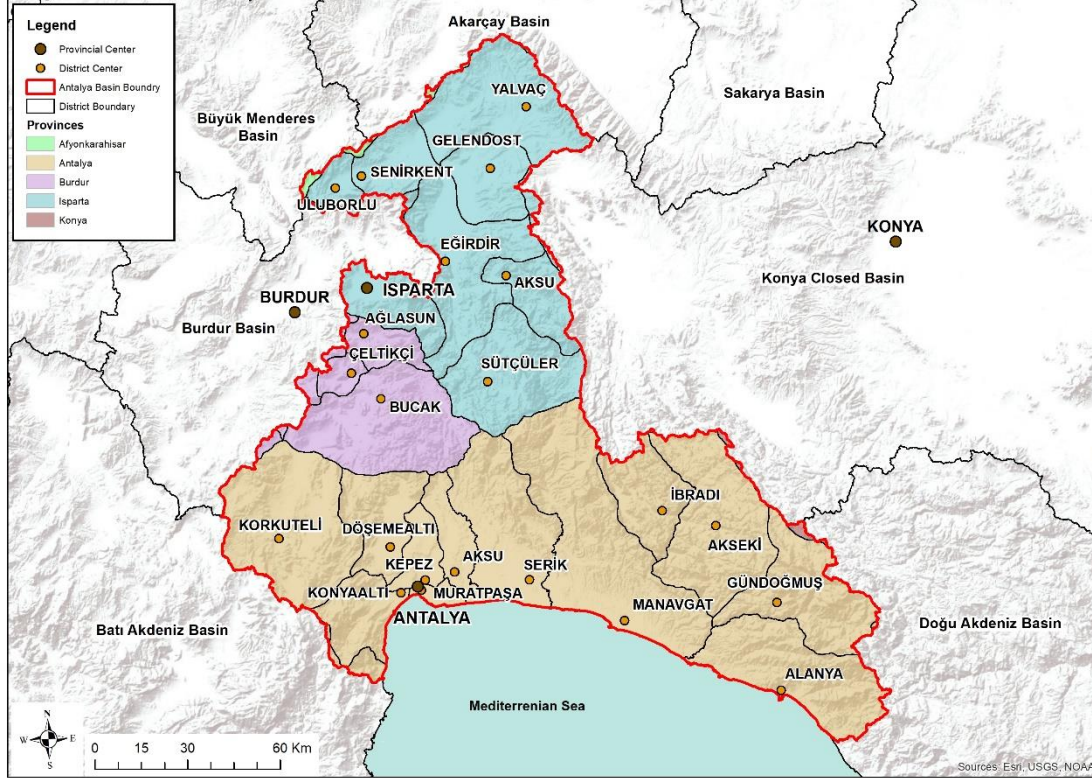


ANTALYA RIVER BASIN



ANTALYA RIVER BASIN

Antalya River Basin is one of the 25 basins in Türkiye and is located between 30°- 32° east longitudes and 36°- 39° north latitudes in the Aegean, Mediterranean and Central Anatolian regions. The basin is bordered by the Akarçay Basin from the north; Burdur and Büyük Menderes Basins from the northwest; Konya Closed Basin from the east, Western Mediterranean Basin from the southwest and the Eastern Mediterranean Basin from the southeast.



The Map of Antalya Basin

The total area of the river basin region, which covers approximately 2.4% of Türkiye's surface area, is 20,235.68 km². Afyonkarahisar, Antalya, Burdur, Isparta and Konya provinces are partially located within the Antalya Basin. The spatial information of the provinces within the borders of the basin is given in the table below.

