

THE IMPORTANCE OF NORTH CYPRUS TURKISH REPUBLIC (TRNC) WATER SUPPLY PROJECT

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Climate Condition and Natural Resources in Cyprus

Access to good quality water in sufficient quantity and quality is fundamental both to most economic activities and to the daily lives of every human being all over the world. However, 3% of water is fresh water and it is not distributed regular in The World. Additionally, increasing in population and industry are negatively affecting sustainable water security and food security. Like some countries, islands have problems under fresh water shortage. One of these islands is Turkish Republic of Northern Cyprus (TRNC).

Cyprus has an intense Mediterranean climate. Hot dry summers from mid-May to mid-September and rainy, rather changeable, winters from November to mid-March are separated by short autumn and spring seasons of rapid change in weather conditions. Climate conditions on the island vary by geographical factors. Winter in the Northern Cyprus is cool and rainy with 60% of annual rainfall. The short spring is characterized by unstable weather, occasional heavy storms and the "meltem", or westerly wind. Summer is hot and dry enough to turn low-lying lands on the island brown. Summer is followed by a short, turbulent autumn.

The country relies heavily on rain to provide household water, but in the past 30 years average yearly precipitation has decreased. Because of irregular rain distribution, rain pour down to the Mediterranean Sea directly without infiltration and due to climate change and high temperature, evaporation is increasing in water storage structures. Because of water shortage, over-pumping of groundwater has increased for 30 years and ground water level has decreased under sea level. This made island water salty and TRNC has one of the lowest domestic water qualities in the world. Since 2004 demand has increased annually as a result of local population growth because of foreigners moving to Cyprus and the number of visiting tourists, while supply has fallen as a result of more frequent droughts.

Almost the entire need for water of the island is supplied with the underground water. Drinking water is normally supplied to homes only every few days but everyone has water tanks to collect it in the north. Water delivery services drain wells in an unregulated way. Water quality is derogating since landfill areas are close to water resources and potable water blends into underground waters. So the quality of water in Cyprus is constantly decreasing and the water potential which is already limited is being reduced every day.

Water desalination plants are gradually being constructed to deal with recent years of prolonged drought. The Government has invested heavily in the creation of water desalination plants which have supplied almost % 50 of domestic water since 2001. Efforts have also been made to raise public awareness of the situation and to encourage domestic water users to take more responsibility for the conservation.

Peace Water from Turkey to Cyprus

Consecutive years of droughts and overuse of aquifers have decreased the amount and quality of water in TRNC. Residents complain about seawater mixing with groundwater sources, disturbing daily life and agricultural irrigation. The salination problem is limited to coastal areas. TRNC Water Supply Project is a unique and complex project globally and Turkish government promoted the project as “The Project of Century”. Turkey named this water as “Peace Water” as well. If the Greek Part of Cyprus also want to utilize this water, Turkey will share its water with this project. The project is expected to solve the northern Cyprus’s fundamental and chronic problems of water shortage and expensive electricity. The Project will be a great contribution to the economic development of the region It will enhance agriculture and will provide extensive contribution to the standard of living in Turkish Republic of North Cyprus and the region, as well as ensure that all residents and visitors to the TRNC can drink purer water and never have to face water shortages in the future. The pipeline will also potentially provide electricity to TRNC from Turkey. The Project meets all of the TRNC’s water needs for the next 50 years.

To meet the water demand of the TRNC which is experiencing water shortage for years, State Hydraulic Works (DSI) under the Ministry of Forests and Water Affairs in Turkey has developed numerous projects until now such as convey water with balloons. It is noticed that the most appropriate way to offer a long term solution is water transmission from Turkey to TRNC. In this context, TRNC Potable Water Supply Project

which is achieved for the first time in the World, has been realized to solve the water problem of TRNC.

What are the Components of Turkish Republic of Northern Cyprus (TRNC) Water Supply Project

Start date of the Project preparation was on 27 May 1998. The project was officially initiated in March 2011 with the construction of Alaköprü Dam in Anamur and structures of the project were planned to finish in 2014 but it completed in 2015.

TRNC Water Supply Project is aimed at delivering water for drinking and irrigation from southern Turkey to the northern coast of Cyprus via a pipeline under the Mediterranean Sea.. The pipeline will provide 75 million cubic meters of water per year to TRNC. With this project, 37,76 million cubic meters per year will be distributed for potable water need and 37,24 million cubic meters per year will be distributed for Irrigation. 2,83 m³ water per second is planned to flow through the pipeline. Area will be irrigated is 4.824 ha. TRNC will be compensated for its projected water need for the next 50 years. While the total cost of the project is expected \$ 450 million, it reaches around \$ 550 million and It is funded by Turkish Government. All dams and pipeline in Mediterranean Sea are completed in 2015.

