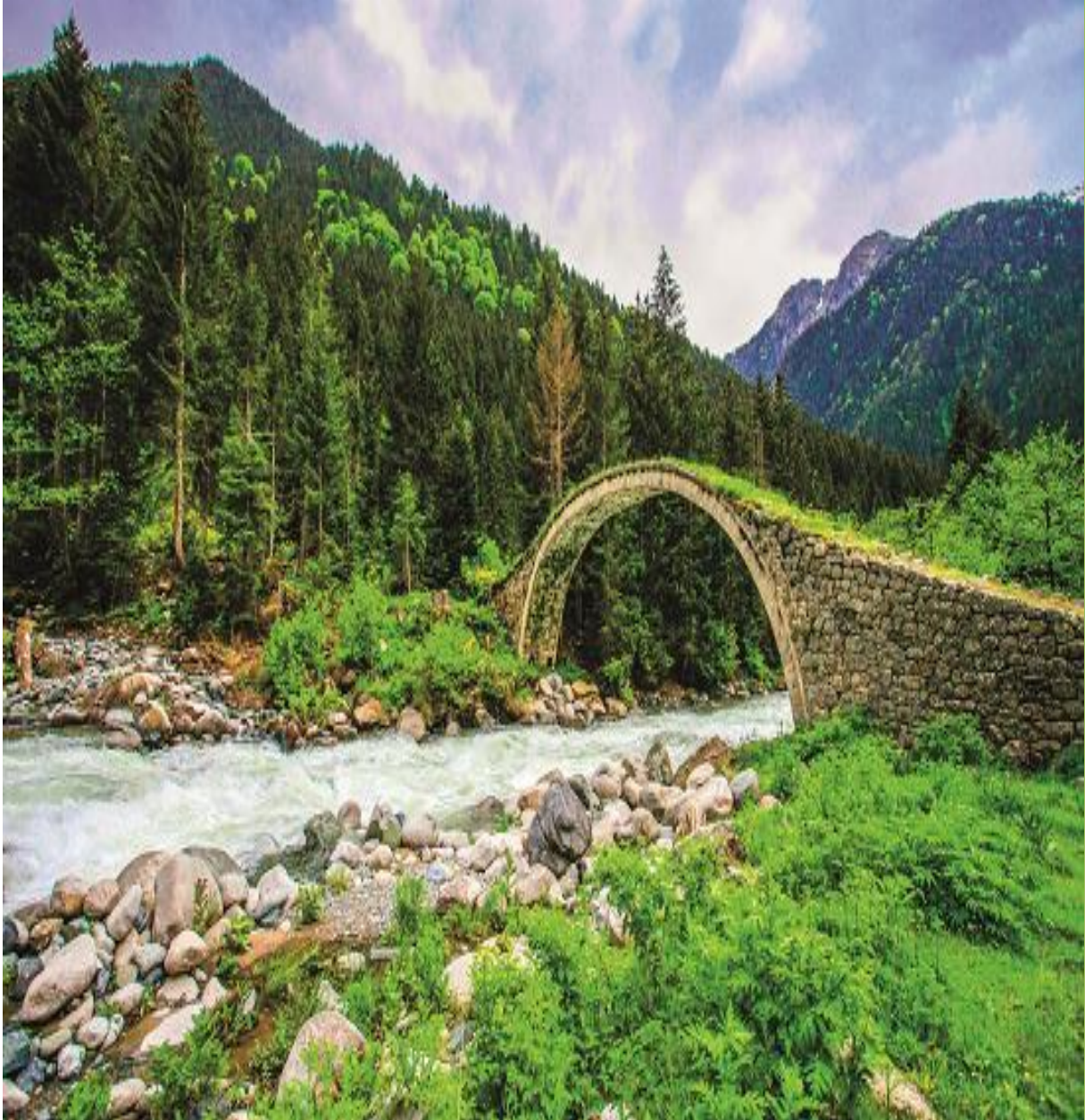
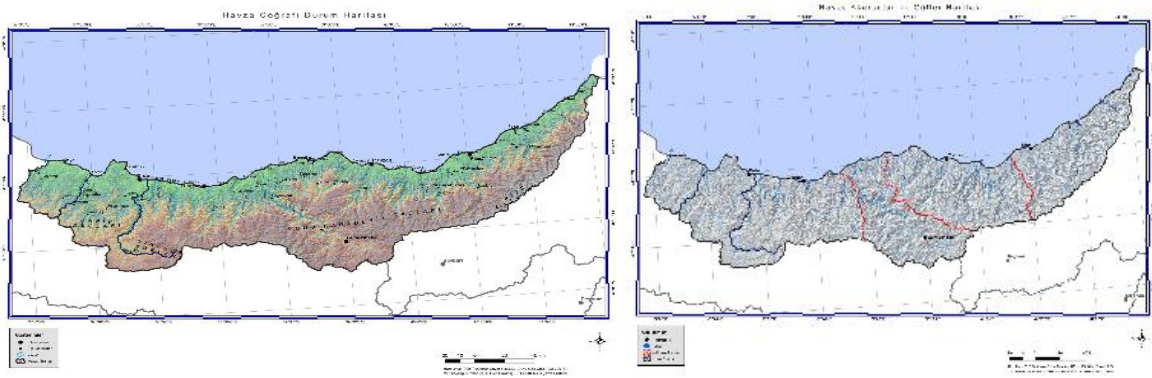


