SUSURLUK RIVER BASIN

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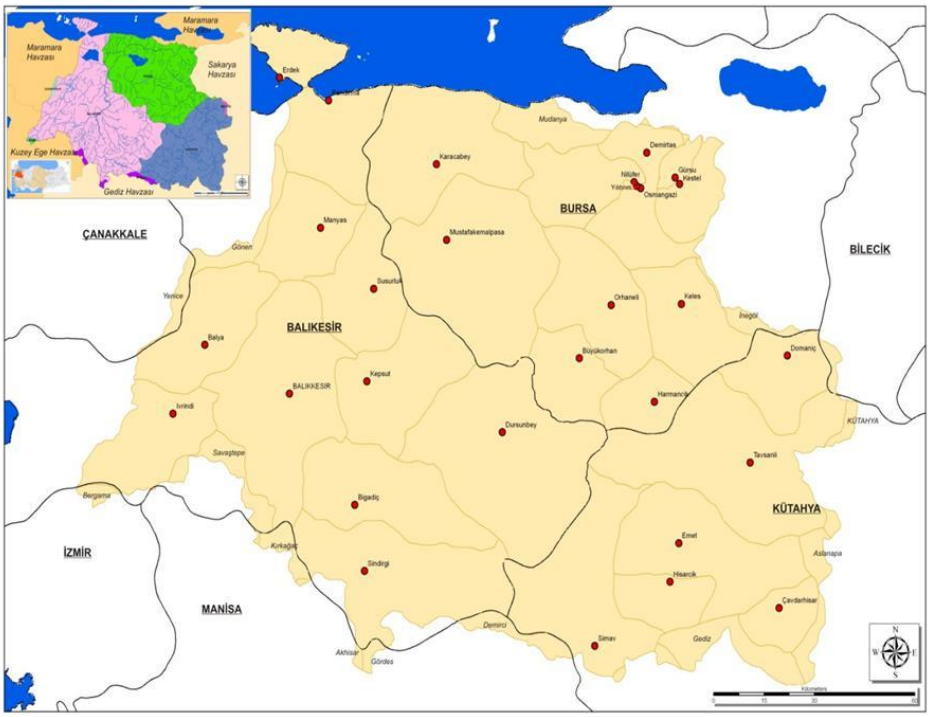
The Susurluk river basin is located in western Türkiye, between 39° - 40° north latitude and 27° - 30° east longitude. The total area of the basin, which covers approximately 3.11% of Türkiye in terms of area, is approximately 2.434,909 ha.



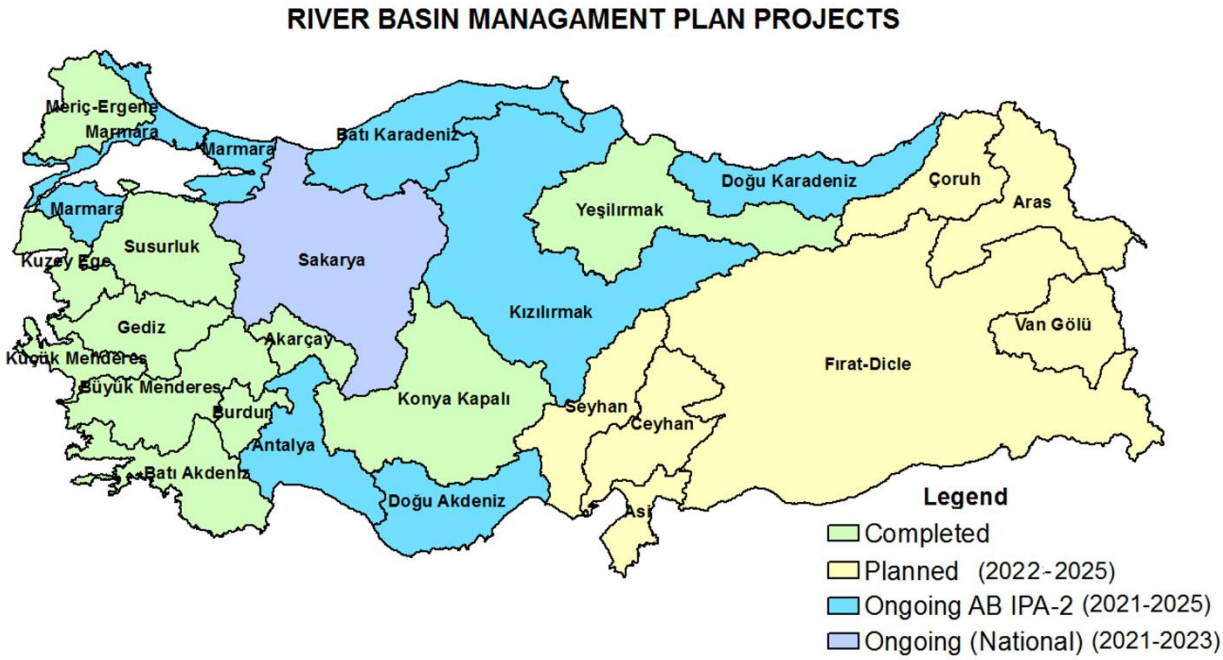
Susurluk Basin, located in the south of the Marmara Region; It covers Bursa, Balıkesir, Kütahya, Bilecik, Çanakkale, Manisa and İzmir provinces partially. The spatial information of the provinces within the borders of the basin is given in the table below.

