VAN LAKE RIVER BASIN

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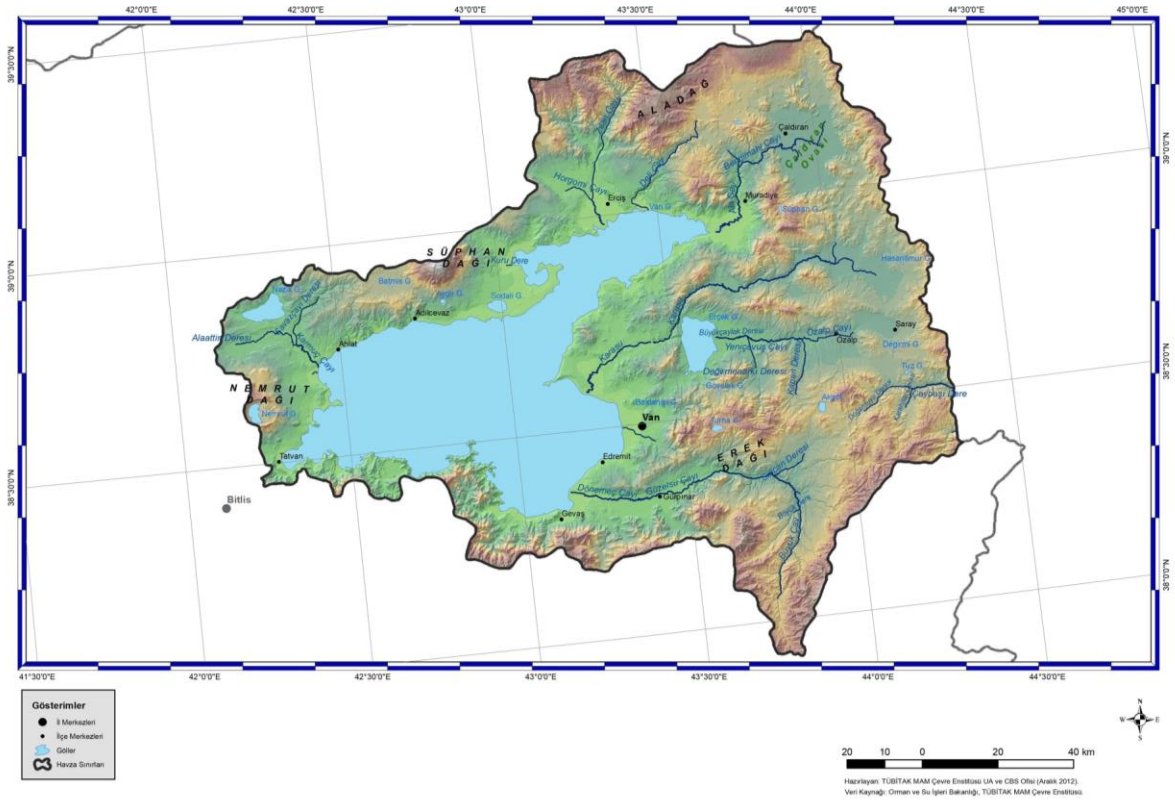
Located in the south of Eastern Anatolia, the basin covers the catchment areas of the streams flowing into the Lake Van. The upper basin of the Kotur Stream, which joins the Aras River, is also included in the Van Lake Basin.



Lake Van Basin

The annual average rainfall of the Van Lake Basin, which has a total area of 17,964 km2, is 474 mm, and the annual average flow is 95.32 m3/s. While the ratio of runoff to precipitation in the basin, which has an average annual yield of 6.25 L/s/km3, is 0.42, the participation rate is 1.64%. Van, Bitlis and Ağrı provinces are located in the Van Lake Basin. The spatial information of the provinces within the borders of the basin is given in the table below.

Province	***Distribution of the Basin to the Provinces (%)***
Van	62
Bitlis	34
Ağrı	1,8

RIVER BASIN PROTECTION ACTION PLANS

The quantities, densities and weights of the existing surface, thickness and coastal waters in the basin and excessive, industrial, user, economic etc. in the heap. Determination of the pressure and load due to acquisition; detailed analysis of the current amount of water savings and use in the basin, and the protection and loads determined on the basis of the basin; creation of water quality maps; identification of building infrastructure structures; Operations and plans, programs and finalizations for the protection of the basin, the reduction and accumulation of pollution, the spread of all erosions in the basin and the conservation of short, medium and long-lasting lives were prepared in 2013.

