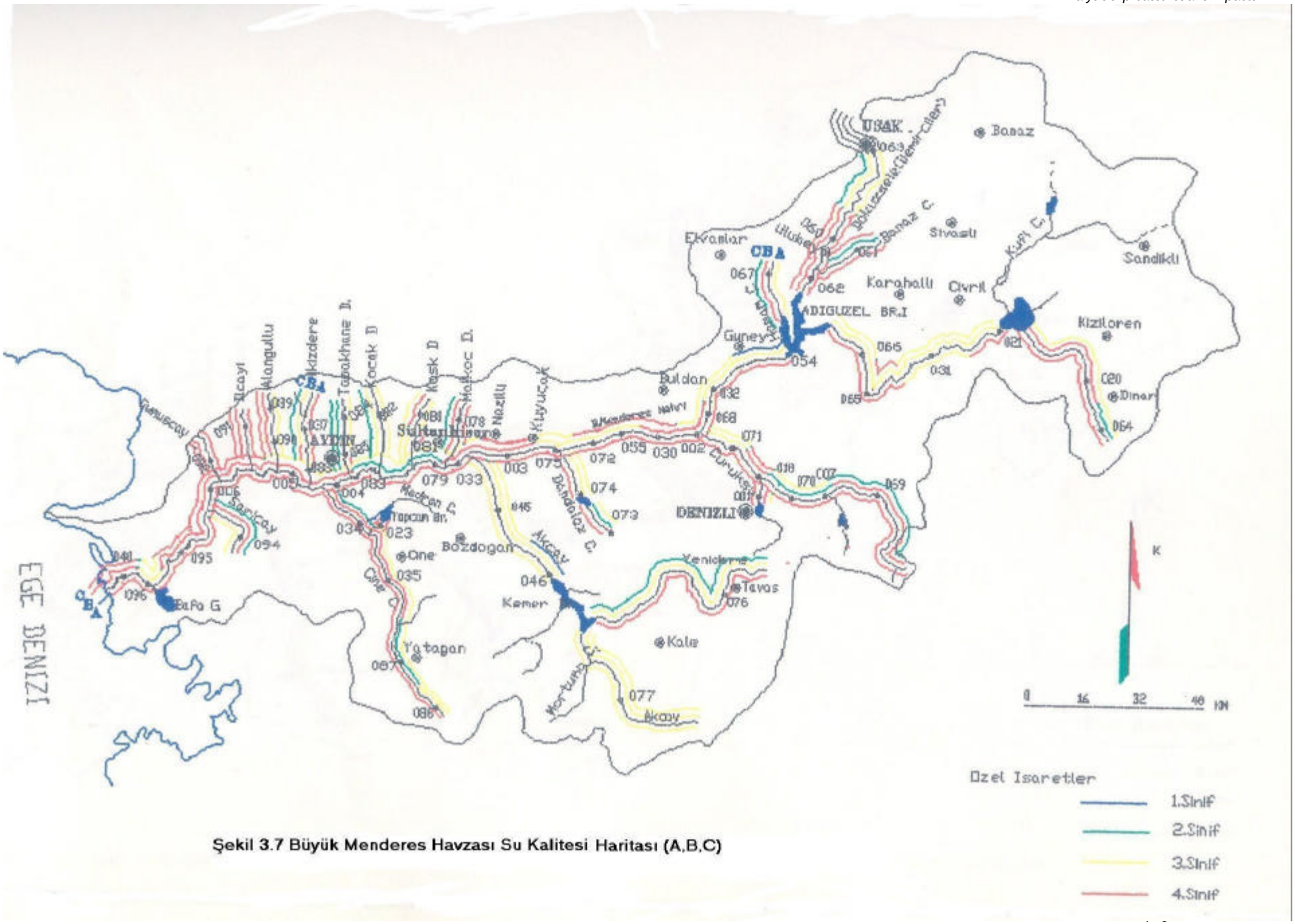
In the Büyük Menderes Basin, groundwaters in the main valley flow to the Aegean Sea via Büyük Menderes Valley by being fed from the source to the mouth. The groundwaters throughout the basin are fed by percolated waters through precipitation and irrigation and by leaking waters from the branches of Büyük Menderes River and from the main bed of this river. In some of the beginning parts where Büyük Menderes River is originated, the riverbed is very permeable and the surface of water is especially in winter months is below the water level of the river. In these periods, river feeds the groundwater. For this reason, the groundwater quality is adversely affected since the Büyük Menderes River, which is polluted by the discharge of domestic, industrial and agricultural wastewaters, feeds the groundwater. In some cases, groundwater feeds the Büyük Menderes River.

The groundwater level varies throughout the basin and increases in static levels are seen near the Büyük Menderes River. In the north of the Büyük Menderes Basin, which is formed by the faults lying in the direction of east-west and which is at the same time a sediment basin, the faults in the tectonic zone lying from Germencik to Denizli-Kizildere and Pamukkale are active and some geothermal areas take place through these faults. The geothermal waters emerging up from the depths of surface in the geothermal areas through the fault zone affect the high-quality groundwater in the aquifer negatively (DSI, 1967).

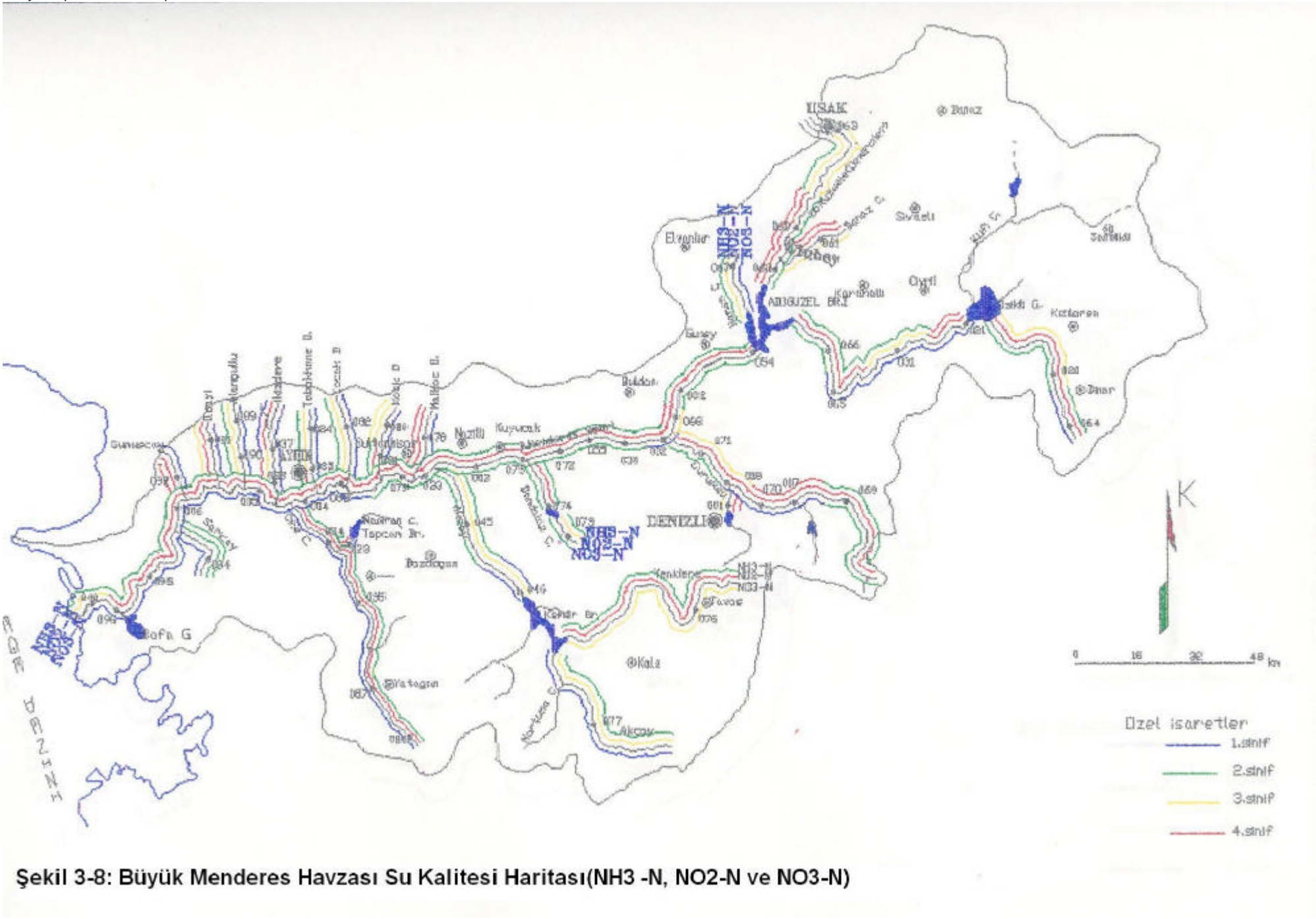
Groundwater sources are estimated to get polluted by the effect of chemical substances used in irrigated agricultural lands and fertilizers, which leak under the ground through the soil profile.

Salty drainage waters are used as irrigation water by the farmers when the irrigation water is scarce in the mouth of the basin. Some part of these waters are known to percolate deep through the soil profile and thus known to feed groundwater. So the quality of groundwater is affected negatively.