Provinces and areas in the basin

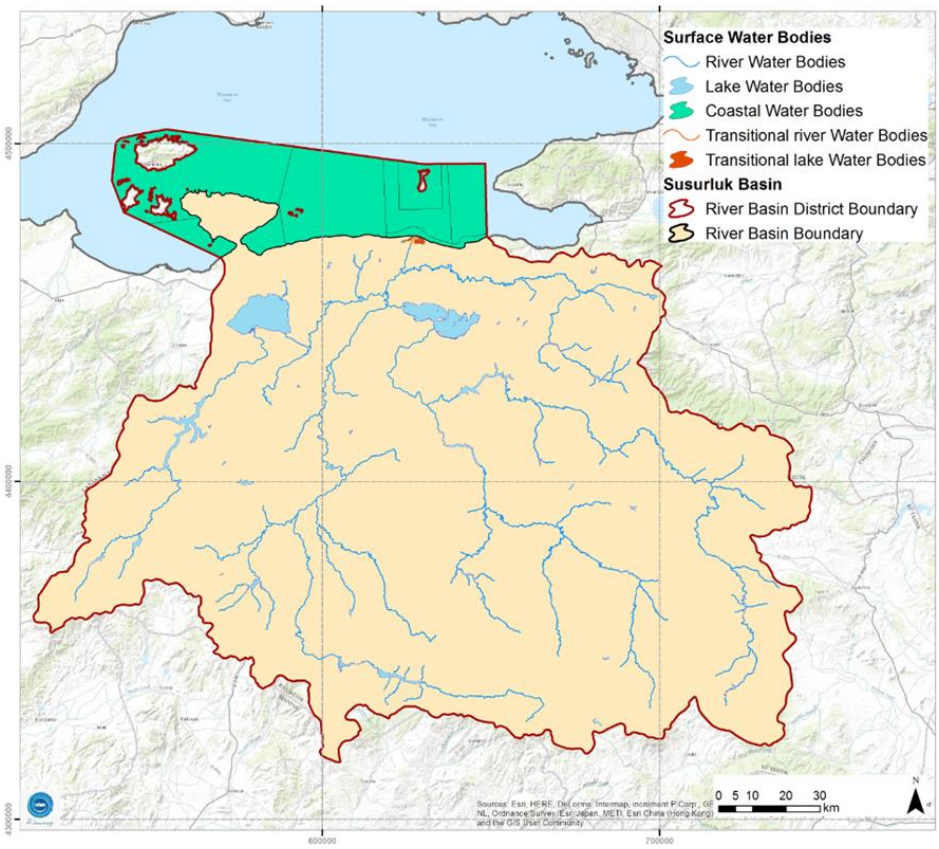
Provinces	*Area of the Province (Ha)*	*Part of the Province in The Basin (Ha)*	*Ratio of the Part in The Basin to the Total Province Area (%)*	*Distribution of the Basin to the Provinces (%)*
BURSA	1.089.100	722.316	66,32	29,7
BALIKESİR	1.429.900	1.080.500	75,56	44,4
KÜTAHYA	1.197.700	588.839	49,16	24,2
MANİSA	1.381.000	28.565	2,07	1,2
ÇANAKKALE	988.700	6.005	0,61	0,2
BİLECİK	430.700	4.286	0,99	0,2
İZMİR	1.197.300	4.394	0,37	0,2

RIVER BASIN MANAGEMENT PLAN

The Susurluk Basin River Basin Management Plan (NHYP) was prepared in 2018 and is followed through the National Water Information System (USBS).

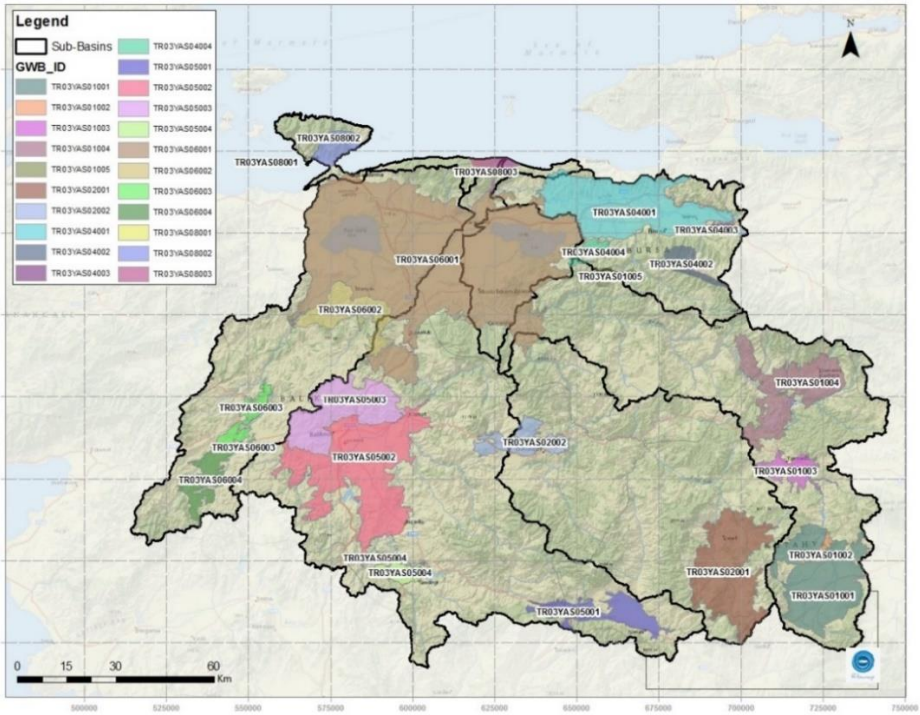


There are 156 surface water bodies in the Susurluk Basin: 107 River Water Bodies, 37 Lake Water Bodies, 3 Transitional Water Bodies (1 estuary and 2 lagoons), and 9 Coastal Water Bodies.



Surface water bodies

There are 22 groundwater bodies in the Susurluk Basin.



Groundwater bodies

In Susurluk Basin 1283 measures have been determined in order to ensure that all water bodies are in good condition and that the ones that are in good condition are protected. The main groups of measures are listed below.