The Name of Province	Total Area (km ²)	Area of the Province in the Basin (km ²)	Part of the Province Entering the Basin (%)	Distribution of the Basin by Provinces (%)
Afyonkarahisar	14,020.11	68,76	0,49	0,34
Antalya	20,191,81	11,853.43	58.70	58.59
Burdur	7,180.35	2,092.74	29,15	10.34
Isparta	8,947.68	6,173.47	69.00	30.51
Konya	40,787,91	44.41	0,11	0,22

RIVER BASIN PROTECTION ACTION PLANS

Türkiye prepared River Basin Protection Action Plans (RBPAP) for all 25 river basins in order to reduce pollution and protect and improve basins by defining short, medium and long-term measures with participation of all stakeholders in 2013. Main aim for these plans were determination of the pressure and effects caused by the urban, industrial, agricultural, economic, ...etc. activities and the amount, characteristics and pollution status of the existing surface, underground and coastal waters in basins; having a detailed basin scale examination of the amount and potential use of the existing water resources and pollution sources/loads; preparation of water quality maps; determination of environmental infrastructure status.

Meanwhile, Basin Management Committees were also formed and the implementation of the measures determined by the RBPAPs began to be followed since 2013.



Short, medium and long term measures for the Antalya River Basin can be grouped as below:
The implementation of the following actions is monitored within the scope of the Basin Protection Action Plan.

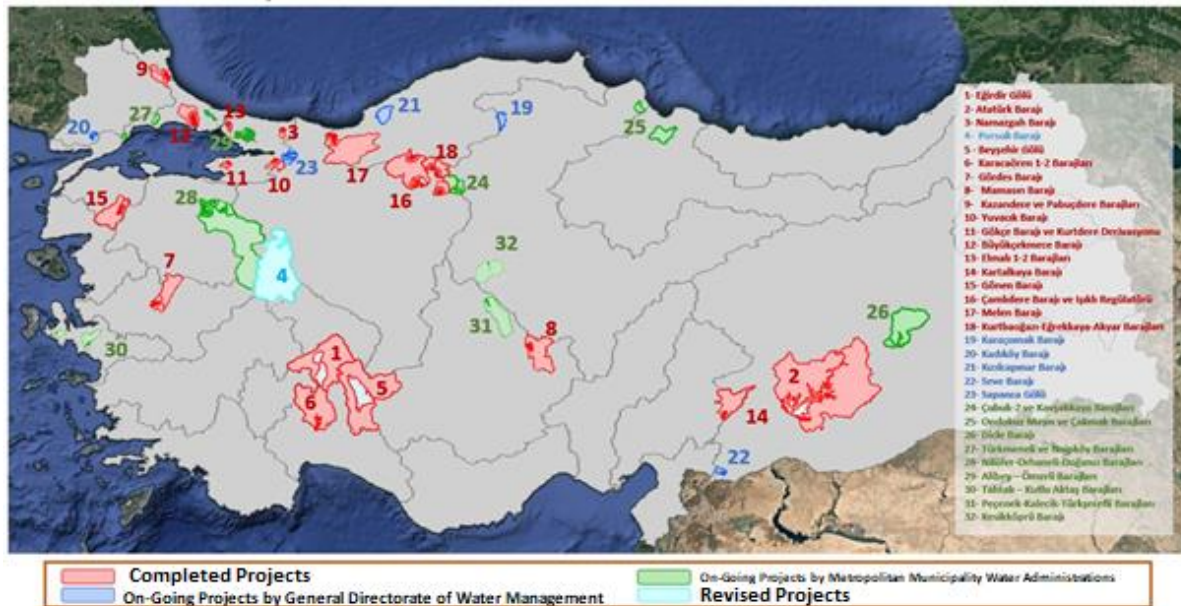
1. Urban Wastewater Management 2. Industrial Wastewater Management 3. Urban Waste Management 4. Non-Point Source Pollution Management 5. Forestation, Erosion and Sedimentation Control 6. Sewage Sludge Management 7. Conservation Studies for Drinking Water Basins 8. Flood Management	9. Drought Management 10. Monitoring, Inventory and Water Information System Studies 11. Water Investments 12. Water Re-use 13. Impacts of Climate Change on Water Resources 14. Sectoral Allocation Plans 15. Planning for Hotspots
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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.