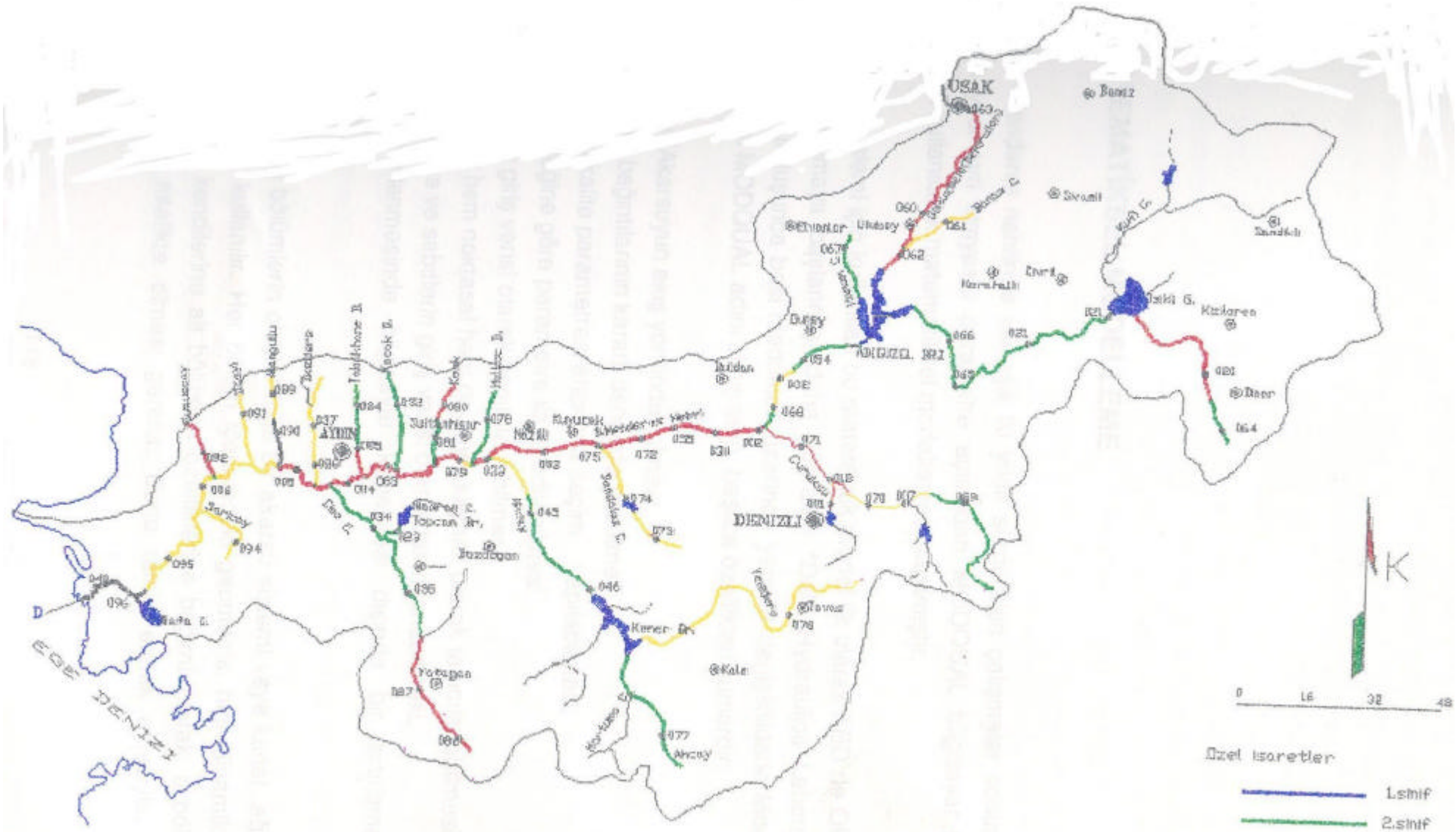
As a result of construction of storage structures in the basin, it is thought that there may be a decrease in feeding amount of groundwaters due to the change in flow regimes of rivers, creeks, streams, and side creeks which constitute the important part of groundwater feeding sources.



Şekil 3.7 Büyük Menderes Havzası Su Kalitesi Haritası (A,B,C)



Şekil 3-8: Büyük Menderes Havzası Su Kalitesi Haritası(NH3 -N, NO2-N ve NO3-N)



Şekil 3-10: Büyük Menderes Havzası Su Kalitesi Haritası(D)

4 Environmental objectives

Typology of the water bodies given at Figure 5.1, typology general state planning map given at Figure 5.2, Flow map given at Figure 5.3, Flowing water altitude map given at Figure 5.4 and map of protection areas in the basin given at Figure 5.5.

By considering the available reference data related with environmental objectives and the pollution load in water, the upper and mid sections of BM river, lower part of Çürüksu Creek, Bafa Lake and BM Delta taken as a reference.

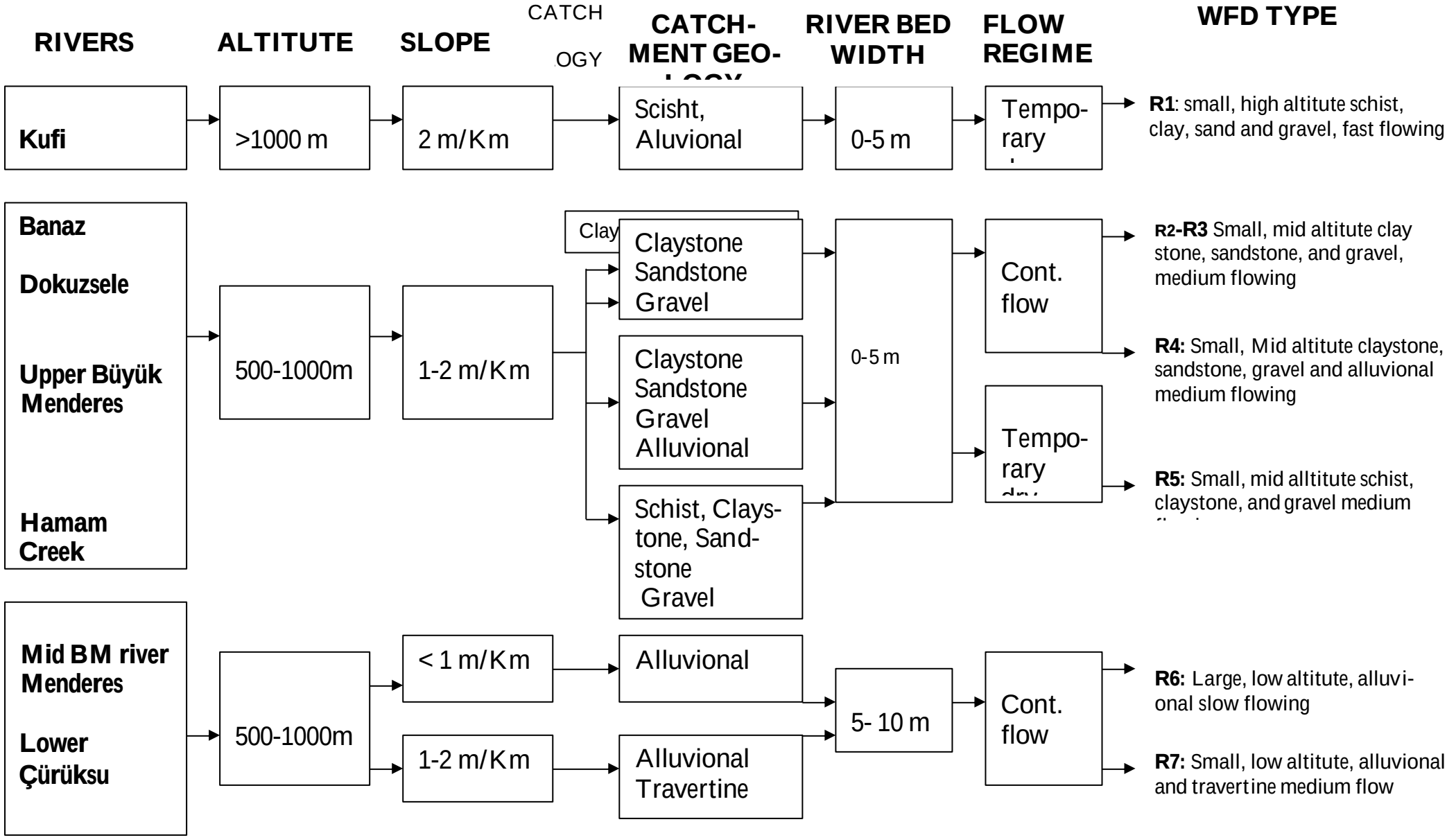
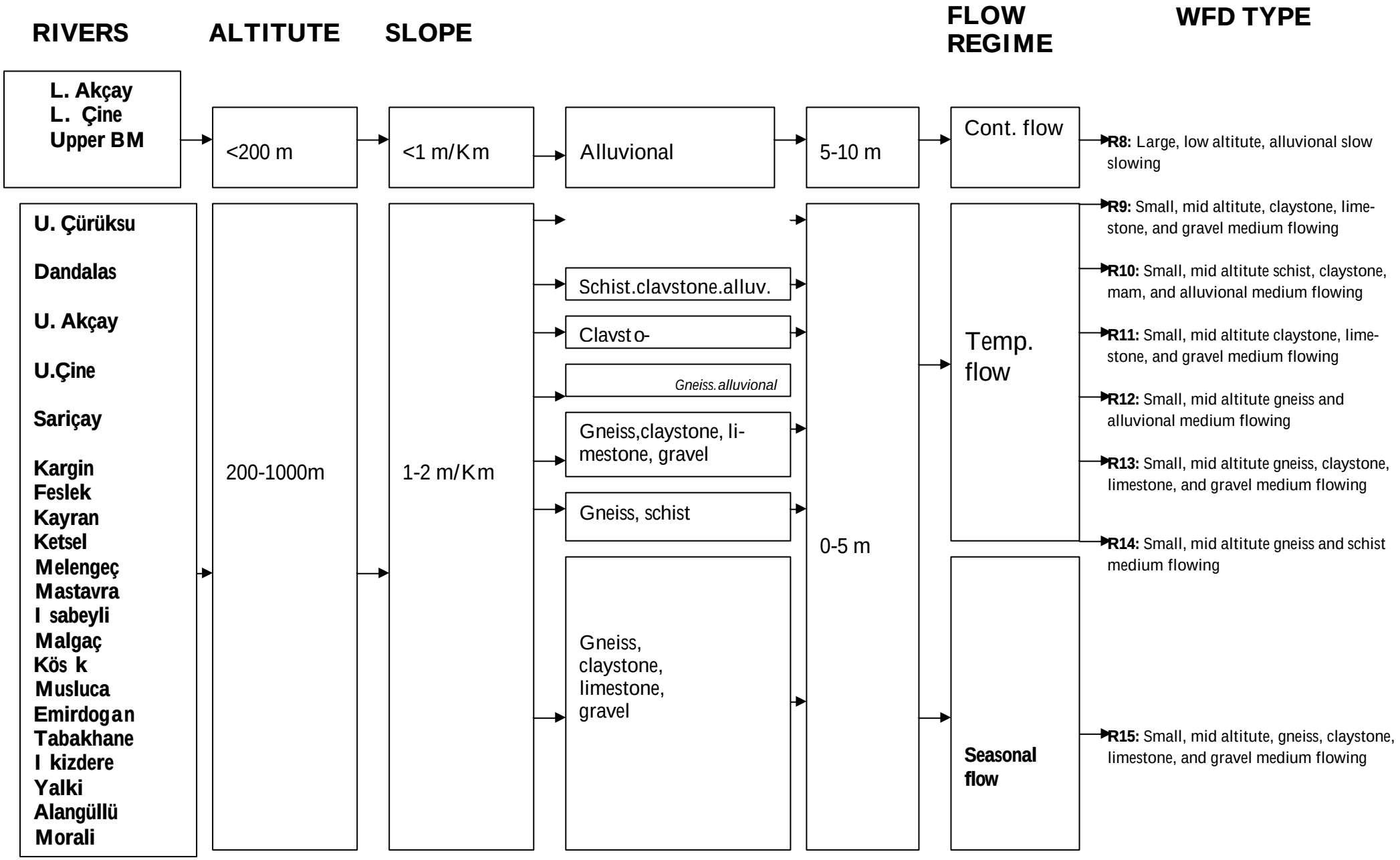