DOGU KARADENIZ RIVER BASIN



DOGU KARADENIZ RIVER BASIN

Dogu Karadeniz (Eastern Blacksea) River Basin is located in the Black Sea geographical region of Türkiye. The basin is neighboring to Çoruh basin in east, Yeşilirmak basin in the west and south. Dogu Karadeniz River Basin covers an area extending from the Terme Stream in west, to the small Streams near Hopa in east. The basin is bounded with Kackar Mountains, Tatos Mountains, Rize Mountains, Soganli Mountains, Gumushane Mountains and Canik Mountains from east to west. Dogu Karadeniz River Basin area is approximately 2.284.439 hectares accounting to 2,92% of the overall area of Türkiye.



There are 11 provinces within the Dogu Karadeniz Basin, namely, Ordu, Trabzon, Giresun, Rize, Gümüşhane, Artvin, Sivas, Bayburt, Erzurum, Samsun and Tokat. The spatial information of the provinces within the borders of the basin is given in the table below.

<i>Provinces</i>	<i>Area of the Province (km²)</i>	<i>Part of the Province in The Basin (km²)</i>	<i>Ratio of the Part in The Basin to the Province Area (%)</i>	<i>Distribution of the Basin to the Provinces (%)</i>
Ordu	595.176	535.186	89,9	23,3
Trabzon	463.612	462.619	99,9	20,2
Giresun	705.327	435.854	61,8	19,0
Rize	384.493	378.573	98,5	16,5
Gümüşhane	684.798	376.213	54,9	16,4
Artvin	748.270	52.404	7,0	2,3
Sivas	2.789.273	31.103	1,1	1,4
Bayburt	374.690	9.516	2,5	0,4
Erzurum	2.515.337	6.257	0,2	0,3
Samsun	994.927	3.642	0,4	0,2
Tokat	1.033.555	4.365	0,4	0,2

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 Doğu Karadeniz River Basin can be grouped as below: The implementation of the following actions is monitored within the scope of the Basin Protection Action Plan.