- Construction of a Sanitary Landfill
- Construction of Animal Manure Storage Tank in Animal Farm/Facility
- Implementation of the Good Agricultural Practices Code Communiqué on the Prevention of Nitrate Pollution in Waters Caused by Agricultural Activities
- Detection of existing unregistered wells and prevention of opening new ones
- Improvement of Wastewater Treatment Plants
- Transfer of olive oil factories from 3-phase system to 2-phase system
- Closure of unsanitary landfills
- Combating Invasive Species and Control of Fishing
- Modernization of irrigation
- Crop rotation in agricultural areas
- Implementation of Environmental Flow Regime
- Construction of Fish Passes
- Reducing loss/leakage rates by reducing pressure on transmission lines
- Construction of Wastewater Treatment Plants with Appropriate Treatment
- Construction of sewer infrastructure
- Construction of Secondary Treatment and Wastewater Treatment Plant
- Construction of gasification facility for liquid and solid wastes from Table Olive and Olive Oil Production activities

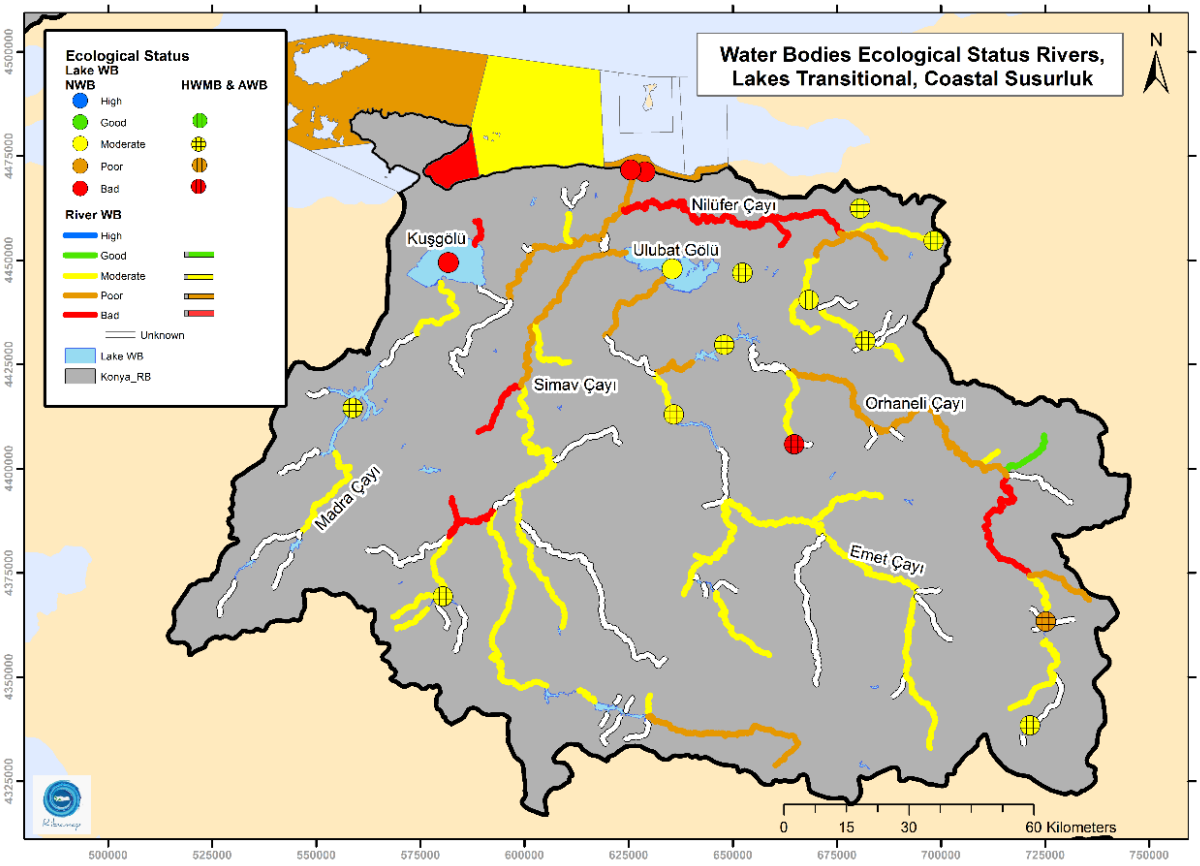
WATER QUALİTY

Surface Water Condition

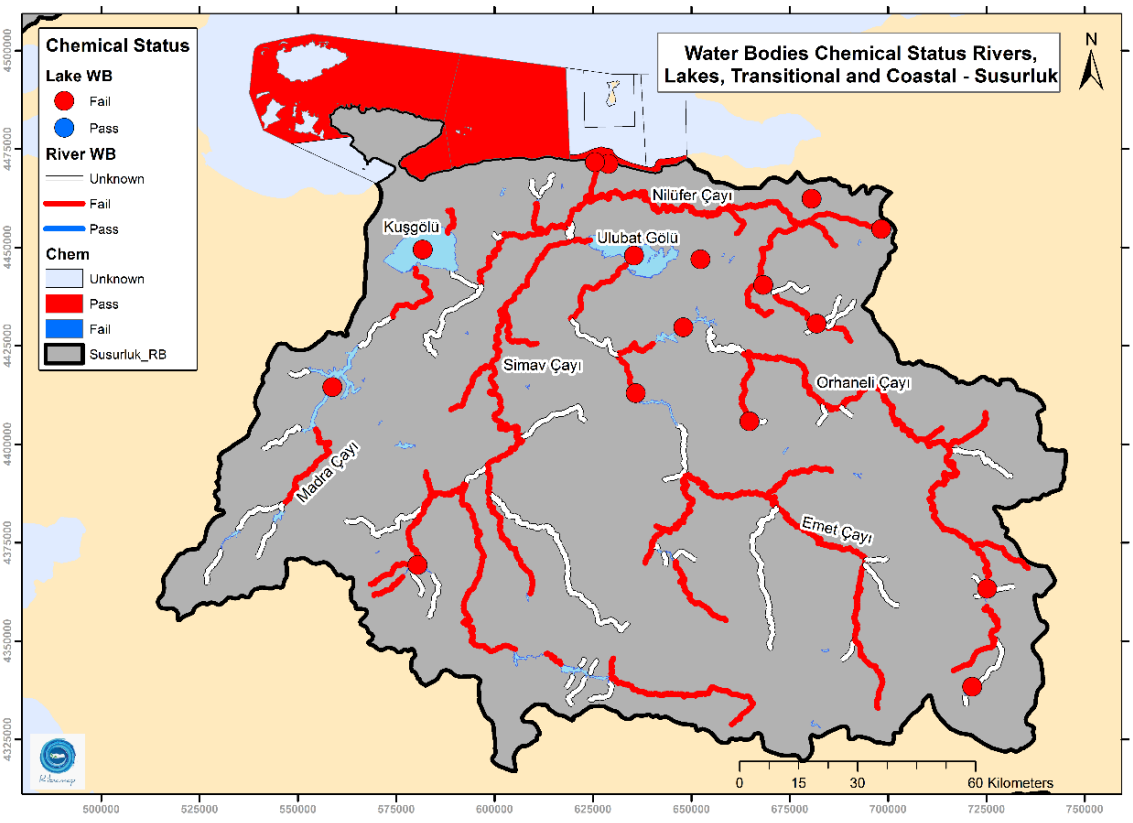
In Susurluk Basin, 16 surface water bodies are in good condition and above, 140 surfacewater bodies are below good condition.

