Hydro Politics Newsletter
by Hydropolitics Association
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Transboundary Water Allocation Agreements need to be adoptable to climate change

To respond to changing conditions, including but not limited to climate variability and change, transboundary water allocation agreements and other arrangements should be adaptable.

New transboundary water allocation agreements and other arrangements need to be designed to be adaptable in the medium and long-terms to changing hydrological, climatic and other related factors (socioeconomic, geographical, cultural, etc.).

Existing water allocation agreements and other arrangements, or adopted subsidiary instruments, may need to be revised to be able to respond to changing conditions.

Adaptive capacity can be integrated into transboundary allocation systems and institutions to respond to changing conditions, impacts and opportunities. Examples of this include applying allocations in percentages instead of absolute amounts, periodic reviews and using objective thresholds (e.g. persistent low precipitation) as a basis if exceptional deviations from agreed allocations are needed.

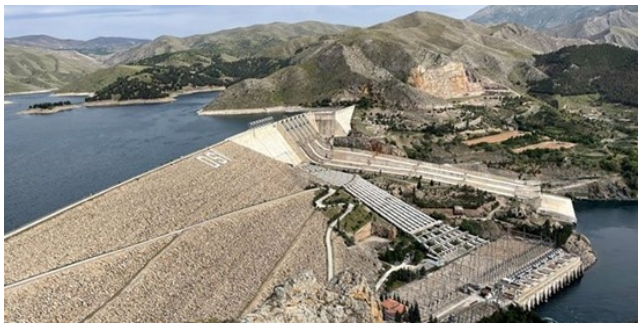
Climate change must be approached as a cross-cutting challenge to effective allocation. It is a potential risk multiplier that may necessitate adjustment of existing—and careful drafting of any new—transboundary water allocation agreements and arrangements.

Transboundary allocation arrangements need to factor in the increased uncertainty and inter- and intraannual variability of precipitation and run-off to cope with increasing frequency and extremity of drought and flood events.

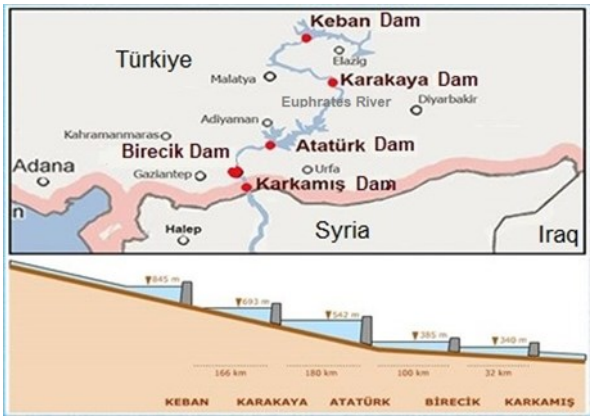
Dursun Yıldız

Hydropolitics Academy

Climate change has decreased hydroelectric energy generation in the Upper Euphrates Basin, says the new HPA Report.



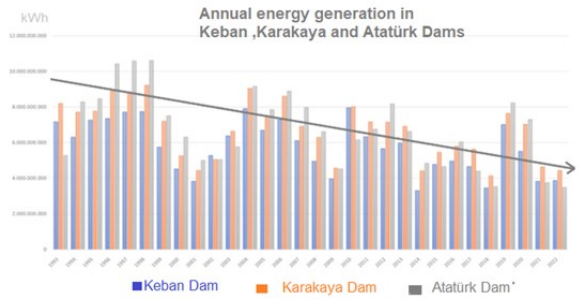
The report titled “The Impact of Climate Change in the Upper Tigris and Euphrates Basin," prepared by the Hydropolitics Association, says that "the electricity generation of Keban, Karakaya, and Atatürk Dams has gradually decreased by 25% since the last 30 years.