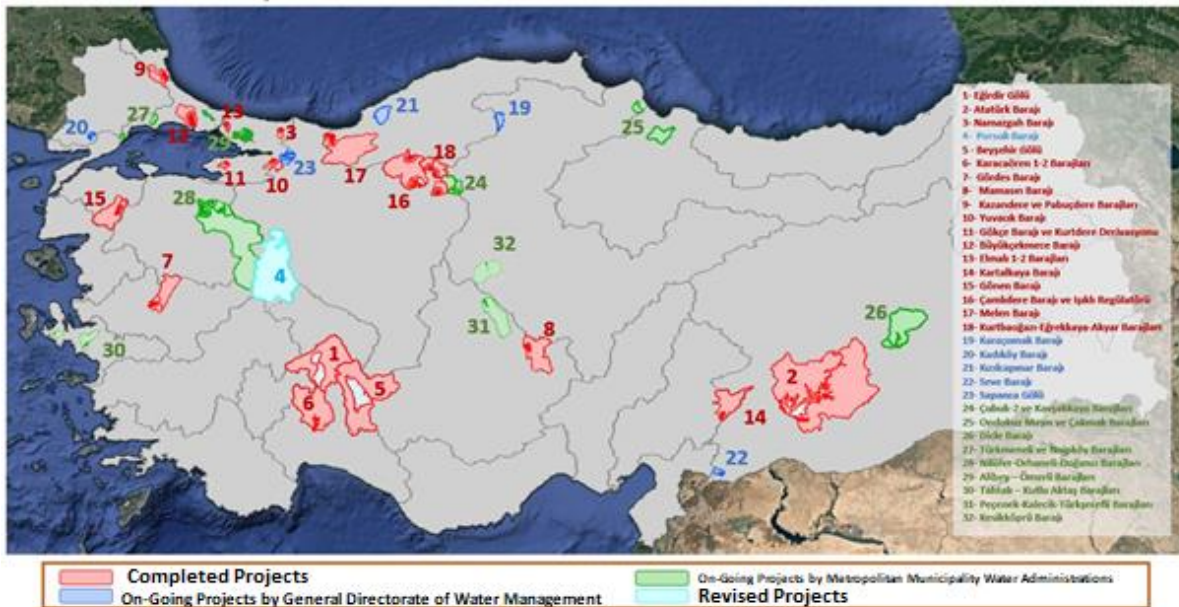
<ol style="list-style-type: none">1. Urban Wastewater Management2. Industrial Wastewater Management3. Urban Waste Management4. Non-Point Source Pollution Management5. Forestation, Erosion and Sedimentation Control6. Sewage Sludge Management7. Conservation Studies for Drinking Water Basins8. Flood Management	<ol style="list-style-type: none">9. Drought Management10. Monitoring, Inventory and Water Information System Studies11. Water Investments12. Water Re-use13. Impacts of Climate Change on Water Resources14. Sectoral Allocation Plans15. 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.

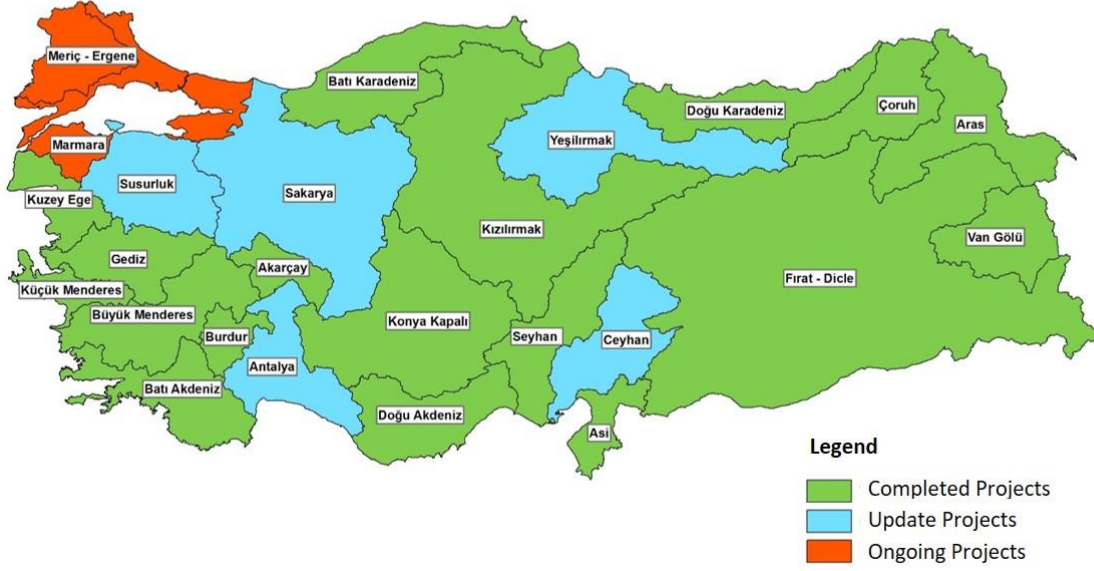
According to the Regulation on the Protection of Drinking-Water Basins:

- 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.

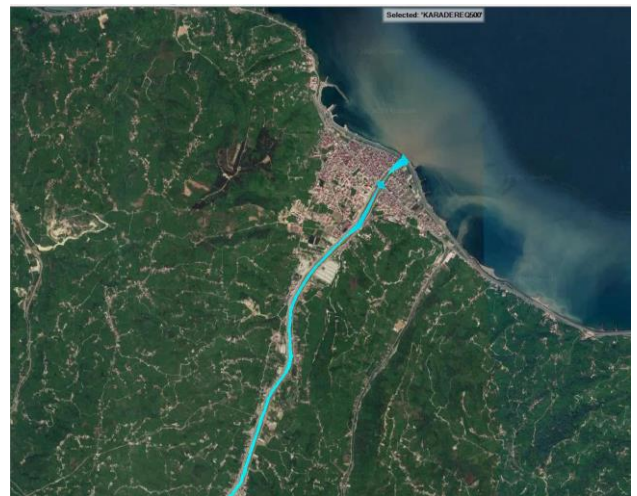
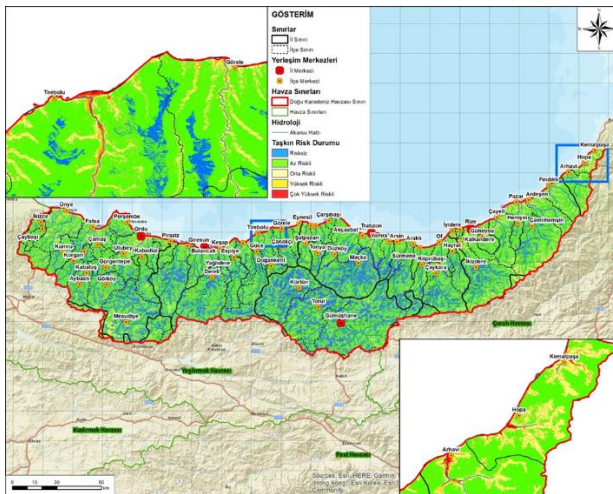