Risk assessment in surface water bodies

Category	Risk level	No. of water bodies	% of water bodies	length (km)	% of length
Inland (river)	High	57	53.3%	1,266.8	67.2%
	Medium	37	34.6%	544.0	28.9%
	Low	13	12.1%	74.5	4.0%
	Zero	0	0.0%	0.0	0.0%
	Total	107	100.0%	1,885.3	100.0%
Inland (lake)	High	14	37.8%	350.7	88.1%
	Medium	20	54.1%	44.4	11.2%
	Low	3	8.1%	3.0	0.7%
	Zero	0	0.0%	0.0	0.0%
	Total	37	100.0%	398.1	100.0%
Transitional (river)	High	1	100.0%	3.8	100.0%
	Medium	0	0.0%	0.0	0.0%
	Low	0	0.0%	0.0	0.0%
	Zero	0	0.0%	0.0	0.0%
	Total	1	100.0%	3.8	100.0%
Transitional (lake)	High	2	100.0%	6.1	100.0%
	Medium	0	0.0%	0.0	0.0%
	Low	0	0.0%	0.0	0.0%
	Zero	0	0.0%	0.0	0.0%
	Total	2	100.0%	6.1	100.0%
Coastal	High	5	55.6%	1,753.6	70.1%
	Medium	2	22.2%	280.9	11.2%
	Low	2	22.2%	468.2	18.7%
	Zero	0	0.0%	0.0	0.0%
	Total	9	100.0%	2,502.7	100.0%



Susurluk Ecological status surface water bodies

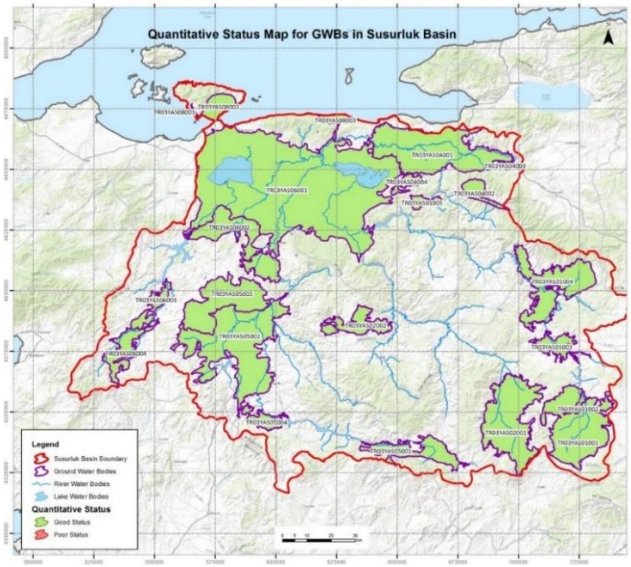


Susurluk Chemical status in the surface water bodies

Physicochemical Parameters Not Meeting the Environmental Objective in SW Bodies
Biochemical oxygen demand, Chemical oxygen demand, Ammonium nitrogen, Total phosphorus, Dissolved Oxygen, Total kjeldahl nitrogen, Electrical Conductivity, Nitrate + Nitrite, PH, Orthophosphate, Total nitrogen, Nitrate Nitrogen, Oil-grease, Manganese, Selenium

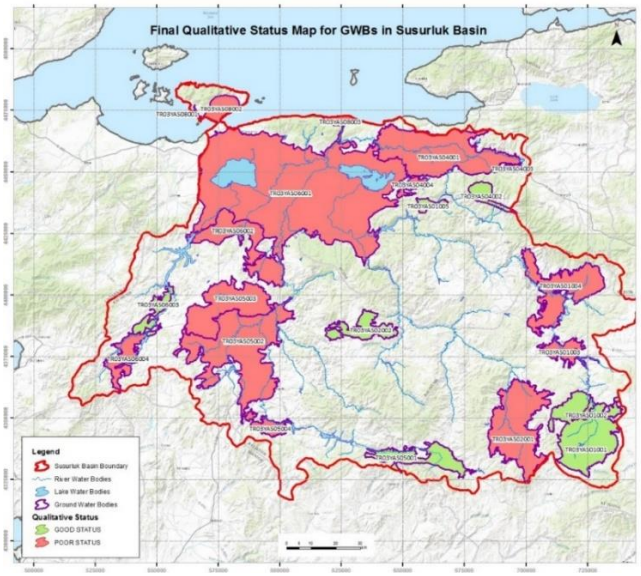
Chemical Parameters Not Meeting the Environmental Objective in SW Bodies
Mercury, Cadmium, Lead, Nickel, Nonylphenol, Polybrominated diphenyl ethers, Aluminum, Iron, Zinc, Copper, Antimony, Arsenic, Fluorantine Polycyclicaromatic hydrocarbon, Barium, Silver, Cobalt, Titanium, Vanadium, Sibutrin, Beryllium, Boron, Octiphenol, Dichlorvos, Aldrin, Heptachlor, Chloroalkanes, Silicon, Pyrene