To mitigate the effects of potential flood events in the Antalya River Basin, 44 measures have been identified under the following groups of mitigation measures within the scope of the Flood Management Plan.

- Improvement of bridges
- Cleaning of stream beds
- Improvement of banks well
- Improvement of culverts
- Improvement of walls
- Upper basin measures
- Data-Information Collection/ Production
- Education/ Informing/ Raising Awareness
- Disaster and Emergency Response Capacity
- Dam Failure
- Improving related legislations
- Stream rehabilitation
- Planning
- Crop pattern management
- Insurance System
- Improvement of the performance of regulators
- Agricultural applications
- Flood forecasting and early warning system

Mitigation measures determined within the scope of the plan are still being tracked via the Flood and Drought Plans Tracking Web Application in 2019 and the National Water Information System (USBS) in 2020.

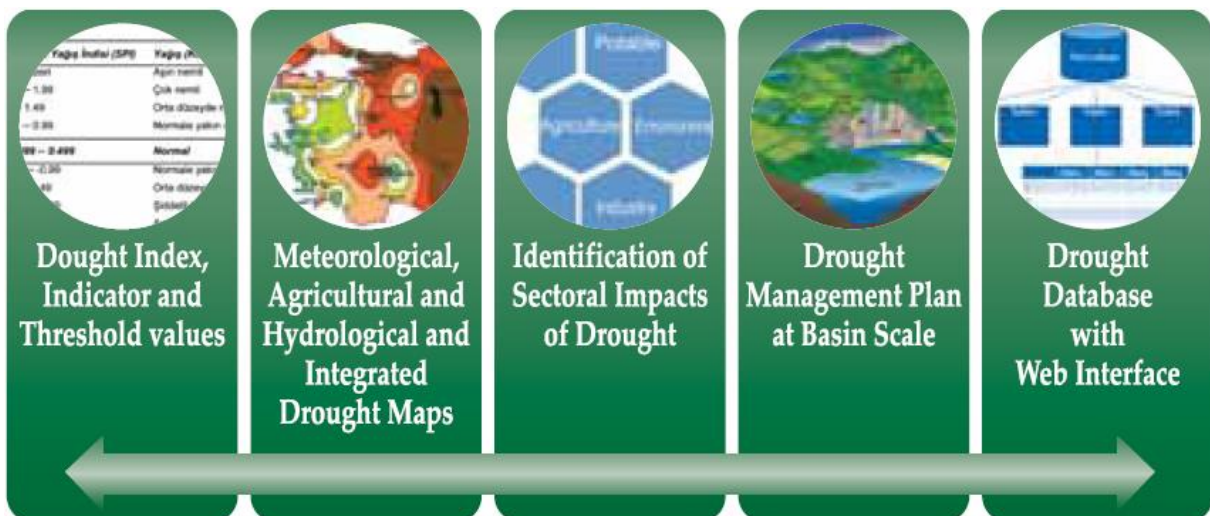
DROUGHT MANAGEMENT PLAN

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.