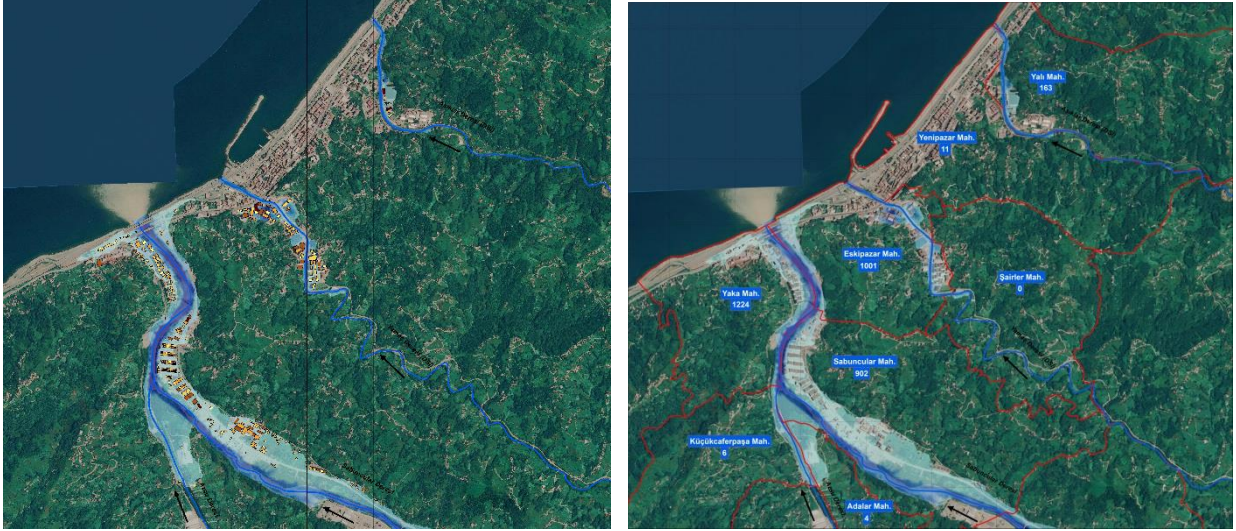
FLOOD MANAGEMENT PLANS

Doğu Karadeniz River Basin Flood Management Plan (FMP) was completed in 2020.



Flood Hazard and Flood Risk maps are generated within the scope of Doğu Karadeniz 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 Doğu Karadeniz Basin, 647 measures have been identified under the following groups of mitigation measures within the scope of the Flood Management Plan.

- Education/ Informing/ Raising Awareness
- Improvement of transition structure
- Improvement of monitoring capacity
- Data Management
- Stream bed regulation
- Cleaning stream beds
- Upper basin measures

Mitigation measures determined within the scope of the plan are still being tracked via the Flood and Drought Plans Tracking Web Application in 2018 and the National Water Information System (USBS) in 2020.

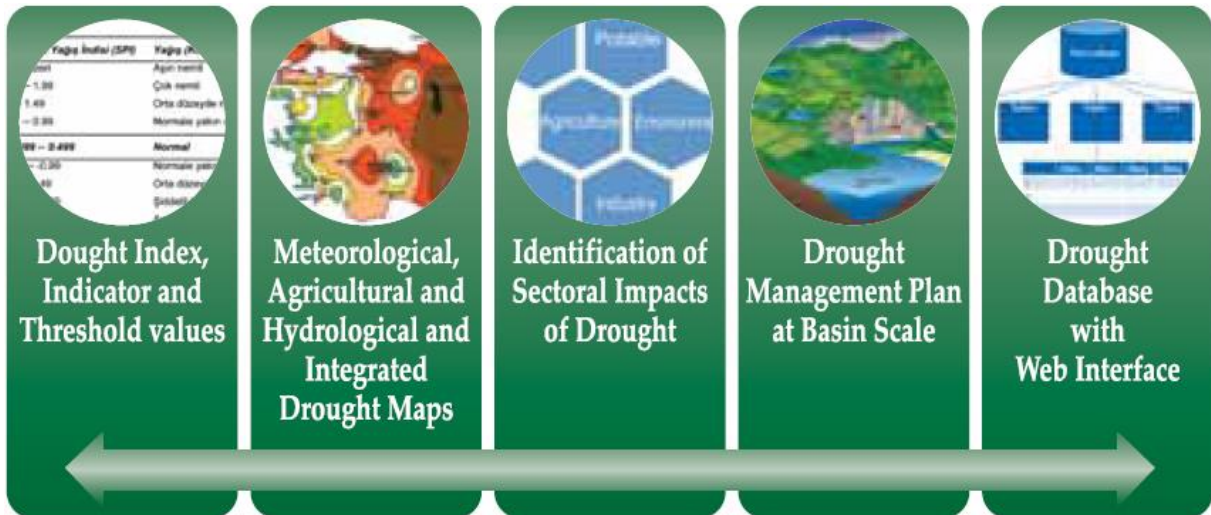
DROUGHT MANAGEMENT PLAN

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.