Biological Parameters Not Meeting Environmental Objective in SW Bodies
Fish, Macrophyte, Phytoplankton, Diatom, Macroinvertebrate



Susurluk Basin Quantitative Status in Groundwater Bodies

Quantitative pressures	With pressure		Without pressure	
Groundwater bodies	1	5%	21	95%



Parameters Exceeding Groundwater Threshold Values

1. Hydrocarbons and Bioaccumulative Organic Toxic Compounds
2. Arsenic
3. Boron
4. Iron
5. Manganese
6. Total Kedal Nitrogen
7. Total Organic Carbon
8. Dissolved Oxygen

Susurluk Basin Chemical Status in Groundwater Bodies

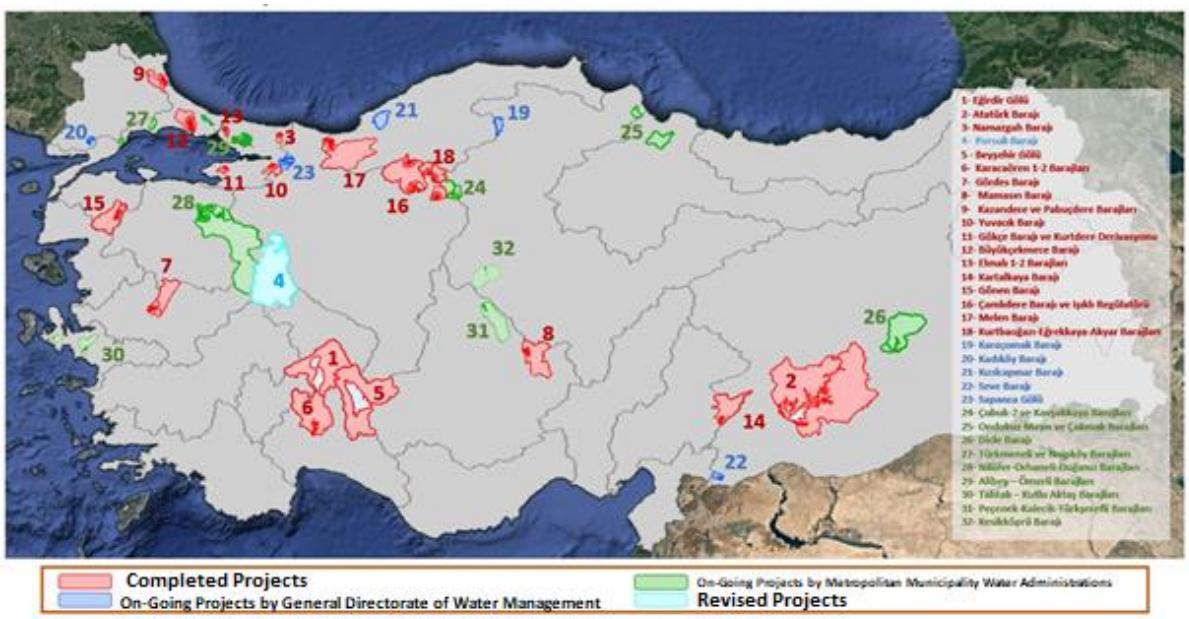
Qualitative pressures	With pressure		Without pressure	
Groundwater bodies	7	32%	15	68%

DRINKING WATER PROTECTION PLANS

The purpose of drinking water protection plans is to determine basin-specific protection areas and principles based on scientific data to improve and sustainably manage the quality and quantity of drinking water sources.

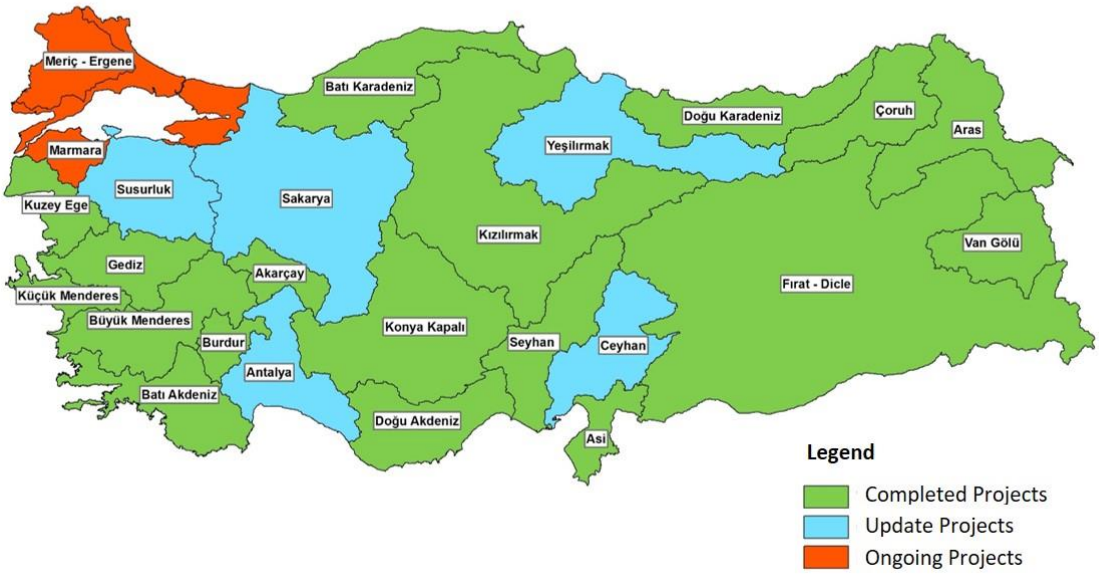
According to the Regulation on the Protection of Drinking-Water Basins:

- Protection plans for surface water sources that provide drinking water to metropolitan municipalities are prepared by the general directorates of water and sewage administrations of metropolitan municipalities in coordination with Ministry;
- Protection plans for surface water sources that provide drinking water to settlements outside of metropolitan municipalities are prepared by Ministry.