Figure 5.1 Typology of water bodies in BM river


RIVERS
ALTITUTE
SLOPE
FLOW REGIME
WFD TYPE
L. Akçay
L. Çine
Upper BM
<200 m
<1 m/Km
Alluvional
5-10 m
Cont. flow
R8: Large, low altitute, alluvional slow slowing
U. Çürüksu
Dandalas
U. Akçay
U.Çine
Sariçay
Kargin
Feslek
Kayran
Ketsel
Melengeç
Mastavra
I sabeyli
Malgaç
Kös k
Musluca
Emirdogan
Tabakhane
I kizdere
Yalki
Alangüllü
Morali
200-1000m
1-2 m/Km
Schist.clavstone.alluv.
Clavsto-
Gneiss.alluvional
Gneiss,claystone, li-mestone, gravel
Gneiss, schist
Gneiss, claystone, limestone, gravel
0-5 m
Temp. flow
Seasonal flow
R9: Small, mid altitute, claystone, lime-stone, and gravel medium flowing
R10: Small, mid altitute schist, claystone, mam, and alluvional medium flowing
R11: Small, mid altitute claystone, lime-stone, and gravel medium flowing
R12: Small, mid altitute gneiss and alluvional medium flowing
R13: Small, mid altitute gneiss, claystone, limestone, and gravel medium flowing
R14: Small, mid altitute gneiss and schist medium flowing
R15: Small, mid altitute, gneiss, claystone, limestone, and gravel medium flowing