Short, medium and long term measures for Antalya River Basin can be grouped as below:

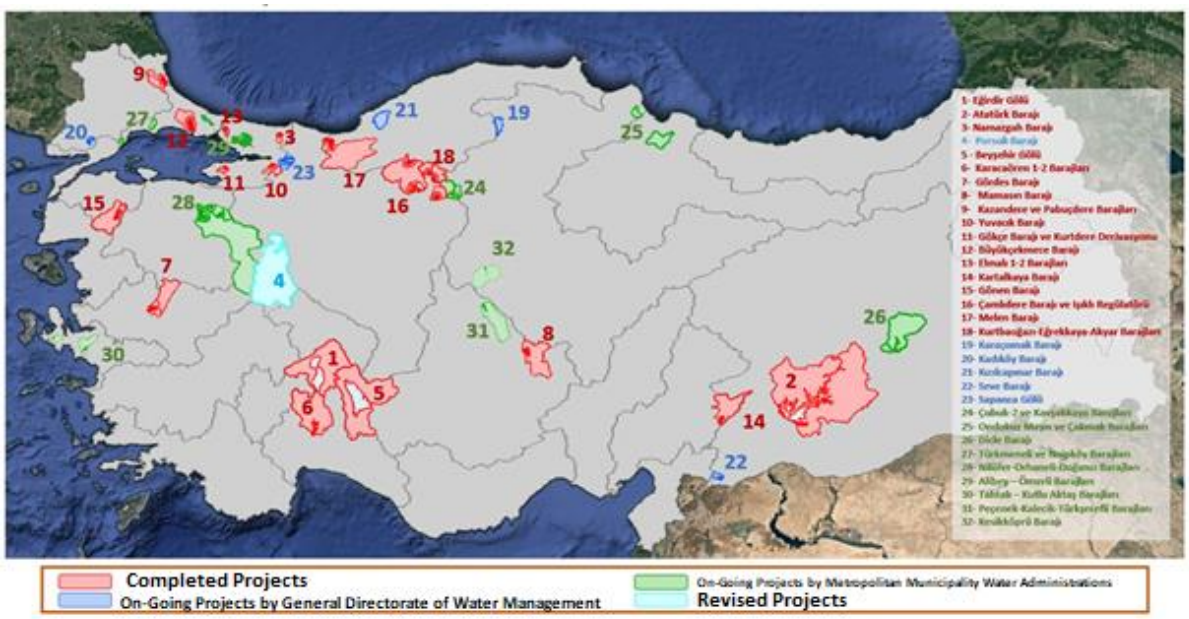
1. Urban Wastewater Management 2. Industrial Wastewater Management 3. Urban Waste Management 4. Non-Point Source Pollution Management 5. Forestation, Erosion and Sedimantation Control 6. Sewage Sludge Management 7. Conservation Studies for Drinking Water Basins 8. Flood Management	9. Drought Management 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

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.

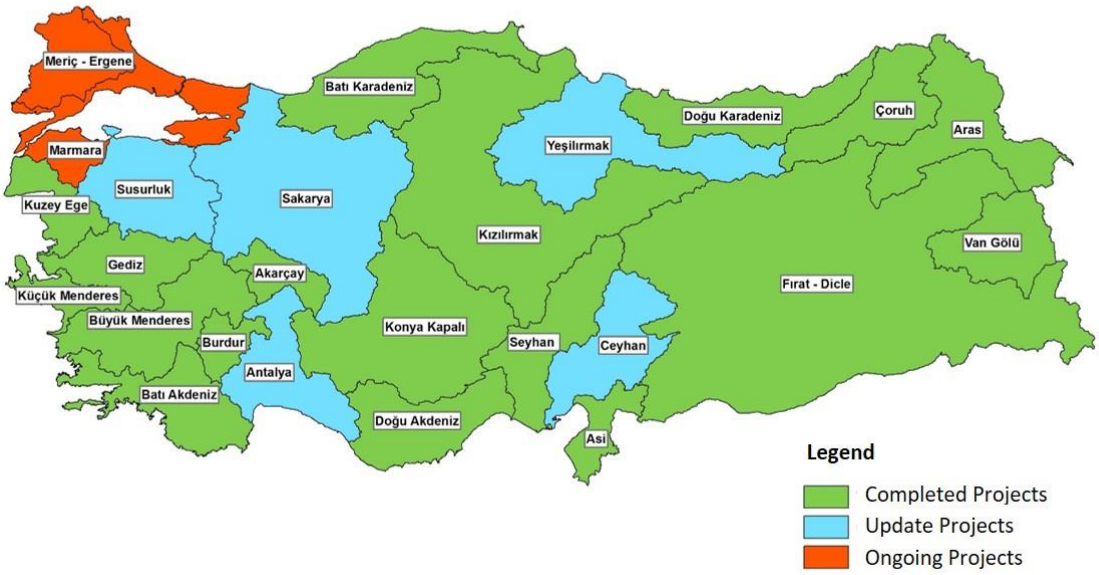
According to the Regulation on the Protection of Drinking-Water Basins:

- 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.

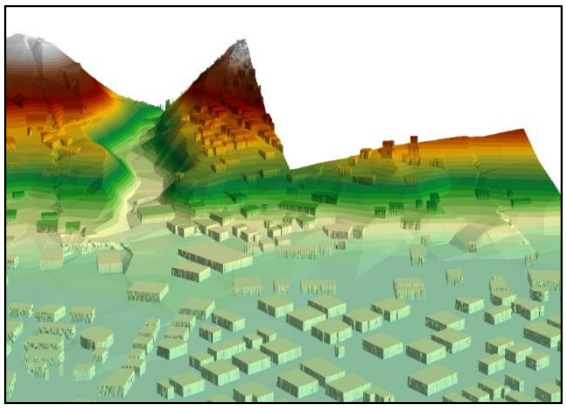


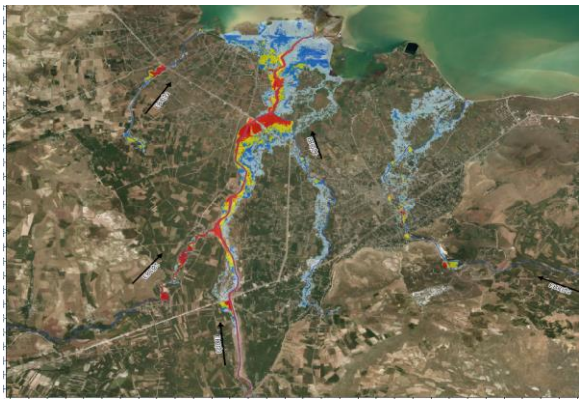
FLOOD MANAGEMENT PLANS

The Van Lake Basin Flood Management Plan (FMP) was completed in 2020.



Flood Hazard and Flood Risk maps are generated within the scope of Van 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 Van Lake Basin, 216 measures have been identified under the following groups of mitigation measures within the scope of the Flood Management Plan.

- Stream-bed regulation
- Improvement of transition structures
- Arrangement of closed transition structures
- Considering downstream conditions
- Improvement of walls
- Improvement of weir and cleaning
- Improvement of monitoring capacity
- Education/ Informing/ Raising Awareness