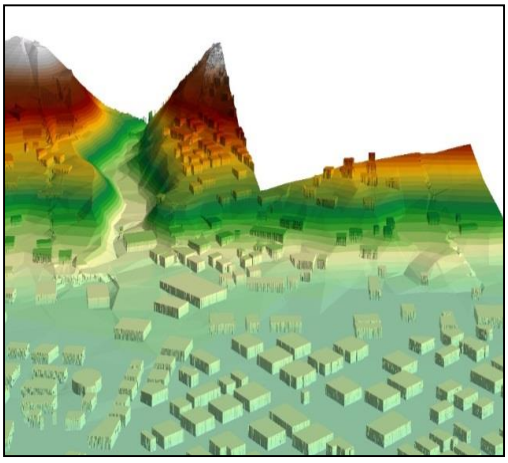


FLOOD MANAGEMENT PLANS

Susurluk River Basin Flood Management Plan (FMP) was completed in 2018.



Flood Hazard and Flood Risk maps are generated within the scope of Susurluk River Basin Flood Management Plan. The necessary measures to be taken to prevent risks before, during, and after floods have been determined using these maps, as have the responsible institutions and the time of implementation of the measures.



To mitigate the effects of potential flood events in the Susurluk Basin, 33 measures have been identified under the following groups of mitigation measures within the scope of the Flood Management Plan.

- Improvement of transition structures
- Stream-bed regulation
- Cleaning of stream beds
- Upper basin measures
- Low-impact urbanization
- Education/ Informing/ Raising Awareness
- Data-Information Collection/ Production
- Change of routes
- Flood forecasting and early warning system

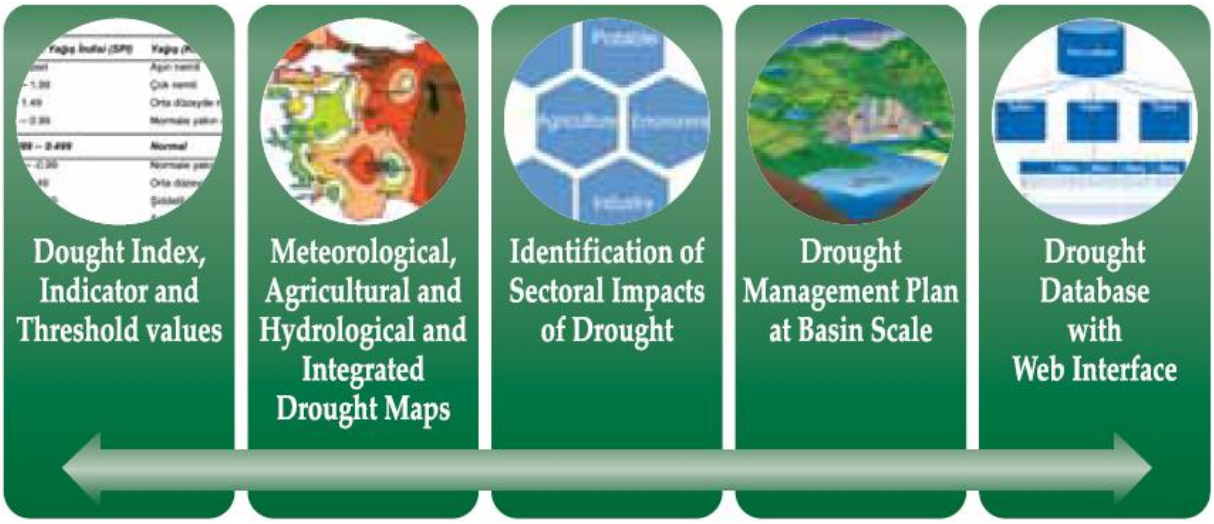
Mitigation measures determined within the scope of the plan are still being tracked via the National Water Information System (USBS) in 2020.

DROUGHT MANAGEMENT PLAN

Drought Management Plans (DMPs) are being prepared at the basin level for all of the water user sectors, including agriculture, in order to minimize the negative effects of possible drought risks and be prepared for drought. The aim of DMPs is to mitigate and prevent the negative impacts of possible droughts by determining the measures to be taken during water scarcity and the measures to be taken before, during, and after the drought periods in order to solve the drought problem as quickly as possible. Drought analyses, climatic and hydrological studies, sectoral vulnerability analyses, and drought maps are used to plan and direct studies such as recovery and intervention.

Susurluk Basin DMP is started at 2021 and expected to complete by 2023.