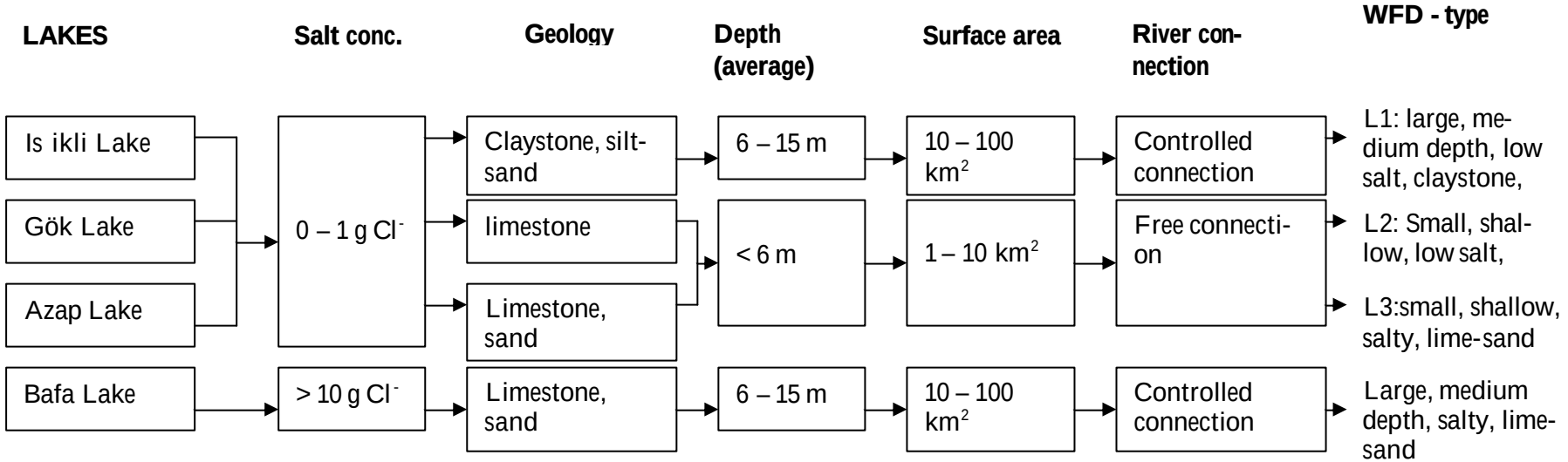


Figure 5.1 Continuing

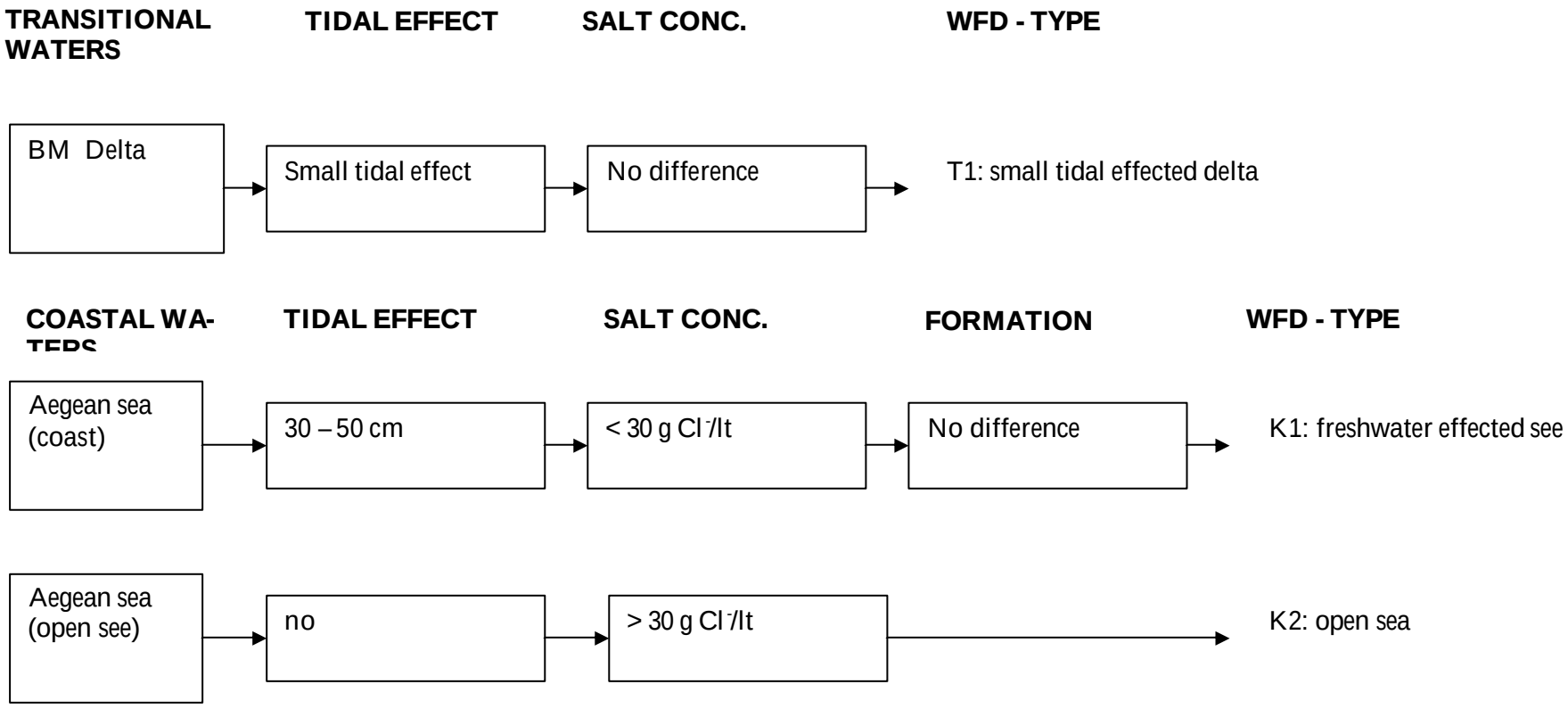


Figure 5.1 Continuing

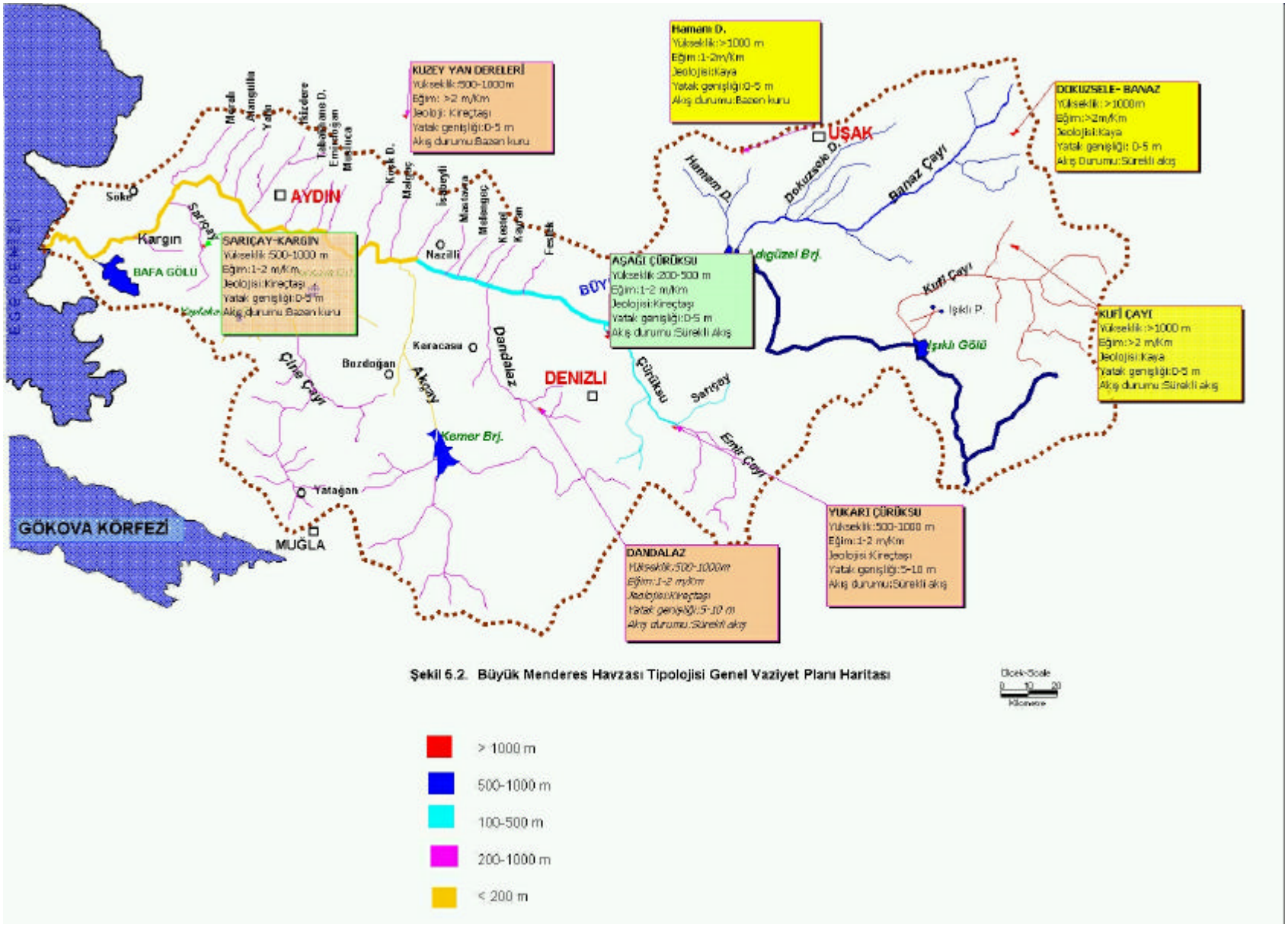


Figure 5.2 Typology of BM Basin

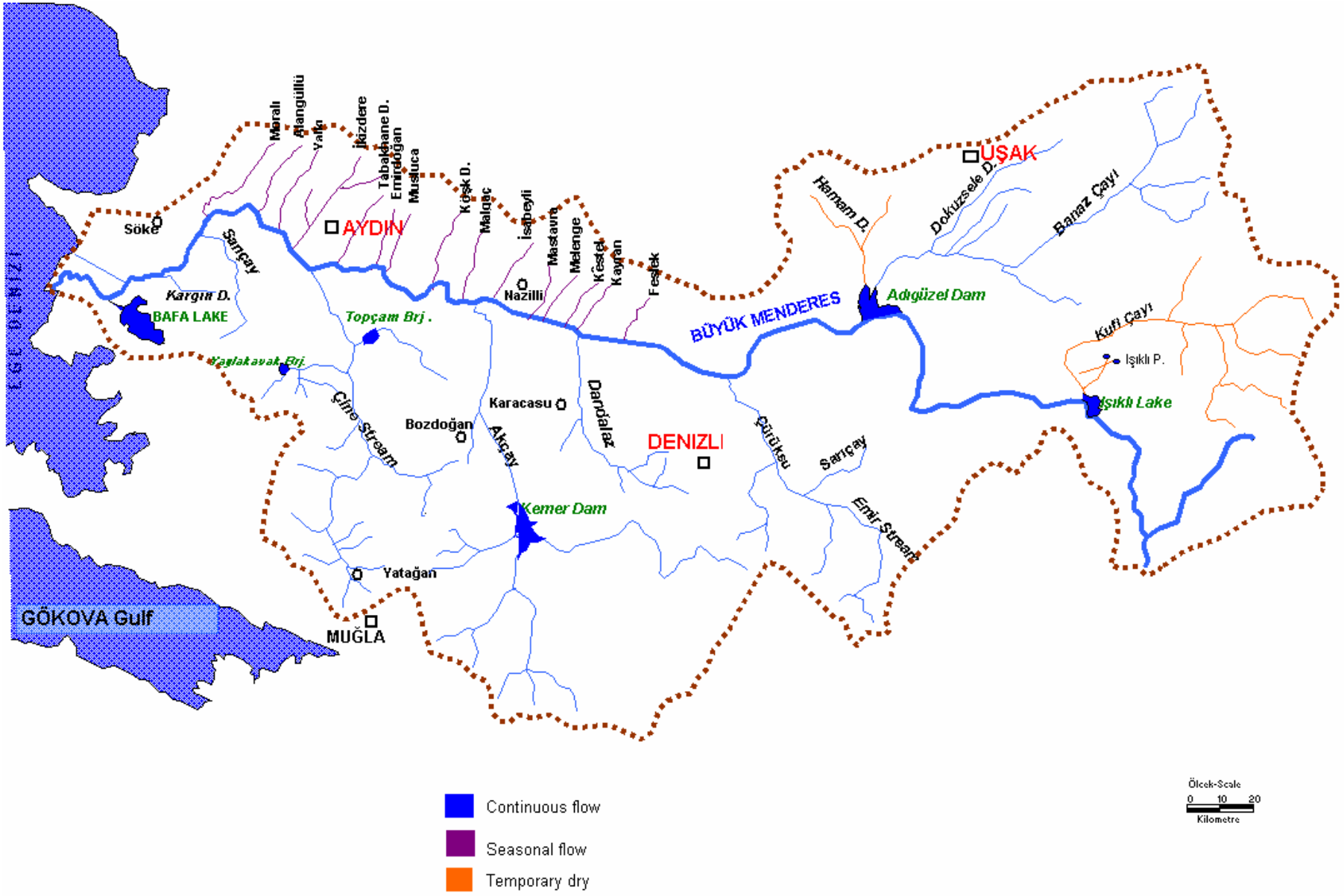


Figure 5.3 *Flow regime of BM basin*

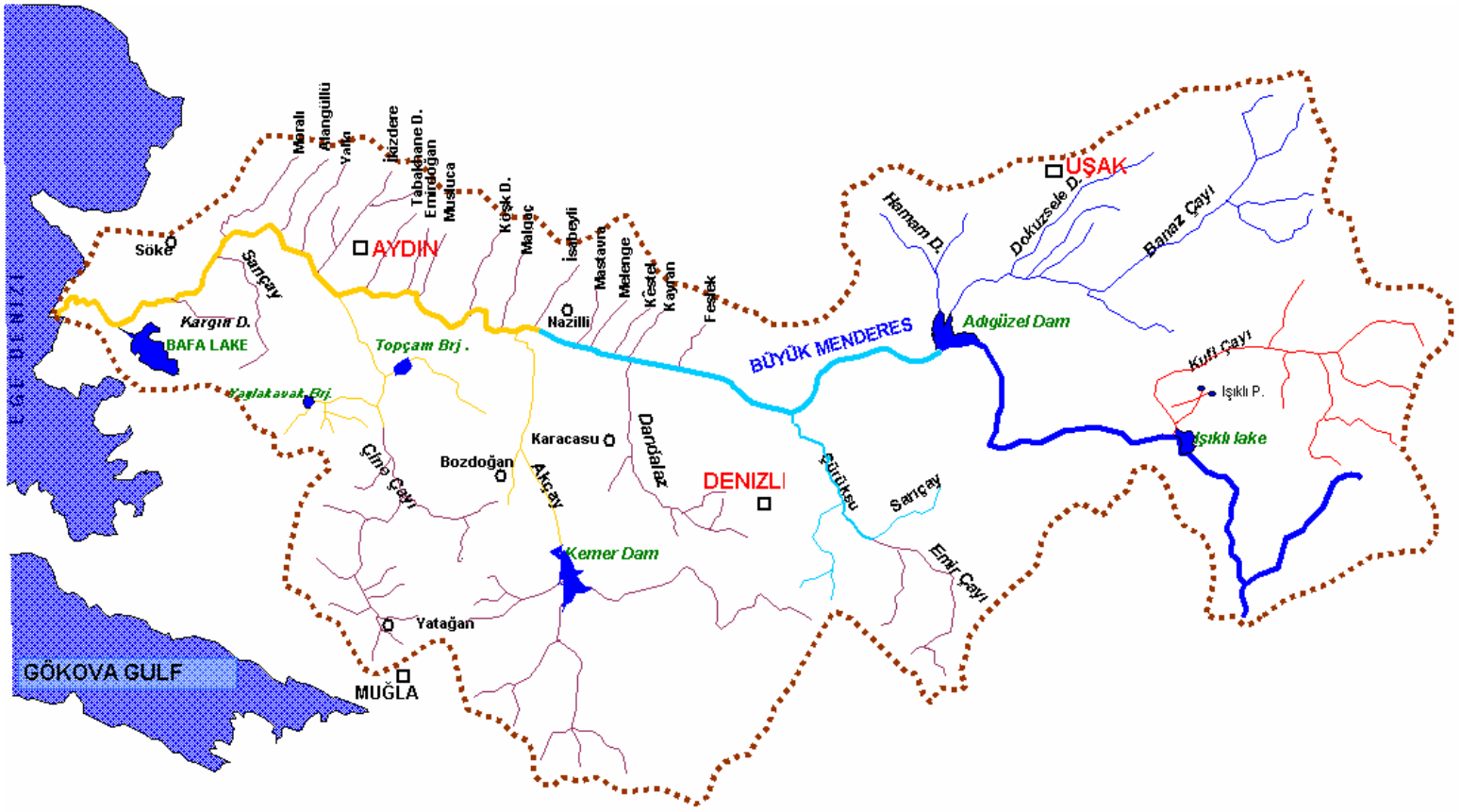


Figure 5.4. Altitudes of river and streams

Figure 5.4 Altitudes of river and streams

4.1 Upper and middle buyuk menderes river

4.1.1 Definition of water body

Heavily modified water

4.1.2 Categorisation

River

4.1.3 Typology

1. Upper BM river

R_1= Small, mid altitude, claystone, sandstone, gravel and medium flow.