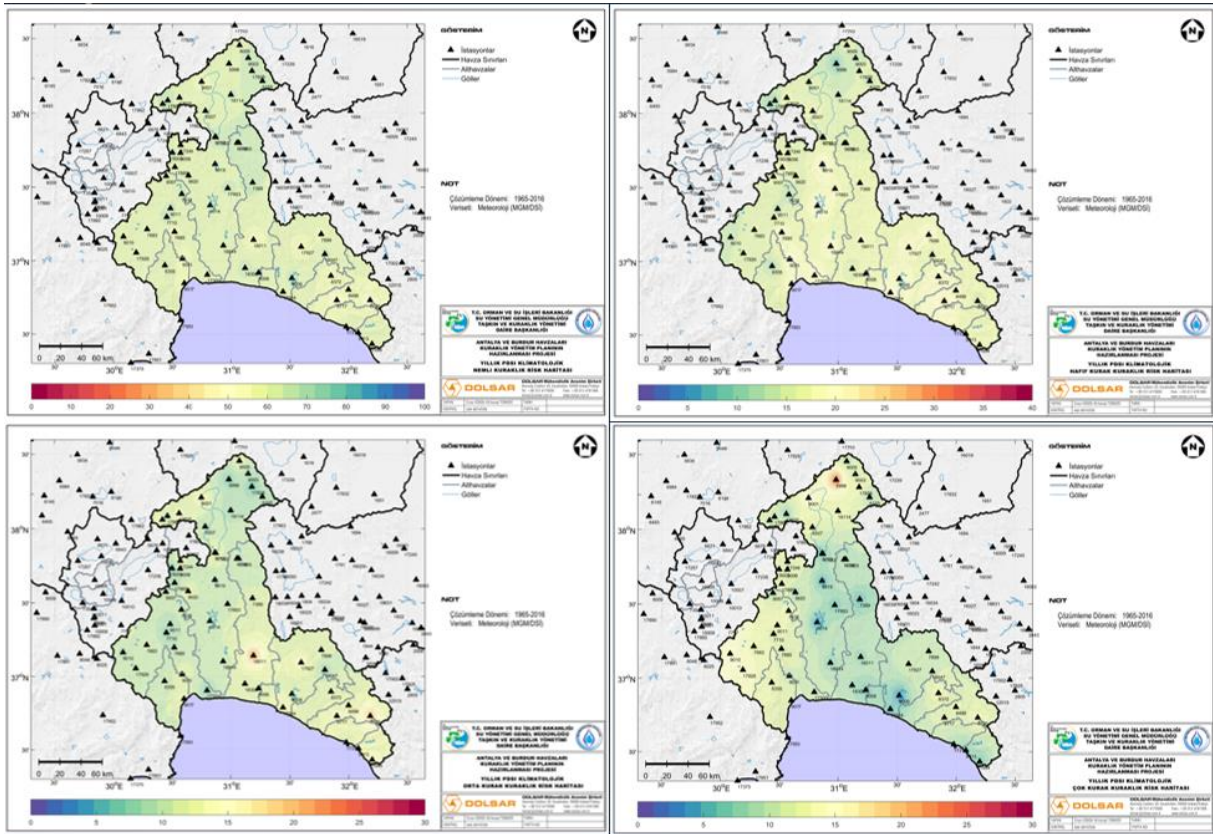


Antalya Basin DMP was started at 2016 and completed at 2018.

Studies During the Preparation of Drought Management Plans:



Drought Risk Maps



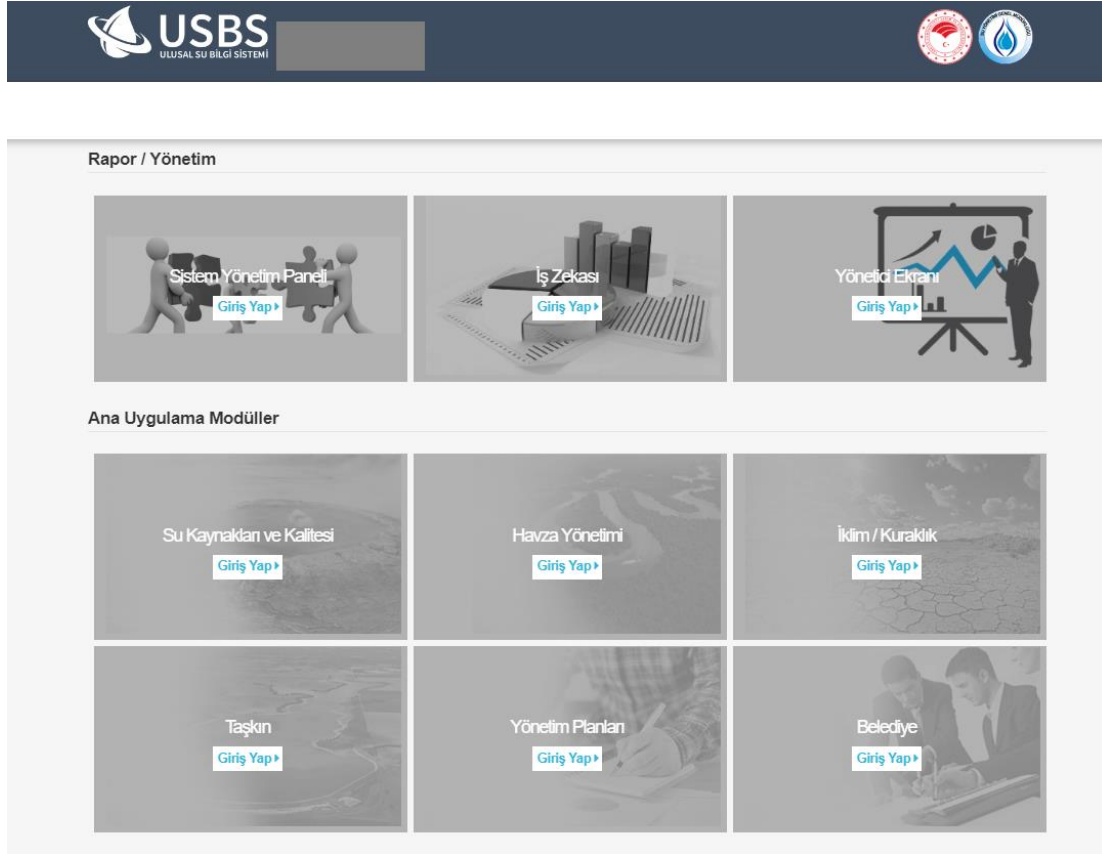
In order to prevent damage caused by possible droughts in the Antalya Basin, 37 measures have been determined under the measure groups of reducing water use/loss and Improving the Monitoring and Measurement Network within the scope of the Drought Management Plan.

Measures determined within the scope of the plan started to be followed via the the National Water Information System (USBS).

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 production of data repeatedly,
- ❖ 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.



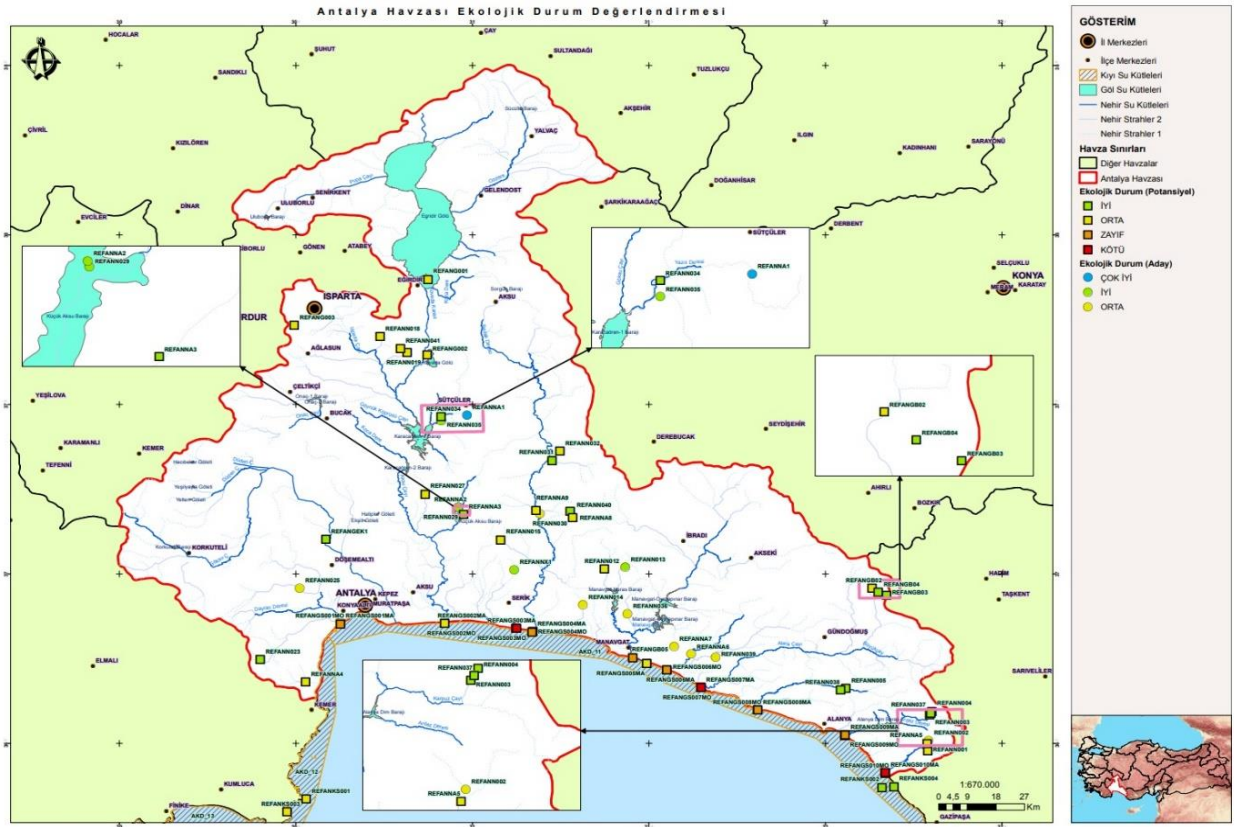
Graphical User Interface of National Water Information System (TRNWIS)