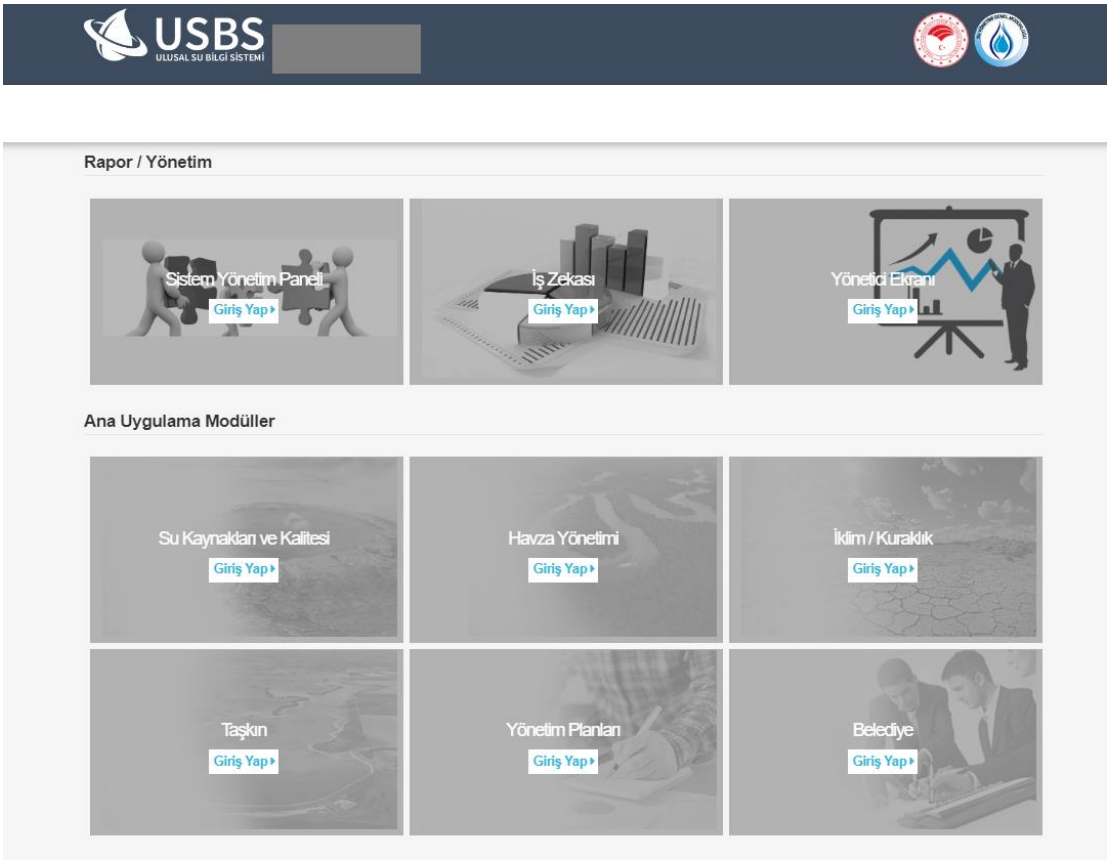
Studies During the Preparation of Drought Management Plans:



MONITORING, INVENTORY and WATER INFORMATION SYSTEM

Actions that are taken about water quality and quantity as follows:

- To acquire the data that has been produced for various purposes by different organizations,
- To enhance the quality of data,
- To prevent the repetitive production of data,
- To enhance the accessibility of data,
- To determine and complete the missing/incomplete data,
- To set and apply a watershed-scale and sustainable monitoring system.



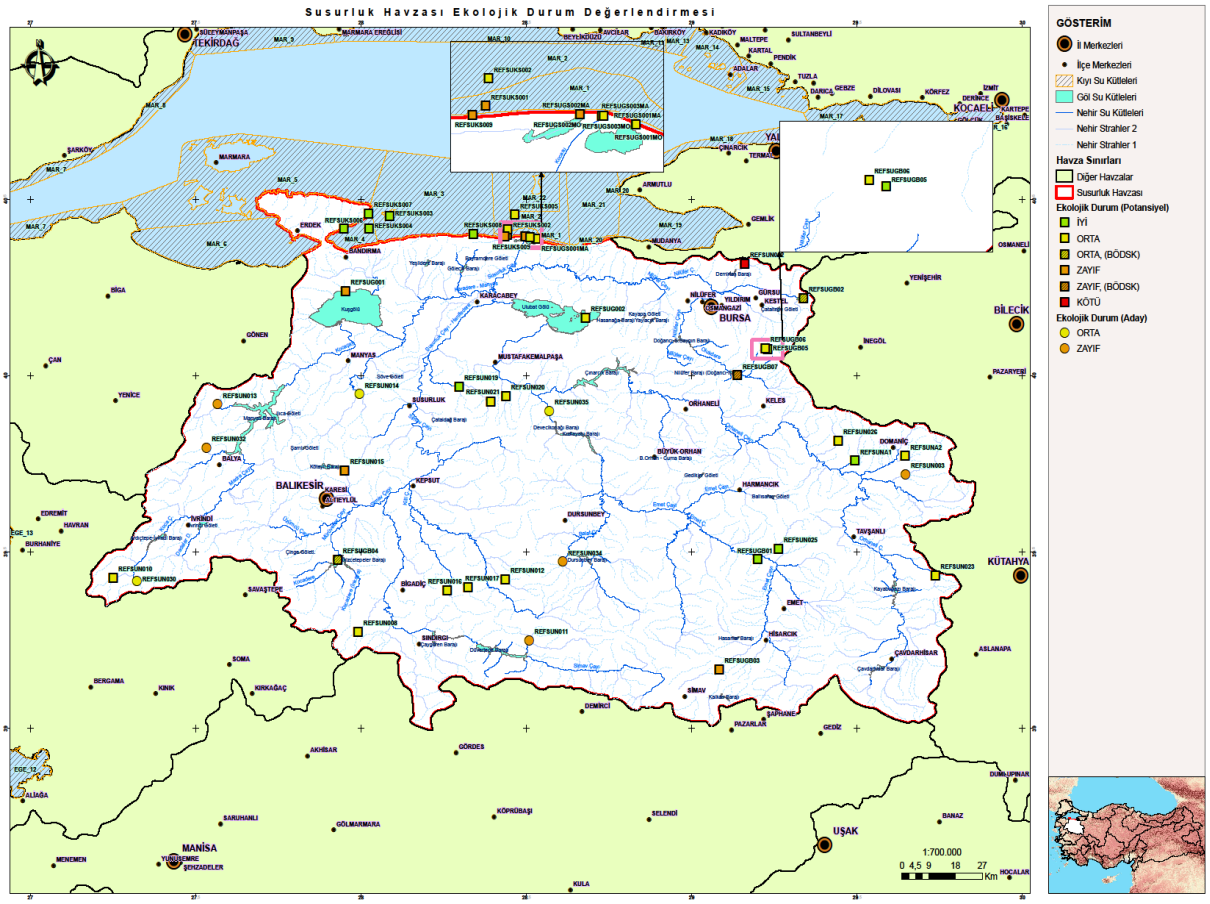
Graphical User Interface of National Water Information System (TRNWIS)