Doğu Karadeniz Basın DMP is started at 2021 and expected to complete by 2023.

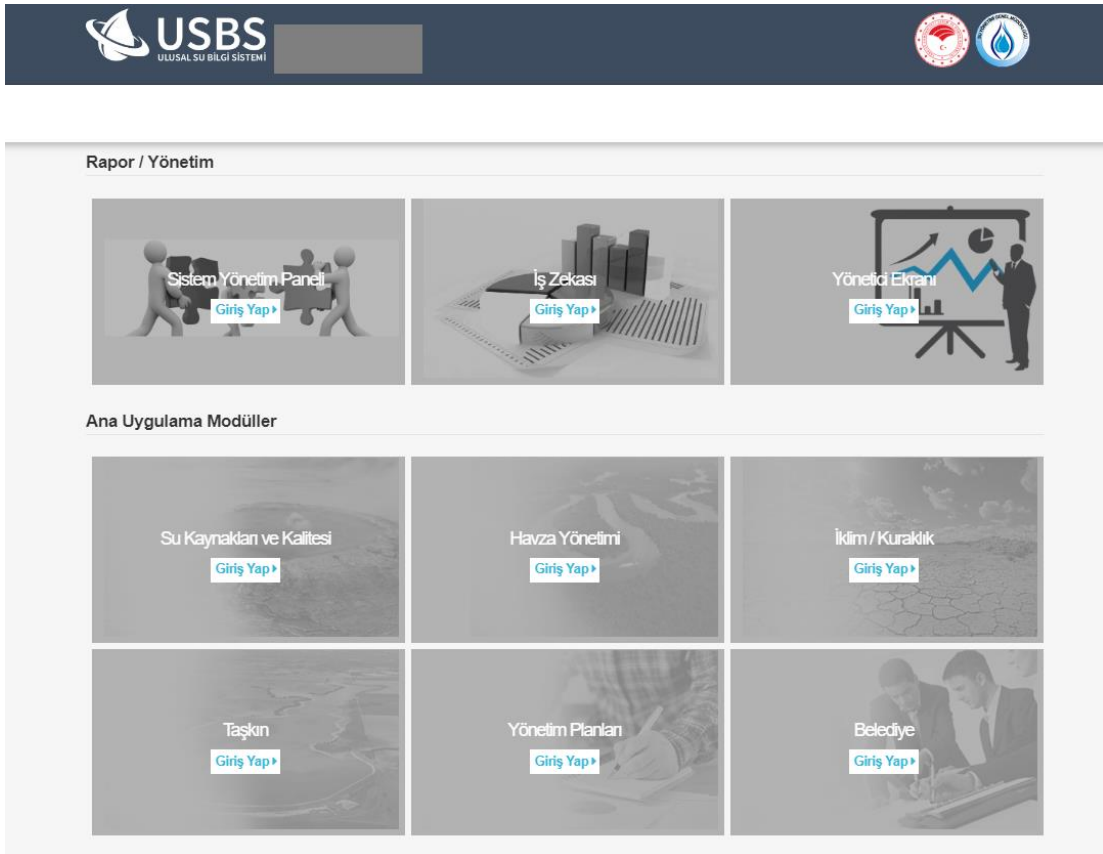
Studies During the Preparation of Drought Management Plans:



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 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.