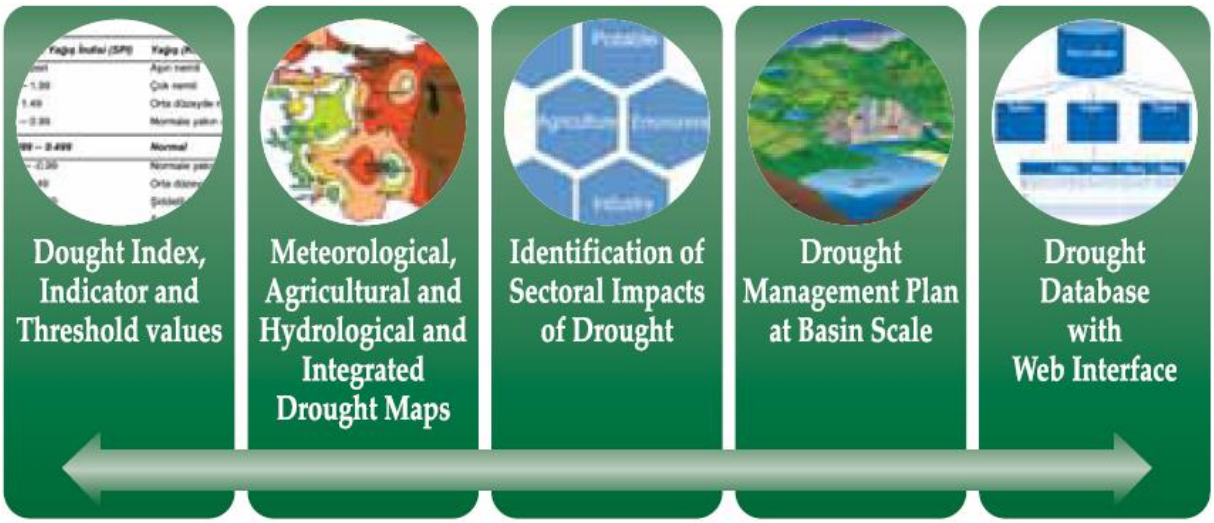
Mitigation measures determined within the scope of the plan are still being tracked via the Flood and Drought Plans Tracking Web Application in 2019 and the National Water Information System (USBS) in 2020.

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.

Van Gölü Basin DMP was started at 2016 and completed at 2018.

Studies During the Preparation of Drought Management Plans:



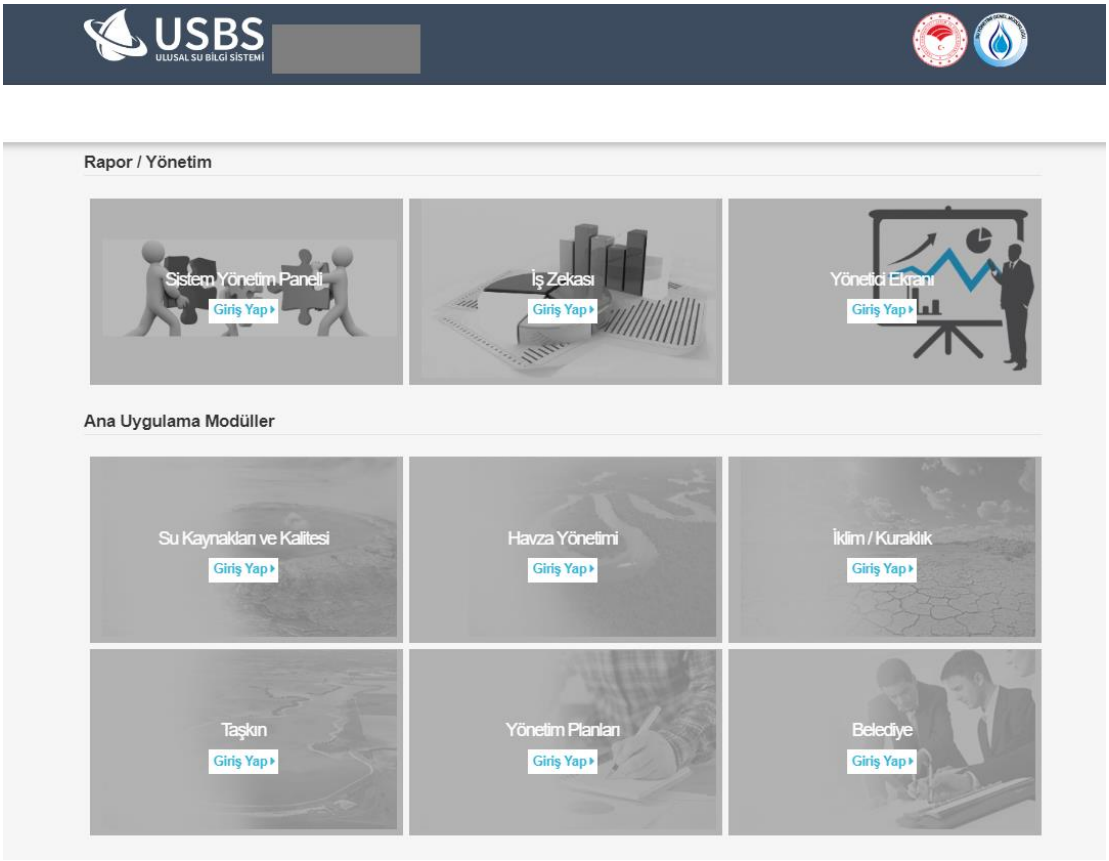
In order to prevent damage caused by possible droughts in the Van Gölü Basin, 24 measures have been determined under the measure groups of reducing water use/loss and Improving the Monitoring and Measurement Network within the scope of the Drought Management Plan.