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 70 locations in the Antalya River Basin, including 37 rivers, 9 lakes (natural), 20 transitional waters, and 4 coastal waters, and 52 reference (unpolluted) water sources were identified. In addition, the ecological status of the monitored water bodies in the Antalya 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 40 fish, 302 phyto-benthos, 383 phytoplankton, 605 macroinvertebrate, 72 macroalgae/angiosperm, and 100 macrophyte species were identified in the Antalya 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 Antalya River Basin

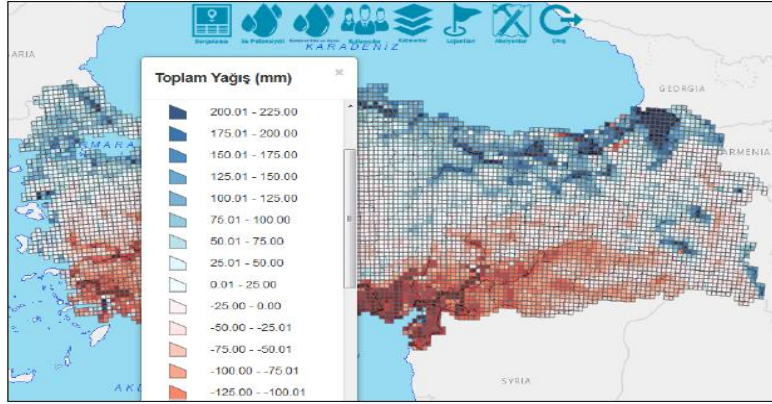
WATER REUSE



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.

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 **13,7°C** according to 1971-2000 observations, will **increase by at least 2°C, maximum 5,3°C** in 2071-2100 period. It is expected that temperature increases for this period will predominate in the **northeastern** parts of the basin.

According to the observations of 1971-2000, the average annual precipitation amount of the reference period of the basin was determined to be **619,3 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 **20% 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.

DSI(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 **8.165 million ³/year**. With the effect of climate change, it is predicted that in the period **2071-2100**, the gross water potential of the basin could **decrease up to 70%**. However, in the same period, it is expected that the annual amount of water available will not meet the total water need, and the **water deficit** will be around **2.650 million m³/year**. As a result of the hydrogeological studies carried out, the hydrogeological reserve of groundwater of the basin was determined to be **76 km³**. The technically and economically usable amount of this reserve, the possible reserve is calculated to be **41 km³**. 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 **8%** and possible reserve by **15%**.