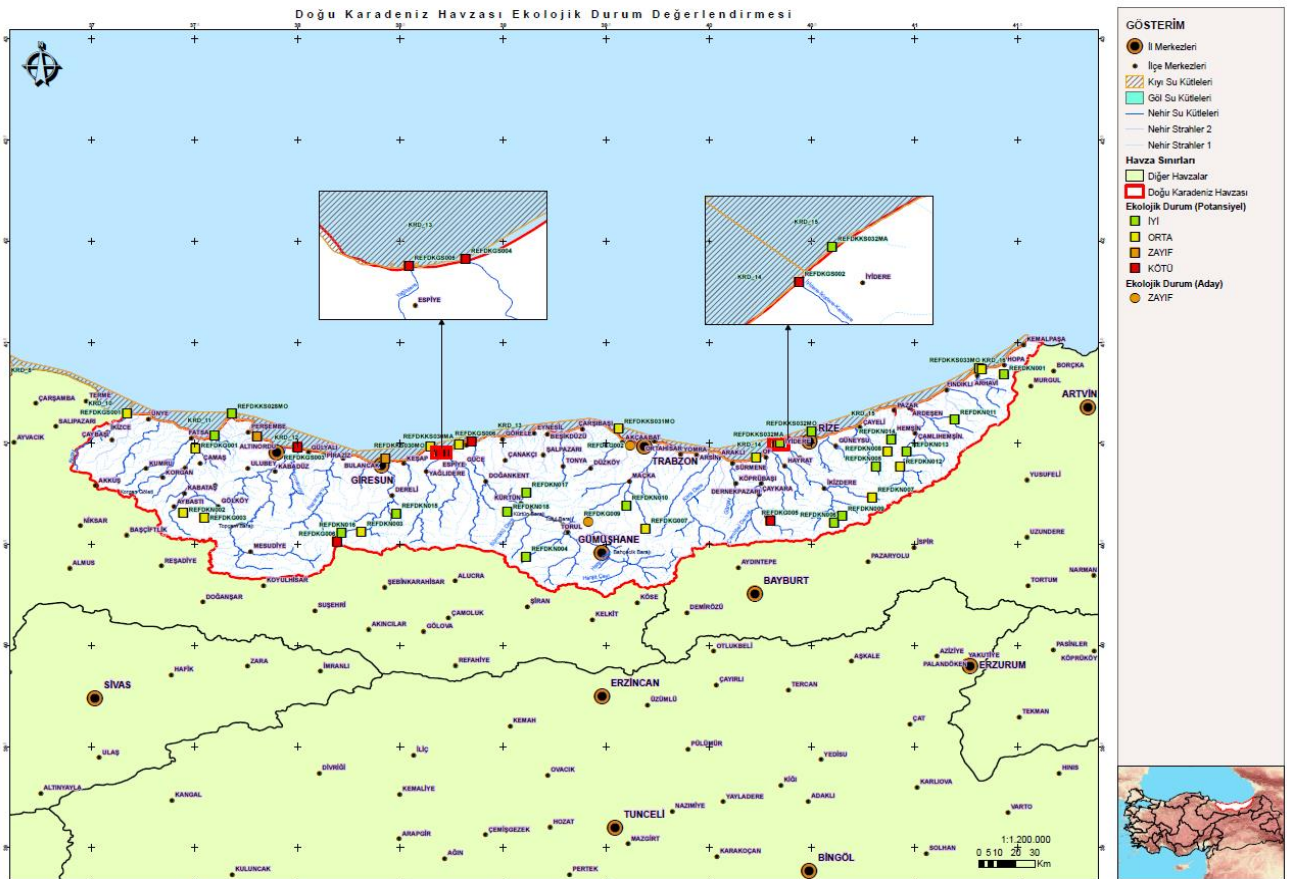
Graphical User Interface of National Water Information System (TRNWIS)

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 43 locations in the East Black Sea River Basin, including 18 rivers, 7 lakes (natural), 6 transitional waters, and 12 coastal waters, and 41 reference (unpolluted) water sources were identified. In addition, the ecological status of the monitored water bodies in the East Black Sea River Basin was determined as a result of the monitoring activities.