2. Middle BM river

R_2= Large, low altitude, alluvional, slow flow.

4.1.4 Reference conditions

For the lower and middle sections of BM river required data for the reference conditions and existing situation could not found separately. For this reason these to sections considered together.
Since there is no similar and untouched river like BM, only the past and existing situation were considered.

Table 5.1 Reference conditions for Upper and Middle BM river

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical	X			
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish	X			
Morphology	X			

Reference data regarding the physicochemical quality conditions of Upper and Middle BM river is given in Table 5.2.

Table 5.2 Reference data regarding the physicochemical quality conditions of Upper and Middle BM river – data from 1986

st.No	PH	Electrical conduc-tivity (microm-hos/cm)	Na^{++} (mg/lt)	K^{+} (mg/lt)	$CO3^{-}$ (mg/lt)	$HCO3^{-}$ (mg/lt)	Cl^{-} (mg/lt)	$SO4^{-}$ (mg/lt)	Total salt	Boron (mg/lt)	%Na	SAR	NH3 (mg/lt)	wa-ter class
01	7.9	620	20.3	2.8	0.0	336	24.8	43.2	400	0.0	13	0.5	0.8	C_2S_1
02	8.1	920	19.5	3.5	0.0	360	31.9	0.4	590	0.20	7.40	0.4	0.3	C_3S_1
03	8.1	1000	25.7	5.6	0.0	305	49.7	211.3	640	0.20	10.4	0.5	0.14	C_3S_1
55	8.1	820	34.1	6.0	0.0	250	31.9	249.7	520	0.6	15	0.7	0.04	C_3S_1

The map of the sampling stations is given in Chapter 3; Figure 3.3. According to the interpretations of the local people, eel, carp, catfish were being hunted. Whereas no literature data or numerical data found on that.
No data on morphology of these sections were found.
The local expert fields of this water bodies are: chemical eng., agricultural eng., geology eng., hydrologist and biologist.

4.1.5 Existing condition:
There are available data on existing condition.

Table 5.3 Current quality elements of Upper and Middle BM river

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical	X			
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish				
Morphology	X			

The data on physicochemical quality elements is given before in Chapter 3, Table 3.1, stations numbered 20,21,66,54,32,02,30,55,03,74,46.
The physicochemical quality elements data of the year 2002 is given at Table 5.4. This table is prepared for comparison with stations of reference conditions.

Table 5.4 Physicochemical quality data of Upper and Middle BM river for August 2002

st.No	PH	Electrical conduc-tivity (mi-cromhos/cm)	Na^{++} (mg/lt)	K^{+} (mg/lt)	BOI (mg/lt)	KOI (mg/lt)	Cl^{-} (mg/lt)	$SO4^{-}$ (mg/lt)	DO (mg/lt)	Boron (mg/lt)	Org. Mad. (mg/lt)	NH_3.N (mg/lt)	Water class
01	8.0	1020	86.0	6.4	330	360	56.7	68	2.4	0.3	11.7	6.0	
02	8.0	930	66.2	12.2	3.8	52	92.2	67	8.2	0.4	3.7	0.30	
03	7.9	1250	110.2	11.0	4.1	24	120.5	192	8.6	0.4	1.8	0.3	
55	7.9	1140	89.2	8.8	3.5	36	109.9	212.0	8.0	0.8	1.6	0.0	

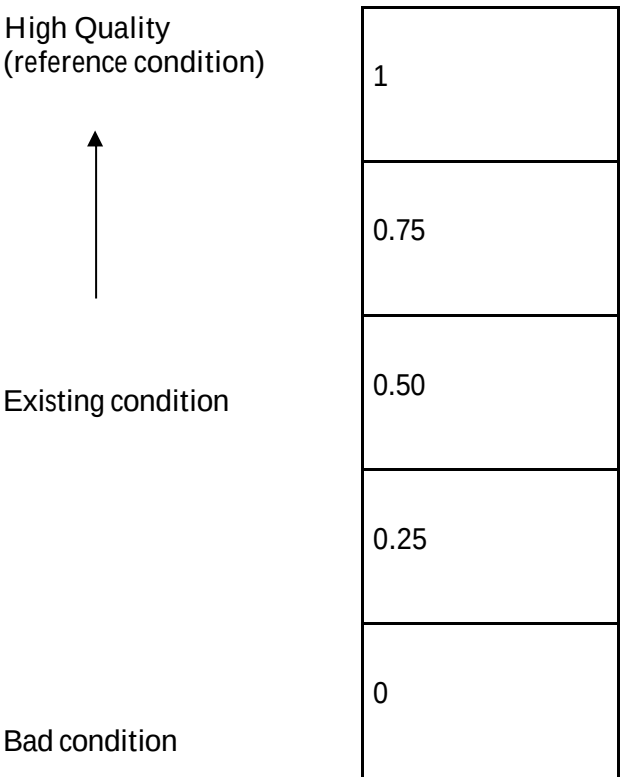
Compared with Tables 5.2 and 5.4, existing conditions of reference parameters are higher than past.

Morphology

According to field observations, its noted that due to water storage constructions built on main river stream and tributaries, erosion and sediment control works on streams and catchment and discharges to the river caused some morphological changes; such as, change in flora and fauna of river bed, river bed capacity, and flow speed of the water. For instance, due to decrease in quantity of water and its speed, the incisions on the river bed decreased. Whereas, as the ratio of sediment precipitation is increased, the cross-section of the river is decreased. In accordance with this, as the quality of water is intensely detoriated, amount of aquatic plants decreased. This situation resulted in changes in riverbed especially during rains seasons and flooding.

4.1.6 Ecological objectives

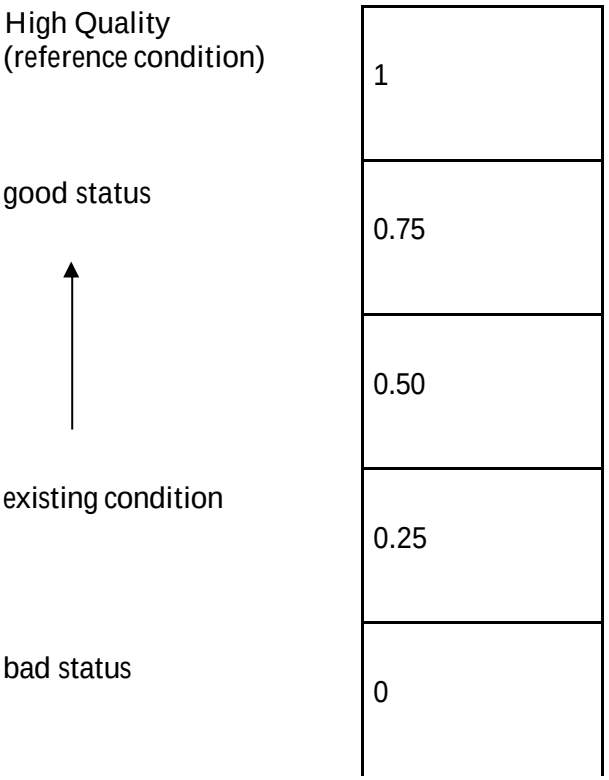
1- Upper BM river



EQR= 0.5

- To increase oxygen,
- To bring back catfish and carp,
- To restore morphologically

2-Middle BM river



EQR= 0.33

- To increase oxygen;
- To bring back catfish and carp;
- To restore morphologically;
- To decrease boron concentration.

4.1.7 Program of Measures

Upper BM river

- Full treatment of discharge waters;
- provision of controlled use of agricultural pesticide/herbicide and fertilizers;
- erosion and sediment control.

Middle BM river

- Full treatment ofdischarge waters;
- provision of controlled use of agricultural pesticide/herbicide and fertilizers;
- erosion and sediment control;
- to prevent discharge of geothermal waters to river or to tributaries.

Experts field on showing existing condition: chemical eng., agricultural eng., geological eng., hydrologist, biologist, environmental eng., and forestry eng.

4.2 Lower çürüksu

4.2.1 Definition of water body

Heavily modified.

4.2.2 Categorisation

River.

4.2.3 Typology

R= Small, low altitude, alluvional and travertine, medium flow.

4.2.4 Reference conditions

There is no other similar untouched water body in the basin. For this reason the past conditions taken as reference, since there are some data existing.

Table 5.5 Reference parameters of Çürüksu Creek

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical	X			
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish				
Morphology				

Data on physicochemical quality elements of Çürüksu creek is given in Table 5.6.

Table 5.6 Data on physicochemical quality elements of Çürüksu creek – data of 1986

st.No	PH	Electrical conductivity (micromhos/cm)	Na^{++} (mg/lt)	K^{+} (mg/lt)	CO_3^{-} (mg/lt)	HCO_3^{-} (mg/lt)	Cl^{-} (mg/lt)	SO_4^{-} (mg/lt)	Total salt	Boron (mg/lt)	%Na	SAR	NH_3 (mg/lt)	Water class
18	8.0	1100	16.9	2.7	0.0	457	56.7	302.6	700	0.0	4.50	0.30	0.30	C_3S_1

Local expert fields: chemical eng., agricultural eng., geological eng., hydrologist, biologist.

4.2.5 Current situation

Monitoring data on existing situation of Çürüksu creek is given in Table 5.7.

Table 5.7 Existing quality elements of Çürüksu creek

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical	X			
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish				
Morphology	X			

The data on physicochemical quality elements is given before in Chapter 3, Table 3.1, station numbered 18.

