= Tabqa Dam =

The Tabqa Dam (Arabic : ?? ??????) , or al @-@ Thawra Dam as it is also named (Arabic : ?? ?????? , literally dam of the revolution) , is an earth @-@ fill dam on the Euphrates , located 40 kilometres (25 mi) upstream from the city of Ar @-@ Raqqah in Ar @-@ Raqqah Governorate , Syria . The dam is 60 metres (200 ft) high and 4 @.@ 5 kilometres (2 @.@ 8 mi) long and is the largest dam in Syria . Its construction led to the creation of Lake Assad , Syria 's largest water reservoir . The dam was constructed between 1968 and 1973 with help from the Soviet Union . At the same time , an international effort was made to excavate and document as many archaeological remains as possible in the area of the future lake before they would be flooded by the rising water . When the flow of the Euphrates was reduced in 1974 to fill the lake behind the dam , a dispute broke out between Syria and Iraq that was settled by intervention from Saudi Arabia and the Soviet Union . The dam was originally built to generate hydroelectric power , as well as irrigate lands on both sides of the Euphrates . The dam has not reached its full potential in either of these objectives .

= = Project history = =

In 1927 , when Syria was a French mandate , it was proposed to build a dam in the Euphrates near the Syro ? Turkish border . After Syria became independent in 1946 , the feasibility of this proposal was re @-@ investigated , but the plan was not carried out . In 1957 , the Syrian government reached an agreement with the Soviet Union for technical and financial aid for the construction of a dam in the Euphrates . Syria , as part of the United Arab Republic (UAR) , signed an agreement with West Germany in 1960 for a loan to finance the construction of the dam . After Syria left the UAR in 1961 , a new agreement about the financing of the dam was reached with the Soviet Union in 1965 . A special government department was created in 1961 to oversee the construction of the dam .

Originally , the Tabqa Dam was conceived as a dual @-@ purpose dam . The dam would include a hydroelectric power station with eight turbines capable of producing 824 MW in total , and would irrigate an area of 640 @,@ 000 hectares (2 @,@ 500 sq mi) on both sides of the Euphrates . Construction of the dam lasted between 1968 and 1973 , while the accompanying power station was finished in 1977 . Total cost of the dam was US $ 340 million of which US $ 100 million was in the form of a loan by the Soviet Union . The Soviet Union also provided technical expertise . During construction , up to 12 thousand Syrians and 900 Russian technicians worked on the dam . They were housed in the greatly expanded town near the construction site , which was subsequently renamed Al @-@ Thawra . To facilitate this project , as well as the construction of irrigation works on the Khabur River , the national railway system (Chemins de Fer Syriens) was extended from Aleppo to the dam , Ar @-@ Raqqa , Deir ez @-@ Zor , and eventually Al @-@ Qamishli . The four thousand @-@ some Arab families who had been living in the flooded part of the Euphrates Valley were resettled in other parts of northern Syria . This resettlement was part of an only partially implemented plan to establish an " Arab belt " along the borders with Turkey and Iraq in order to separate Kurds living in Syria from Kurds living in Turkey and Iraq .

= = = Dispute with Iraq = = =

In 1974 , Syria started to fill the lake behind the dam by reducing the flow of the Euphrates . Slightly earlier , Turkey had started filling the reservoir of the newly constructed Keban Dam , and at the same time the area was also hit by significant drought . As a result , Iraq received significantly less water from the Euphrates than normal , and complained that annual Euphrates flow had dropped from 15 @.@ 3 cubic kilometres (3 @.@ 7 cu mi) in 1973 to 9 @.@ 4 cubic kilometres (2 @.@ 3 cu mi) in 1975 . Iraq asked the Arab League to intervene but Syria argued that it received less water from Turkey as well and refused to cooperate . As a result , tensions rose and Iraq and Syria sent troops to their shared border . Iraq also threatened to bomb the Tabqa Dam . Before the

dispute could escalate any further , an agreement was reached in 1975 by mediation of Saudi Arabia and the Soviet Union whereby Syria immediately increased the flow from the dam and reportedly henceforth agreed to let 60 percent of the Euphrates water flow into Iraq . In 1987 , Turkey , Syria and Iraq signed an agreement by which Turkey was committed to maintain an average Euphrates flow of 500 cubic metres (18 @,@ 000 cu ft) per second into Syria , which translates into 16 cubic kilometres (3 @.@ 8 cu mi) of water per year .