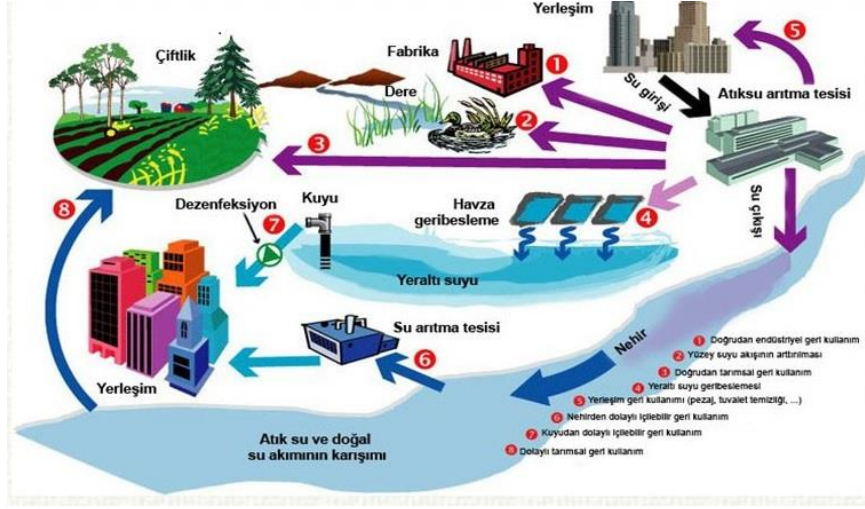
In the scope of monitoring activities, the smallest possible taxonomic level of all biological quality elements was identified and in this context 21 fish, 74 phytobenthos, 206 phytoplankton, 392 macroinvertebrate, 50 macroalgae/angiosperm and 53 macrophyte species were identified in the East Black Sea 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 East Black Sea River Basin

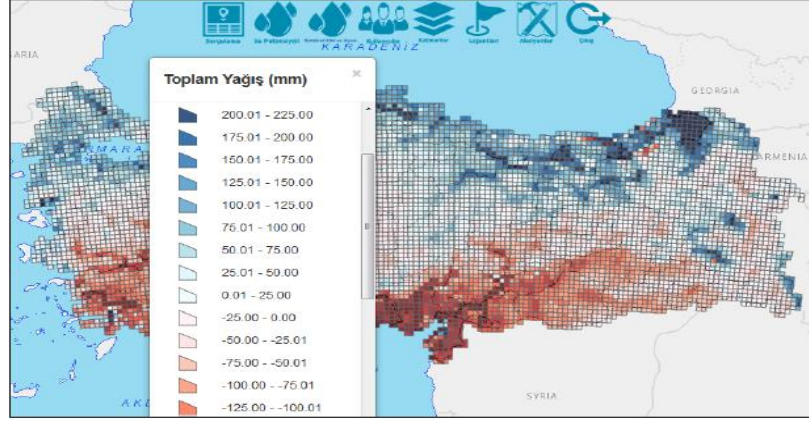
WATER REUSE



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. In the light of all this information, in the evaluation made specifically for Doğu Karadeniz basin, the wastewater treated in the wastewater treatment plants and the water returned from agriculture were determined as used water resources.

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 **12,2°C** according to 1971-2000 observations, will **increase by at least 1,7°C, maximum 4,9°C** in 2071-2100 period. It is expected that temperature increases for this period will predominate in the **southern** 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 **961,4 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 **15% more** rainfall compared to the reference period in **2071-2100**. It is expected that rainfall increases for this period will predominate in the **northeastern** 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 **15.336 million³/year**. With the effect of climate change, it is predicted that in the period **2015-2020**, the gross water potential of the basin could **decrease up to 60%**. Despite this, it is expected that the total water need of the basin can be met until 2100 and there will be no water deficit in the basin.

As a result of the hydrogeological studies carried out, the hydrogeological reserve of groundwater of the basin was determined to be **0,015 km³**. The technically and economically usable amount of this reserve, the possible reserve is calculated to be **0,008 km³**. Under the effects of the climate change, no significant change is expected in the hydrogeological and possible reserves of the basin by the end of the century.