Table 5.8 Physicochemical quality data of Lower Çürüksu creek for August 2002

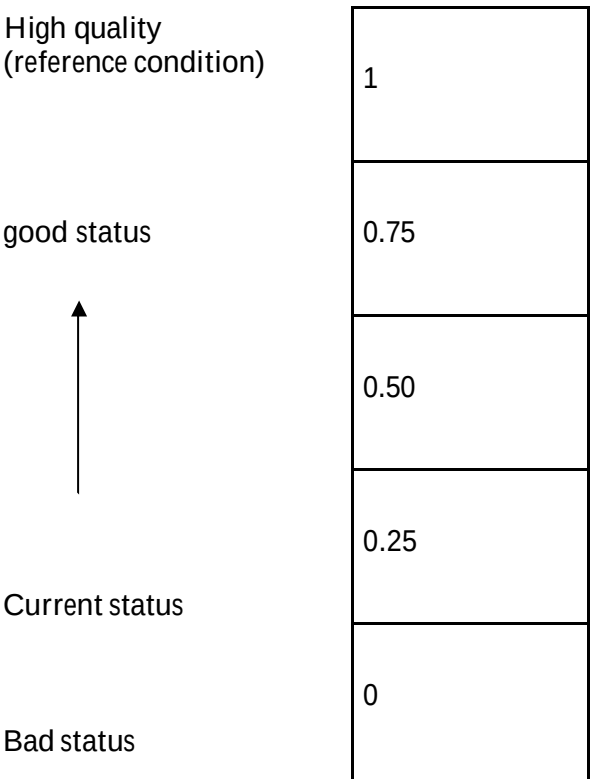
st.No	PH	Electrical conduc-tivity (microm-hos/cm)	Na^{++} (mg/lt)	K^{+} (mg/lt)	BOI (mg/lt)	KOI (mg/lt)	Cl^{-} (mg/lt)	SO_4^{-} (mg/lt)	DO (mg/lt)	Boron (mg/lt)	Org. Mad. (mg/lt)	NH_3.N (mg/lt)	Water class
18	8.0	3100	266	19.4	390	480	326.1	780	5.4	0.3	7.4	1.0	

Compared to the Table 5.6 and 5.8 all the current values of parameters increased one or two fold.

Morphology; a proportion of creeks water is taken by DSIs main irrigational canals. For this reason, especially in the summer times water amount significantly decreases. This also leads high pollution due to discharge of untreated industrial and domestic wastewater around Denizli Province and its surrounding. Consequently this high pollution negatively effects biological life in and around the creek. In addition, improvement works and other erosion and sediment control works changes the morphology of the riverbed. Moreover, due to geology of river bed, there is high calcium sulphate and calcium carbonate ions existing. To precipitate and separate these ions in irrigation canals, DSI had some works.

As a result of all these works; depending on the time of the activity, riverbed enlarged, consequently water carrying capacity increased. Whereas, due to deterioration of flora if riverbed, decrease in water amount and flow, increase in sediment precipitation and etc. the riverbed narrowed and water carrying capacity decreased again. In addition the deterioration of biological life of river may also cause changes in riverbed.

4.2.6 Ecological objectives



EQR= 0.33

- To increase oxygen in water;
- morphological restoration of riverbed;
- to decrease boron concentration in water;
- to decrease concentration of sulphate and calcium carbonate in water.

4.2.7 Program of measures

- Discharge of wastewaters with limits in related standards;
- provision of controlled use of agricultural pesticide/herbicide and fertilizers;
- provision of erosion and sediment control;
- to prevent discharge of geothermal water to main river and its tributaries;
- precipitation or decrease of sulphate and calcium carbonate concentration in water.

4.3 Bafa Lake

4.3.1 Definition of water body

Transitional water

4.3.2 Categorisation

Lake.

4.3.3 Typology

L = Low altitude, medium depth, large, very brackish (salty), buffer zone with controlled connection.

4.3.4 Reference conditions

There is no other similar featured untouched lake in basin. For this reason past data used as reference.

Table 5.9 Existing Quality elements Bafa Lake

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical		X		
Phytoplankton		X		
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish		X		
Morphology		X		

The physicochemical reference data of Bafa Lake is given in Table 5.10.

Table 5.10 Reference data on Physicochemical quality data of Bafa Lake

Sampling st.	PH	Electrical conductivity (micromhos/cm)	Na^{++} (mg/lt)	K^{+} (mg/lt)	CO_3^{--} (mg/lt)	HCO_3^{-} (mg/lt)	Cl^{-} (mg/lt)	SO_4^{--} (mg/lt)	Total salt	Boron (mg/lt)	%Na	SAR	NH_3 (mg/lt)	Water class
Bafa lake (1986)	8.2	890	46.3	6.2	0.0	206	113.4	120.1	570	0.0	20.6	1.0	0.18	C_3S_1
Bafa lake exit (1987)	8.3	8000	13800	58.0	0.1	500	2368	350.6	5120	0.0	72.70	18.5	0.5	Out of classification

No current data found on physicochemical quality elements. Whereas, field observations showing that current condition is worse than the reference conditions

Reference data on phytoplankton family and genus of Bafa Lake is given in Table 5.11.

Table 5.11 Data (reference) of phytoplankton of year 1973

Cyanophyceae		**Bacillariophyceae**		**Chlorophyceae**		**Euglenphycea**		**Dinophycea**		**Rhodophycea**	
Anabaena	+	Asreionella	-	Ankistrodesmus	-	Euglena	-	Ceratium	-	Lemanea	-
Anabaenopsis	+	Amphora	+	Curcigenia	-						
Aphanocapsa	-	Amphiphora	+	Chlorella	+						
Aphanizomenon	-	Chaetoceros	-	Closterium	+						
Chrococcus	-	Cyclotella	+	Cosmarium	-						
Gomphosphaeria	-	Campylodiscus	+	Geminella	-						
Lyngbya	-	Cymbella	-	Mougetoia	-						
Merismopedia	+	Cocconeis	+	Monoraphidium	-						
Microcystis	-	Ceratoneis	-	Myrmesia	+						
Nostoc	+	Closterioides	-	Oocystis	+						
Oscillatoria	+	Cymatopleura	+	Pediastrum	+						
Phormidium	+	Coloneis	+	Planktosphaeria	+						
Pseudoanabaena	-	Diatoma	+	Scenedesmus	+						
		Diploneis	+	Spirogyra	+						
		Eunotia	+	Straurastrum	+						
		Fragilaria	+	Tetraedron	-						
		Gyrosigma	-	Tetrallantos	-						
		Gomphonema	+	Teiling	-						
		Melosira	+	Tetradesmus	+						
		Navicula	+	Ulotrix	-						
		Nitzschia	-	Vestalla	+						
		Neidium	+								

Cyanophyceae		**Bacillariophyceae**		**Chlorophyceae**		**Euglenphycea**		**Dinophycea**		**Rhodophycea**	
		Pinnularia	+								
		Pleurosigma	-								
		Roicospheria	+								
		Rhopaledia	+								
		Synedra	+								
		Surirella	+								
		Stephanodiscus	+								
		Tabellaria	-								

Fish species of Bafa Lake detected before the year 1988 (reference data) given in Table 5.12.

Table 5.12 Fish species of Bafa Lake before 1988

Sazan	Carp- *Cyprinus carpio*
Has kefal (topan)	
Altinbas kefal(ceran)	
Ince dudakli kefal (mavri)	
Yilan baligi	Eel
Deniz levregi	Sea Bass
Yayin	Catfish
Ulubat baligi	
Karaburun	
Biyikli balik	
Gümüs baligi	
Tatli su kaya baligi	
Sivrisinek baligi	
Horozbina	

Reference data on morphological quality elements of Bafa Lake is given in Table 5.13.

Table 5.13 Morphological reference data of Bafa Lake for the year 1957

altitude (m)	Area (ha)	Volume (hm^3)	Depth (m)
+2.0	6708	692.42	10.32

Local experts fields: chemical eng., agricultural eng., geological eng., hydrologist, biologist, aqua products eng.

4.3.5 Current situation

There exists data showing the current condition of the lake.

Table 5.14 Existing quality elements data of Bafa lake

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical		X		
Phytoplankton		X		
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish		X		
Morphology		X		

Data on physicochemical elements is given Table 5.15.

Table 5.15 Data on physicochemical quality elements Bafa lake for the year 1992

Parameters	amount
PH	8.5
Electrical conductivity	15 000 micromhos/cm
Na+	3391 ppm
K+1	133 ppm
Organic matter	6.51ppm
CO3-2	534 ppm
HCO3-	1495 ppm
Cl-	3496 ppm
SO4-2	767 ppm
Dissolved oxygen	7.7
Total salt	6406 ppm
Alkalinity	230 ppm
Ammonia	0.89 ppm
BOI	3 ppm
Eutrophication	% 30

In 1992 analysis it has been seen that heavy metal concentration in Bafa lake is lower then aqua products standard concentrations.
Data on family and genus names of phytoplankton of Bafa lake given in Table 5.16.

Table 5.16 Family and genus names of phytoplankton of Bafa lake of the year 1993

Cyanophyceae		Bacillariophyceae		Chlorophyceae		Euglenphycea		Dinophycea		Rhodophycea	
Anabaena	+	Asreionella	+	Ankistrodesmus	+	Euglena	+	Ceratium	+	Lemanea	+
Anabaenopsis	-	Amphora	+	Curcigenia	+						
Aphanocapsa	+	Amphiphora	-	Chlorella	+						
Aphanizomenon	-	Chaetoceros	+	Closterium	+						
Chrococcus	+	Cyclotella	+	Cosmarium	-						
Gomphosphaeria	+	Campylodiscus	+	Geminella	+						
Lyngbya	-	Cymbella	+	Mougetoia	+						
Merismopedia	+	Cocconeis	+	Monoraphidium	-						
Microcystis	+	Ceratoneis	+	Myrmesia	-						
Nostoc	-	Closterioides	-	Oocystis	+						
Oscillatoria	+	Cymatopleura	-	Pediastrum	+						
Phormidium	-	Coloneis	-	Planktosphaeria	-						
Pseudoanabaena	-	Diatoma	+	Scenedesmus	+						
		Diploneis	+	Spirogyra	+						
		Eunotia	+	Straurastrum	-						
		Fragilaria	+	Tetraedron	+						
		Gyrosigma	+	Tetrallantos	-						
		Gomphonema	-	Teiling	-						
		Melosira	+	Tetradesmus	-						
		Navicula	+	Ulotrix	+						
		Nitzschia	+	Vestalla	-						
		Neidium	-								
		Pinnularia	+								
		Pleurosigma	-								
		Roicospheria	-								
		Rhopaledia	-								
		Synedra	+								
		Surirella	+								
		Stephanodiscus	-								
		Tabellaria	+								

Fish species of Bafa Lake in the years of 1992-1993 are given Table 5.17.