= = = Rescue excavations in the Lake Assad region = = =

The upper part of the Syrian Euphrates valley has been intensively occupied at least since the Late Natufian period (10 @,@ 800 ? 9500 BC) . Nineteenth- and early twentieth @-@ century European travellers had already noted the presence of numerous archaeological sites in the area that would be flooded by the new reservoir . In order to preserve or at least document as many of these remains as possible , an extensive archaeological rescue programme was initiated during which more than 25 sites were excavated .

Between 1963 and 1965 , archaeological sites and remains were located with the help of aerial photographs , and a ground survey was carried out as well to determine the periods that were present at each site . Between 1965 and 1970 , foreign archaeological missions carried out systematic excavations at the sites of Mureybet (United States) , Tell Qannas (Belgium) , Habuba Kabira , Mumbaqa (Germany) , Selenkahiye (Netherlands) , and Emar (France) . With help from UNESCO , two minarets at Mureybet and Meskene were photogrammetrically measured , and a protective glacis was built around the castle Qal 'at Ja 'bar . The castle was located on a hilltop that would not be flooded , but the lake would turn it in an island . The castle is now connected to the shore by a causeway .

In 1971 , with support from UNESCO , Syria appealed to the international community to participate in the efforts to salvage as many archaeological remains as possible before the area would disappear under the rising water of Lake Assad . To stimulate foreign participation , the Syrian antiquities law was modified so that foreign missions had the right to claim a part of the artefacts that were found during excavation . As a result , between 1971 and 1974 , numerous excavations were carried out in the Lake Assad area by Syrian as well as foreign missions . Syrian archaeologists worked at the sites of Tell al- ' Abd , ' Anab al @-@ Safinah , Tell Sheikh Hassan , Qal 'at Ja 'bar , Dibsi Faraj and Tell Fray . There were missions from the United States on Dibsi Faraj , Tell Fray and Shams ed @-@ Din @-@ Tannira ; from France on Mureybet and Emar ; from Italy on Tell Fray ; from the Netherlands on Tell Ta 'as , Hadidi , Jebel ' Aruda and Selenkahiye ; from Switzerland on Tell al @-@ Hajj ; from Great Britain on Abu Hureyra and Tell es @-@ Sweyhat ; and from Japan on Tell Roumeila . In addition , the minarets of Mureybet and Meskene were moved to higher locations , and Qal 'at Ja 'bar was further reinforced and restored . Many finds from the excavations are now on display in the National Museum of Aleppo , where a special permanent exhibition is devoted to the finds from the Lake Assad region .

= = = Other dams in the Syrian Euphrates valley = = =

After the completion of the Tabqa Dam , Syria built two more dams in the Euphrates , both of which were functionally related to the Tabqa Dam . The Baath Dam , located 18 kilometres (11 mi) downstream from the Tabqa Dam , was completed in 1986 and functions as a floodwater control to manage the irregular output of the Tabqa Dam and as a hydroelectric power station . The Tishrin Dam , which functions primarily as a hydroelectric power station , has been constructed 80 kilometres (50 mi) south from the Syro ? Turkish border and filling of the reservoir started in 1999 . Its construction was partly motivated by the disappointing performance of the Tabqa Dam . The implementation of a fourth dam between Ar @-@ Raqqah and Deir ez @-@ Zor ? the Halabiye Dam ? has recently been initiated with an appeal to archaeologists to excavate sites that will be flooded by the new reservoir .