For the purpose of ecological-based assessment of water quality; biological, physicochemical, and hydromorphological monitoring studies were conducted in 25 basins across the country as part of the Project for the Establishment of a Reference Monitoring Network in Türkiye to identify natural and/or near-natural reference (unpolluted) sites that were not or minimally impacted by anthropogenic activities, and pristine water sources were identified.

Within the scope of the study, monitoring studies were carried out in a total of 47 locations in the Susurluk River Basin, including 23 rivers, 9 lakes (6 natural, 3 heavily modified), 6 transitional waters, and 9 coastal waters, and 36 reference (unpolluted) water sources were identified. In addition, the ecological status of the monitored water bodies in the Susurluk River Basin was determined as a result of the monitoring activities.

In the scope of monitoring activities, the smallest possible taxonomic level of all biological quality elements was identified and in this context 26 fish, 139 phytobenthos, 289 phytoplankton, 579 macroinvertebrate, 36 macroalgae/angiosperm and 45 macrophyte species were identified in the Susurluk River Basin.

Additionally, for each biological quality element, the Reference Monitoring Network and Reference Monitoring Programs have been established, which include the monitoring stations determined in the reference sites, the parameters to be monitored at these stations, and the monitoring frequencies. In line with these monitoring programs, monitoring activities will be carried out regularly.

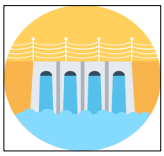


Ecological Status Assessment Results in the Susurluk River Basin

WATER REUSE

In the fight against possible water scarcity in our country in the future, it is necessary to develop practices related to the economical and planned use of existing water resources. One of these strategies, the option of reusing used water, is one of the most important methods of using water sparingly. With the recovery and use of used water, it is planned to reduce the need for existing water resources and to provide significant water savings. In the "Project for the Evaluation of Reuse Alternatives of Used Water", which was prepared specifically for 25 river basins in our country, both the reuse of wastewater treated in wastewater treatment plants and the water returned from agriculture were evaluated. With the evaluation, used water resources and reuse alternatives were determined. Used water resources was determined as waste water treated in wastewater treatment plants, drainage water returning from agriculture, cooling water and rain water.

As a result of the calculations, the reuse potential, usage areas and gains of the used waters in the Susurluk basin are given below.



9 million m^3 Water Storage

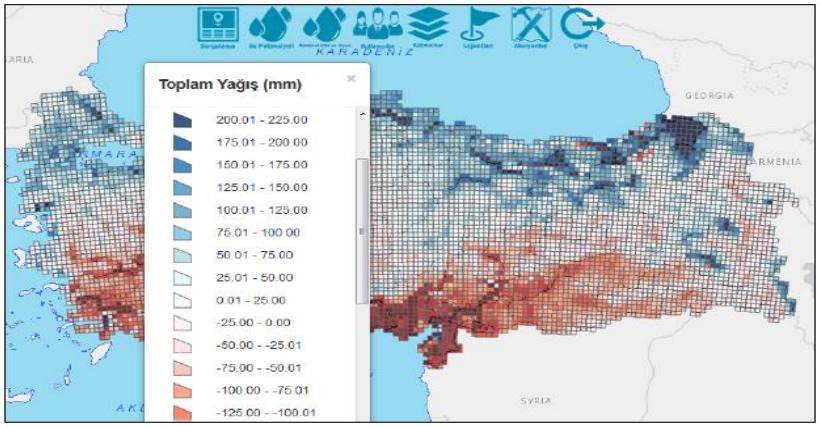
9,741 ha Agricultural Area Irrigation

1,2 million m^2 Landscape Irrigation

30,6 million m^3 Environmental Restoration

IMPACTS OF CLIMATE CHANGE

The project on impacts of climate change on water resources was finalized in 2016.



According to the climate change projections made for 2015-2100 period:

It is expected that there will be a continuous increase in average temperatures. It is expected that the average temperature of the basin, which was **12,5ºC** according to 1971-2000 observations, will **increase** by **at least 1,6°C**, **maximum 4,7ºC** in 2071-2100 period.

According to the observations of 1971-2000, the average annual precipitation amount of the reference period of the basin was determined to be **640 mm**. According to the results of the projection carried out, there is a **decrease tendency** in the total precipitation compared to the reference period (1971-2000), and it is predicted that the basin will receive **10% less** rainfall compared to the reference period in **2071-2100**. It is expected that rainfall decreases for this period will predominate in the **southern** parts of the basin.

DSİ (Directorate General for State Hydraulic Works) data were used for hydrological model studies and the mean gross water potential of the basin for the reference period was determined to be **6.157 million ^{3}/year**. With the effect of climate change, it is predicted that in the period **2041-2070**, the gross water potential of the basin could **decrease up to 50%**.

Despite this, it is not expected that the annual available water amount for the projection period will meet the total water need.

As a result of the hydrogeological studies carried out, the hydrogeological reserve of groundwater of the basin was determined to be **34 km^3**. The technically and economically usable amount of this reserve, the possible reserve is calculated to be **18 km^3**. It is estimated that at the end of the century under the effects of the climate change, the hydrogeological reserve of the basin will decrease by **6%** and possible reserve by **11%**.