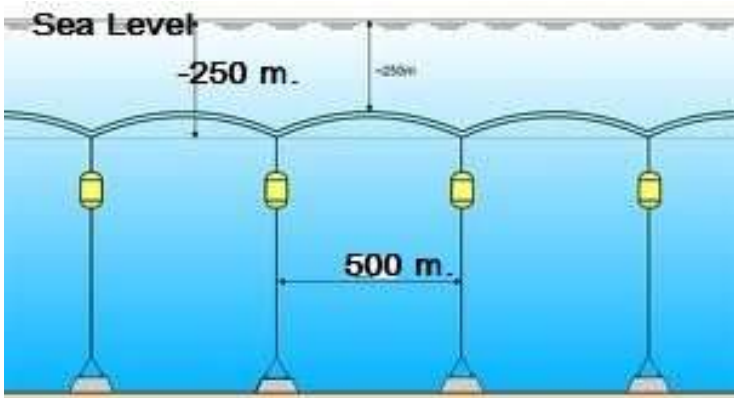
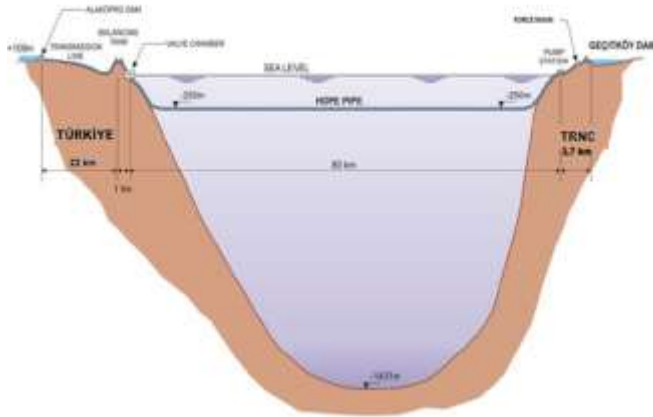


This gigantic project has structures of 3 main parts as Turkey Part Land Structures, Sea Crossing and TRNC Part Land Structures. Within the scope of this project, water being supplied from Alaköprü Dam constructed in Turkey was passed through the sea and conveyed to Geçitköy Dam constructed in TRNC. The most critical points of the Project are the pipes carrying the water through the sea.

The Alaköprü dam at the height of 99 m at Turkey side is storing the water required for the pipeline. From Alaköprü Dam, the water is transported by 23 km pipeline to the Anamuryum pumping station, and then enters



the PE pressure line leading into the Mediterranean.



The most critical point of Water Supply Project is “sea crossing”. What makes this project important is the fact that such a long-distance transition suspended subsea pipeline is the first in the World. Sea crossing is implemented by a very special high density polyethylene pipe HDPE. The pipes are suspended 250 meters below the Mediterranean Sea level and cover the 80 km from the Alaköprü Dam in Turkey to the Geçitköy Dam in the TRNC. Each pipe with 500 meters was tied with special ropes to the sea bottom. 160 pipes with diameter of 1,600 mm were used for the sea crossing.

The pipeline posed an engineering challenge: Since the water pressure is too great, it couldn't run on the seabed. It also had to be far enough under water that it didn't interfere with ships and submarines. Other advantages are that the pipes can be laid in as straight a line as possible, avoiding the steep contours of the sea floor. The deepest part of sea bed is 1.430 meter. After travelling through the sea, the HDPE pipeline reaches the coast of the Turkish Republic of Northern Cyprus, where the water is pumped into the reservoir of the Geçitköy dam, some 3 km away.



Related to sea crossing, many issues such as the impact on the pipeline and on the sea life are taken into account carefully in project design work. In Project design studies;

many issues such as model tests on the sea crossing, risk analysis, seismic studies, oceanographic and climatic characteristics, effects of sea creatures to pipeline has been considered carefully and examined. Avoiding the unfavorable parts of the sea floor, geological and geotechnical surveys on the steep slope and landslide zones were performed to determine the direction of a straight line as possible. Discharge measuring device to watch the waves and currents near the shore and discharge measuring device to watch the stream at the depth are placed. Wave and current data were collected using these units. In order to determine the likelihood of the development of marine creatures, biofouling research program was carried out in sea crossing transmission line. Some HDPE pipe samples were placed in some points of the transmission line route. To minimize the negative effect and increase the safety, all measurements were taken.

TRNC part of the Project contains; Güzelyalı and Geçitköy pumping stations, Geçitköy Dam at the height of 65 m, 470 km main distribution lines with 80-1500 mm ductile cast, 3 reservoir in 500, 1000 and 10.000 m³ storage capacity, 19 pumping station for 5 provinces, 20 towns, 141 villages and drinking water treatment plant.

This project, which is an important international experience in terms of water transfer under sea level, will be an example to other countries who has problems of water shortage.

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