Table 5.17 Fish species of Bafa lake in the years 1992-1993

Fish species
Has kefal
Altinbas kefal(ceran)
Ince dudakli kefal(mavri)
Yilan baligi

Current morphological condition of Bafa lake:
In and around Bafa lake:

- prevent lands from floods;
- to provide controlled connection between BM river and Bafa Lake;
- to prevent saltation of agricultural lands by irrigation;
- to control lakes water level;
- to control sediment transport to the lake;
- to conserve ecological balance in the lake;
- there are some significant changes in the lakes morphology due to some constructions around the lake to protect the water quality.
  These constructions are:
  1. Bafa lake Fishpond (Dalyan)
  2. Flood protection constructions
     - B. Menderes right coast (Söke) Dike
     - B. Menderes left coast (Bafa lake) Dike
     - B. Menderes River closing construction
     - Serçin Dike
     - Inflatable regulator (fishpond regulator)

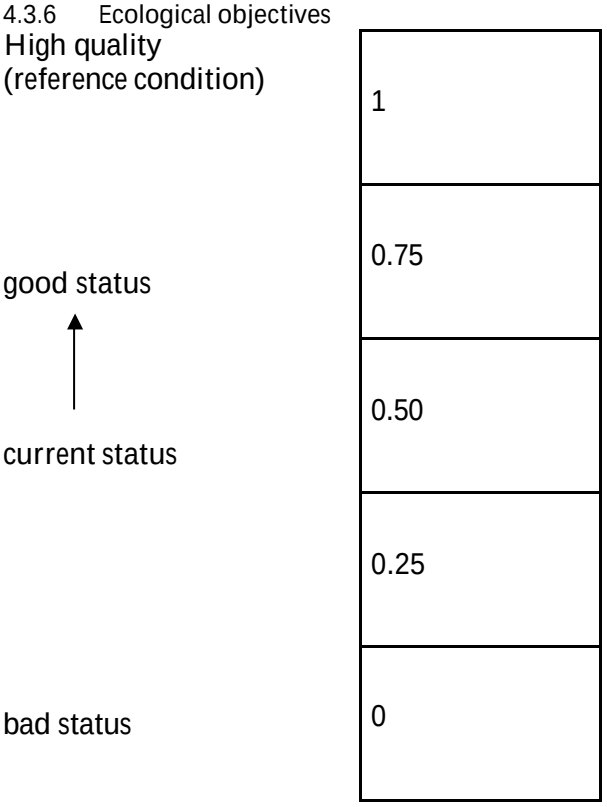
Morphological data (1994) of Bafa lake given in Table 5.18.

Table 5.18 Morphologic data (existing) of Bafa lake for the year 1994

Altitude (m)	Area (ha)	Volume (hm^3)	Depth (m)
+2.0	6708	692.42	10.00

Experts fields are: chemical eng., agricultural eng., geological eng., hydrologist, biologist, environmental eng., forestry eng., aqua products eng.

4.3.6 Ecological objectives



EQR= 0.66

- To increase oxygen in water;
- to increase light penetration of water;
- to decrease algae in lake;
- to decrease nutrient concentration in the lake;
- to increase fish population in lake;
- to decrease salt concentration of the lake;
- to increase bird population coming to the lake.

4.3.7 Program of measures

- To provide good quality of water entrance from BM river;
- controlled use of agricultural pesticide/herbicide and fertilizers;
- to decrease sediment load coming from BM river;
- to control water level;
- to decrease anthropogenic influences (fishery, hunting, agricultural activities);
- to conserve existing status of the lake;
- to obey provisions of international agreements.

4.4 Büyük menderes delta

4.4.1 Definition of water body

Transitional water.

4.4.2 5.4.2 Categorisation

Delta.

4.4.3 Typology

D = Small, tidal influenced delta.

4.4.4 Reference conditions

There is no other delta with similar features in the basin. Information on the past data is given in Table 5.19.

Table 5.19 Reference elements of B. Menderes Delta

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical				
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish			X	
Morphology				
Birds			X	

Reference information on fish species of B. Menderes Delta:
Önceki yillarda kefal baligi türlerinin 80–100 ton/yil, çipura ve levrek baliginin 30 ton/yil, dil baliginin 7-8 ton/yil ve yilan baliginin ise 2 ton/yil olarak avlandigi belirlenmistir.
Reference information on bird species of B. Menderes Delta:
According to the consultations with local people, its known that king fisher (Alcedo attis) use to live in the delta.
There is no reference data found on morphology of B. Menderes Deltas.
Experts fields: chemical eng., agricultural eng., geological eng., hydrologist, biologist, environmental eng., forestry eng., aqua products eng., ornithologist.

4.4.5 Current status

Monitoring data showing the current status is given in Table 5.20.

Table 5.20 Data on current status of B. Menderes Delta

Quality conditions	River	Lake	Transitional waters	Coastal waters
Physicochemical				
Phytoplankton				
Phytobenthos				
Macrophytes				
Macro-algae				
Angiosperms				
Macro-invert				
Fish			X	
Morphology			X	
Birds			X	

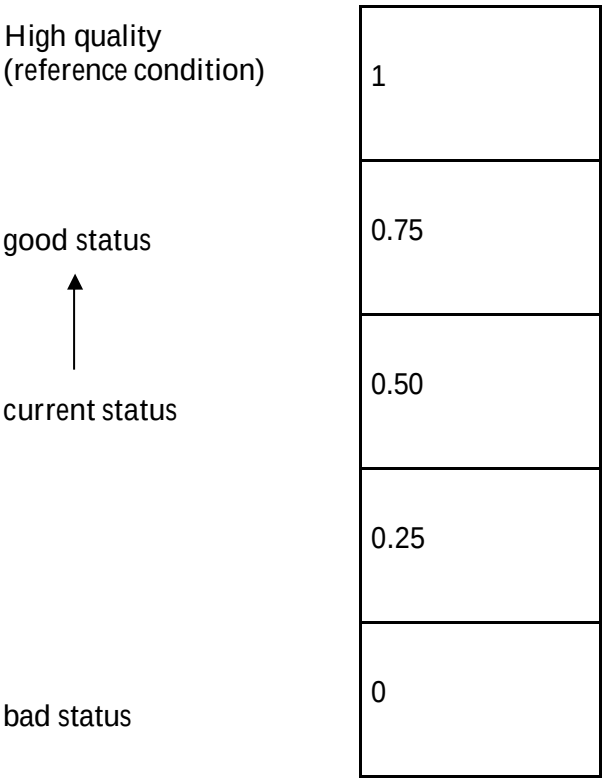
Current information on fish species of B. Menderes Delta
Mevcut haliyle topan kefal baligi 40 ton/yil, çipura ve levrek baligi 1 ton/yil, dil baligi 1 ton/yil ve yilan baligi ise 500 kg/yil olarak avlanmaktadir.

Current information on bird species of B. Menderes Delta
Fisher kins is no more living the delta.

Current morphological data on B. Menderes Delta
B. Menderes Delta has been formed in neolitic era by the sediment load of B. Menderes river. Delta has formed by salty swamps and two big main lagoons; North (Karina) and South lagoons. The morphology of delta has changed by

the time due to water storage constructions and erosion and sediment control works on the BM river. All these resulted in the decrease in the extend of the delta. Despite all these, the sediment load of many years has caused and altitude difference between sea and the delta. As a result water amount in lagoons and fish population negatively effected. Besides the economical products supplied by the delta, nationally and internationally protected birds, endemic flora and the biological richness of the delta is under threat due to pollution carried by BM River to the delta. As a result of all these mentioned problems the area of wetlands decreased. Today 28 km^2 of total of 100 km^2 delta had transformed into wetland.
Experts fields: chemical eng., agricultural eng., geological eng., hydrologist, biologist, environmental eng., forestry eng., aqua products eng., ornithologist.

4.4.6 Ecological objectives



EQR= 0.66

- To bring back king fisher;
- to provide controlled sediment entrance;
- to prevent the use of chemical pesticide/herbicide and fertilizers;
- to increase fish population;
- to increase bird population.

4.4.7 Program of measures

- to increase the water quality of BM River;
- to decrease the anthropogenic influences (fishery, hunting, agricultural activities);
- to protect current status;
- to obey the standards of international agreements.

5 Program of measures

Protection of quality and quantity of surface water and groundwater, provision of the continuity of aquatic life by preventing further pollution of waters, control of erosion by controlling floods, prevention of water and soil pollution, rationalist and efficient use of water and soil in basin scale, fulfilling the criteria for national parks and other protected areas are important measure for the future sustainable use and provision of ecological balance in the basin. To achieve these following measures are suggested.

5.1 Planning and Organisation

First of all, the current status of the basin should be defined. Then sectoral requirements and their priorities should be defined by consulting the local groups and people. According to defined requirements, long term and short term settlement and environmental plans should be prepared. While preparing the plans economical and rational criteria should be taken without any political influence and these criteria should also be considering while resource partitioning. In the frame of these plans, settlement areas, infrastructure projects, agricultural and non-agricultural lands, aqua product sites, meadows, sources of surface and groundwater resources, location and potential of geothermal water resources, areas of organized industrial sites and small industrial sites, tourism, historical, protection areas, roads should be identified. In the planning projects, cost-benefit analysis should be done and participation of all related institutions should be provided.

5.2 Monitoring and Evaluation

To protect the quality and quantity of aqua products in sea and inland waters, to provide economic asset from these resources, to provide continuity of aquatic life by preventing pollution, to prevent and develop the quality and quantity of drinking, industrial and irrigational waters, receiving water bodies and potential polluters should be strictly monitored.
For this aim, firstly, all the work done related to the quality and quantity of surface and groundwater should be reanalysed and lacking points should be defined. To establish a suitable and efficient monitoring network, required equipment and qualified personnel should be provided, and then for the analysis and evaluation of the data, the technology and the capacities of the existing laboratories should be renewed. The laboratories of the different institutions related with the subject should be centralised. A centralised data base system should be established and while preparing the program of measures these data should be considered.
In addition, the coordination and cooperation with universities and other research institutions should develop to get best benefit from their researches.

5.3 Removal of wastes

Wastes should be treated according to the standards mentioned in Environmental law, numbered: 2872, and its related regulations and circulars. When in the aqua product area, related Aqua Products Law, numbered 1380, should be considered.

5.3.1 Removal of Solid Wastes

For the removal of domestic, industrial, medical and dangerous wastes, the local authorities of close settlement areas (cities) should develop and manage common dumping/removal sites, especially for minimising the environmental effects and financial costs. Together with this the system of separation of solid wastes at the source should be developed. For the construction of recycling units, entrepreneur should be supported and encouraged by the government and when its needed possibilities of low interest international loans should be provided.