Measures determined within the scope of the plan started to be followed via the Flood and Drought Plans Tracking Web Application as of 2019, and the National Water Information System (USBS) as of 2020.

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.



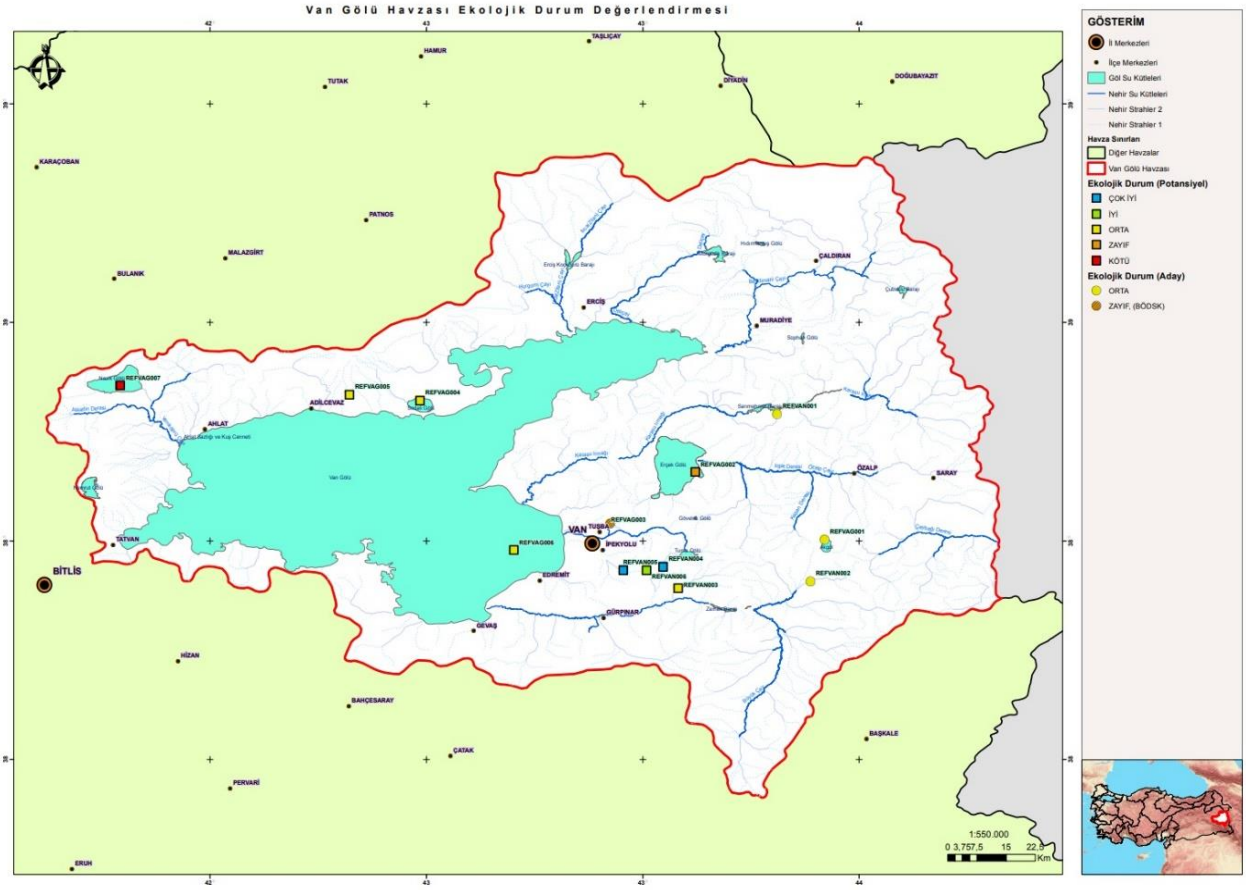
Graphical User Interface of National Water Information System (TRNWIS)

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 13 locations in the Lake Van River Basin, including 6 rivers, 7 lakes (6 natural, 1 heavily modified), and 11 reference (unpolluted) water sources were identified. In addition, the ecological status of the monitored water bodies in the Lake Van River Basin was determined as a result of the monitoring activities.