= = = Recent history = = =

The Syrian Observatory for Human Rights reported on 11 February 2013 that the dam was captured by the Syrian opposition in their fight against the government . As of May 2013 the village near the dam , Al @-@ Thawrah , is occupied by the Uwais al @-@ Qarni Brigade . Four of the dam 's eight turbines are operational and the original staff continues to manage the dam . Workers at the dam still receive pay from the Syrian Government and fighting in the area will temporary cease if repairs are needed .

= = Characteristics of the dam and the reservoir = =

The Tabqa dam is located on a spot where rocky outcrops on each side of the Euphrates Valley are less than 5 kilometres (3 @.@ 1 mi) apart . The dam is an earth @-@ fill dam that is 4 @.@ 5 kilometres (2 @.@ 8 mi) long , 60 metres (200 ft) high from the riverbed (307 metres (1 @,@ 007 ft) above sea @-@ level) , 512 metres (1 @,@ 680 ft) wide at its base and 19 metres (62 ft) at the top . The hydroelectric power station is located on the southern end of the dam and contains eight Kaplan turbines . The turbines ' rotation speed is 125 RPM , and they can potentially generate 103 MW each . Lake Assad is 80 kilometres (50 mi) long and on average 8 kilometres (5 @.@ 0 mi) wide . The reservoir can potentially hold 11 @.@ 7 cubic kilometres (2 @.@ 8 cu mi) of water , at which size its surface area would be 610 square kilometres (240 sq mi) . Annual evaporation is 1 @.@ 3 cubic kilometres (0 @.@ 31 cu mi) due to the high average summer temperature in northern Syria . This is high compared to reservoirs upstream from Lake Assad . For example , the evaporation at Keban Dam Lake is 0 @.@ 48 cubic kilometres (0 @.@ 12 cu mi) per year at roughly the same surface area .

Neither the Tabqa Dam nor Lake Assad is currently used to its full economic potential . Although the lake can potentially hold 11 @.@ 7 cubic kilometres (2 @.@ 8 cu mi) , actual capacity is 9 @.@ 6 cubic kilometres (2 @.@ 3 cu mi) , with a surface area of 447 square kilometres (173 sq mi) . The proposed irrigation scheme suffered from a number of problems , including the high gypsum content in the reclaimed soils around Lake Assad , soil salinization , the collapse of canals that distributed the water from Lake Assad , and the unwillingness of farmers to resettle in the reclaimed areas . As a result , only 60 @,@ 000 hectares (230 sq mi) were irrigated from Lake Assad in 1984 . In 2000 , the irrigated surface had risen to 124 @,@ 000 hectares (480 sq mi) , which is 19 percent of the projected 640 @,@ 000 hectares (2 @,@ 500 sq mi) . Due to lower than expected water flow from Turkey , as well as lack of maintenance , the dam generates only 150 MW instead of 800 MW . Lake Assad is the most important source of drinking water to Aleppo , providing the city through a pipeline with 0 @.@ 08 cubic kilometres (0 @.@ 019 cu mi) of drinking water per year . The lake also supports a fishing industry .

= = = Environmental effects = = =

Research indicates that the salinity of the Euphrates water in Iraq has increased considerably since the nearly simultaneous construction of the Keban Dam in Turkey and the Tabqa Dam in Syria . This increase can , among other things , be related to the lower discharge of the Euphrates as a result of the construction of the Keban Dam and the dams of the Southeastern Anatolia Project (GAP) in Turkey , and to a lesser degree of the Tabqa Dam in Syria . High @-@ salinity water is less useful for domestic and irrigation purposes .

The shore of the lake has developed into an important marshland area . On the southeastern shore , some areas have been reforested with evergreen trees including the Aleppo pine and the Euphrates poplar . Lake Assad is an important wintering location for migratory birds and the government has recently undertaken measures to protect small areas along the shores of Lake Assad from hunters by downgrading access roads . The island of Jazirat al @-@ Thawra has been designated a nature reserve .