While recycling the organic wastes, the side products should be valued for the production of energy and compost.

The price of the waste collection/removal system should developed according to number of people living in houses, income level, conditions of the region, the amount of supplied investments and services provided by the local authorities.

5.3.2 Removal of Wastewaters

To dispose and avoid from the hazardous effects of industrial wastewaters, first of sector based organised industrial sites (OIS) should establish and existing industries should move to these OIS, and then construction and use of common treatment sites should be obliged. Treatment plants should be strictly monitored according to related regulations and it should not be allowed to any treatment side without having necessary discharge permission. The same enforcements should also be applied to the municipalities for the treatment of domestic wastewater and no governmental support should be supplied to the municipalities which do not have treatment plants.

For the first phase investment costs and implementation of above mentioned wastewater treatment plants, certain amount of government support should be provided. In addition to this discount for the electricity cost should be provided. Entrepreneurs who build and implement wastewater treatment plants according to the related standards should be supported by providing easiness in exporting. Whereas the one, having no WWTP should be enforced and seriously punished.

5.4 Agricultural Measures

For the development, protection and improvement of the existing situations of water and soil resources below mentioned agricultural measures should be taken into account. These measures will provide sustainability of the resources and at the same time will prevent the negative effects to the environment.

5.4.1 In-Field Improvement Services

For minimising the water loss and improving the efficiency of plant-soil interactions, the measures of land re-plotting and land levelling, according to type of irrigation, should be provided.

The required drainage systems should be developed together with irrigation systems in the fields to clean the salted lands and to prevent the further saltation

Best irrigation techniques should be applied by considering the soil, topography, climate and plant pattern in the basin. When the conditions are suitable, the pressured irrigation techniques should be applied to minimise the water loss. For the management, maintenance and repairing of the irrigation and drainage systems, a responsible unit should be established and the efficiency of the irrigation unions should be improved with a legal status.

To use the modern agricultural techniques in more applicable and economical way, further split of the lands should be prevented by arranging the inheritance law. The land re-plotting should be done by a single institution.

5.4.2 Agricultural Production Planning

Selection of the most appropriate plant pattern by considering the characteristics of soil, climate and irrigation system, is very important. In the basin scale, planning of agricultural products should be planned and with the introduction of new species the alternative ways should be improved. In addition to these, crop rotation should be done, with the consultation of research institutions.

Agricultural policies and implications should be organised as state policy and these policies should be long termed and continuous. Agricultural policies should not change according to each government.

5.4.3 Use of Agricultural Pesticide/Herbicide and Fertilizer

Although the agriculturally using chemical fertilizers and pesticides/herbicides increase agricultural production, they also have some negative effects on ecological balance. Especially excess amount of nitrate and phosphate, has some serious negative effects of water and soil, consequently disturbing natural balance. With the application of irrigation, use of these substances increased. For this reason, controlled use of these substances should be achieved through application at right time and quantity. The seller of these substances should also be controlled and selling should be done through recipes with a consultation of technical help.

Mobile laboratories should be established to inspect the residues of these chemicals applied to the agricultural products, especially at marketplaces.

To control the use of chemical fertilizers, soil of the land should be analysed to determine fertilizer need. At the same time use of organic ways of agriculture should be encouraged and farmers should be informed on techniques and application of it.

5.5 Use of Surface Water and Groundwater

Sectoral use of water in the basin scale should be planned by considering needs and priorities.

Heavy sanctions should be applied for the activities which has negative effects on the quality of surface and groundwater. These sanctions should be able to ban the activities when it is necessary.

To protect the quality and quantity (safely usable) of groundwater, illegal well and use should be prevented and related regulations rearranged with necessary updates and heavy sanctions. The inspection of these issues is another point to be take care off.

Since the surface and groundwater is closely connected, firstly surface water projects should be developed, and then measures should be taken to conserve and improve quality.

5.6 Erosion and Flood Control

For controlling and preventing erosion and floods, dams, reservoirs and similar water storage constructions should be constructed; in catchment areas of surface water resources necessary measurements should be taken, e.g. planting and reforestation; required measurements should also betaken in the tributaries and sub-tributaries to control the flow of water and to prevent erosion.

Modern agricultural techniques; right way of ploughing and irrigation, should be applied and most suitable crop pattern should be chosen. Especially in the areas of high flood risk, flood preventive plant species should be planted.
In addition, meadows should also be protected and improved.

5.7 Geothermal Waters

BM Basin is the Turkeys one of the richest region in having geothermal water resources. For this reason, this region is very important for benefiting from the geothermal resources by energy production, heating, for green housed and other similar uses. Whereas these resources contain high concentration of boron element, which accumulates in soil together with other parameters, and in turn decreases the productivity of land and negatively affects production. For this reason geothermal water should not be discharged to other surface and groundwater reserves, instead it should be reinjected to aquifer. If reinjection is not possible technically, geothermal water should be discharged to sea with sealed pipeline in accordance with related regulations.
In small scale establishments where geothermal waters using for touristic, health and other purposes, such as, thermal springs and Turkish baths, the use of geothermal waters should be taken under control with an overall plan.

5.8 Coastal and Transition Waters

No discharge to coastal and transitional waters should be allowed outside the standards of related regulations.
The regions where coastal and transition waters meets provides very important areas for the aquatic life and other biological life. The biodiversity and endemism in these regions should be carefully protected; consequently, these regions should be under protection to prevent any disturbance to ecological balance, and any fishing and hunting activities should also be taken under control.

5.9 Pricing of Water

Pricing having a great importance in any use of water and recycling of wastewater. Pricing should be planned by considering the new investments and maintenance of existing systems. An effective enforcement system should be developed to provide the timely and complete payment of water use.
Current system of licensing should be revised and another licensing system on quantity of water use should be developed. While pricing the quality and quantity of water, regional and local conditions should be taken into account. The pricing according to the areas of use will provide efficient use of water.

5.9.1 Pricing of Irrigational Water

Pricing should be determined according to volume used in unit area depending on the crop type and water requirement. While determining the prices, in addition to points mentioned in Section 7.9., local farmers associations like irrigation unions, cooperatives, the local conditions and economic asset expected from each type of crop should be considered and the determined prices should also be approved by DSI.

5.9.2 Pricing of Drinking Water and Other Uses

In pricing of these waters, way of getting water, amount used and social conditions of users should be considered. In this system, if water use exceeds the amount determined by related municipal councils, an extra price should be added to encourage less use.

5.9.3 Pricing of Groundwater

While pricing, conditions, cost of energy used, time, purpose of use and amount should be considered.

5.9.4 Pricing of Wastewater

Wastewater should be recycled and hazardous effects should be treated according to mentioned standards in related regulations.
Every municipality should construct its own treatment plan by considering existing and potential industrial establishments in its borders and future needs.
Household and other users should pay according to amount they use and pollution load they produce. This prices, first, should be determined by municipal council, then should approved related industry and ministries.
Money collected from wastewater by the municipalities should not be used for any other purpose and should be open to inspection.

5.10 Educational and Publication Works

- For the irrigational, domestic, touristic, industrial, health and other uses of water and for protecting resources and providing sustainability, a widespread and effective educational system should be developed and this system should cover all parts of public;
- use of media should have priority;
- by establishing village groups, with support of technical personnel, problems of farmers and their solutions should be determined;
- farmers education programs should be developed and arranged for the use of modern irrigation techniques; controlled use of fertilizers, pesticides, herbicides; selection of crop patterns; crop rotation; new agricultural techniques; production of locally adapted seeds and seedlings.

5.11 Institutional and Legal Arrangements

- There is an uncertainness in the tasks and responsibilities, and lack of coordination between different institutions in the basin. Uncertainties in the tasks and responsibilities of the institutions should be clarified and adapted to the EU water framework directive. By this way, loss of resources due to repeating of same infrastructures and services, which results in loos of resources, will be prevented and coordination will be achieved;
- the current needs and deficiencies of the institutions should be carefully determined;
- for establishing the institutional coordination, the existing River Basin Working Group (RBWG) should have a legal basis in frame of objectives and criteria;
- both National Platform (NP) and RBWG should have a legal basis with clearly defined tasks and responsibilities. RBWG as a regional, National Platform as an upper level national authority;
- related government institutions and organisations, universities, NGOs, water user groups in the basin should participate in RBWG. Water management planning should be prepared according to suggestions of this group;
- RBWG should meet in regular basis as determined in management plan and by this way information should be disseminated. This will empower institutional cooperation and coordination;

- representatives of all water users should participate other groups; irrigation unions, irrigation cooperatives, agricultural chamber, industrial chamber and NGOs. Participation of these groups in RBWG with a selected representative should be provided. Participation should be basis in administration, management, monitoring and evaluation processes;
- when related plans are preparing representation of related institutions should be provided according to task and responsibilities they take;
- national Platform should be structured as being able to coordinate basins;
- A database should be developed to gather the information produced by different institutions and sharing of this information should be arranged according to determined tasks and responsibilities. Universities and research institutions should also give their information to common database;
- while preparing and implementing laws and regulations, an effective system with objective criteria should be developed to avoid from political pressures;
- to provide the sustainability of water management in the basin, arrangements should be made to minimise the bureaucracy for implementing to projects handled;
- in the national scale projects, priorities should carefully be determined and these priorities objectively determined;
- organization of all water related users among themselves should be encouraged;
- water management should be done in integrated way in a basin scale by considering the hydrological borders of rivers, in this frame, quantity, quality and environmental effects of water should be considered as a whole. In the frame of national policies and principles, the opinions, suggestions and research results of related institutions should be considered as basis in defining and solving problems;
- when necessary work should be done in sub-basins;
- while preparing plans, participation of different professional groups and sectors should be provided;
- the rules and principles of preparing and implementing integrated basin water management plans should be legally defined in an effective and rationalist way;
- "Polluter Pays Principle" should be used to cover the cost of works/services from tis users/sectors.
- while preparing plans, basin scale reference conditions and comparison with current conditions is important;
- in services and works, social and public conditions should be considered, pricing, permissions and sanctions should be judicious;
- quality, quantity and environmental effects on both groundwater and surface waters should be carefully considered in issues like use of water and soil resources, biodiversity, future conditions of resources and human impact.