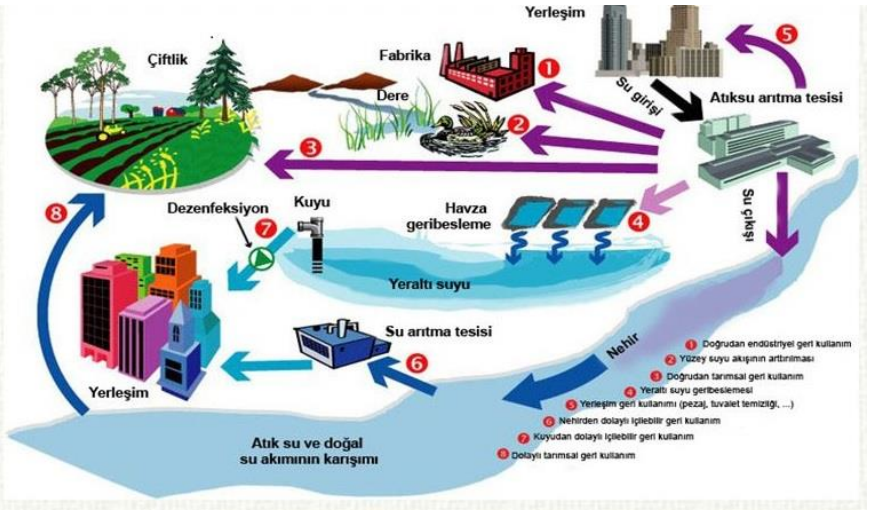
In the scope of monitoring activities, the smallest possible taxonomic level of all biological quality elements was identified and in this context 4 fish, 100 phytobenthos, 79 phytoplankton, 130 macroinvertebrate, and 12 macrophyte species were identified in the Lake Van River Basin.

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 Lake Van River Basin

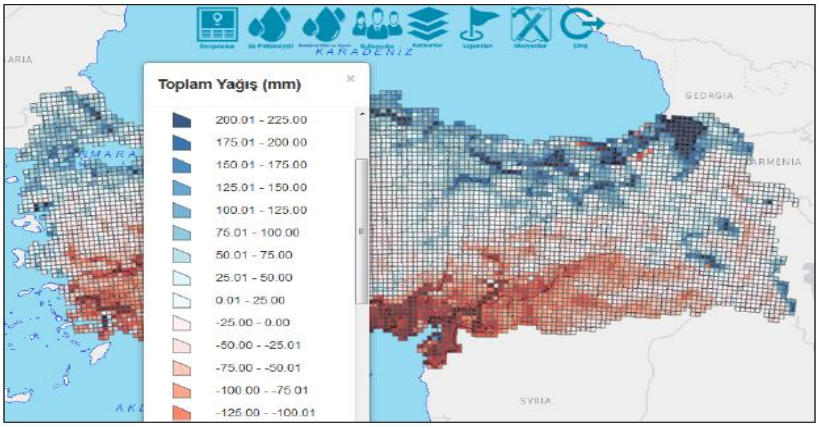
WATER REUSE



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 **8ºC** according to 1971-2000 observations, will **increase** by **at least 2,2°C**, **maximum 6ºC** in 2071-2100 period. It is expected that temperature increases for this period will predominate in the **southeastern** 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 **527,6 mm**. According to the results of the projection carried out, there is an **increase tendency** in the total precipitation compared to the reference period (1971-2000), and it is predicted that the basin will receive **7% more** rainfall compared to the reference period in **2071-2100**. It is expected that rainfall increases for this period will predominate in the **southwestern** 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 **2.569 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 40%**. Despite this, it is expected that the annual available water amount for the projection period will meet the total water need, and there will be no water deficit.

As a result of the hydrogeological studies carried out, the hydrogeological reserve of groundwater of the basin was determined to be **14 km^3**. The technically and economically usable amount of this reserve, the possible reserve is calculated to be **7 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 **9%** and possible reserve by **17%**.