These dams on the Euphrates River annually generate one-fifth of the total hydroelectric energy in Türkiye. These dams have generated 17 years of lower project capacity in the last 30 years. In the Atatürk Dam, the annual generation amounts during the eight years in the last 30 years were 45% below the capacity of 8.9 GWh.

The report prepared by the experts of the Hydropolitics Association investigated the reasons for this continuous energy generation decrease. In the report, many effects that may cause a continuous decrease in the energy generation from the dams in the Upper Euphrates basin have been investigated in detail.

It was concluded that this gradual decrease in hydroenergy generation in the last 30 years was caused by a decrease in precipitation and meteorological drought periods in the basin. In addi-

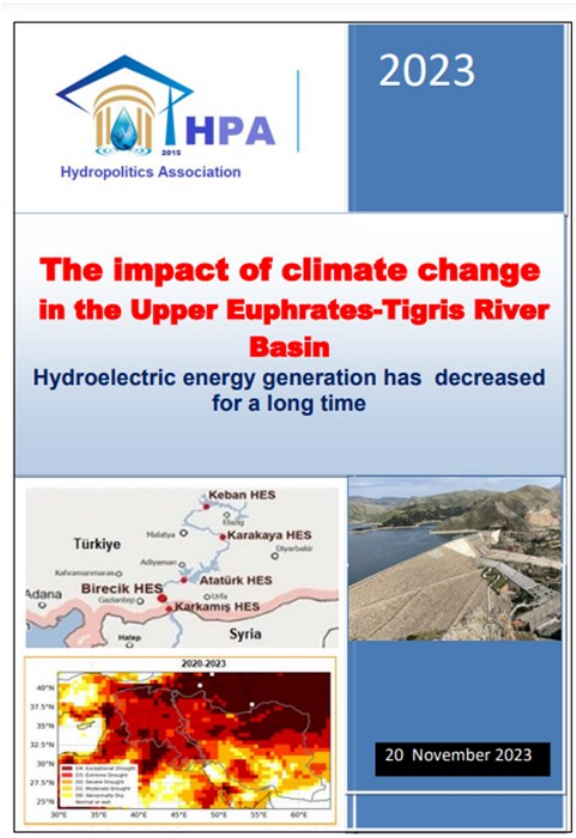


tion, many other scientific research results examining the effects of climate change in this region and snowfall analyses made by the General Directorate of Meteorology (MGM) for the region have been reviewed. It was found that the tendency to decrease hydroelectric energy production mentioned in the report was also compatible with these results and analyses.

Dursun Yıldız, President of the Hydropolitics Association, made the following statement regarding the results of the report:

1. Climate change has reduced hydroenergy generation in the Upper Euphrates Basin for the last 30 years. This decreased tendency is likely to continue.
2. Climate change will also adversely affect irrigation projects in the GAP region.
3. This has been a concrete example for the studies to take into account the effect of climate change on transboundary water allocation agreements ongoing in the UNECE.
4. Climate change will also have significant effects on the hydropolitics of the Tigris and Euphrates River Basin.

Because of climate change's adverse effects on water resources in the region, existing plans on sectoral water allocation and regional hydropolitics need to be updated.



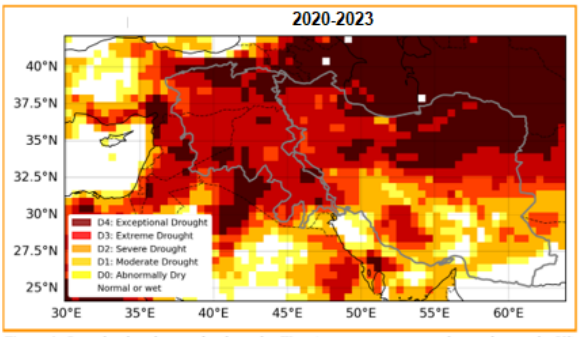
About the Report

Keban, Karakaya, and Atatürk Dams are located in line with the Euphrates River and still produce about 12% of the total hydroelectric energy of Türkiye. The water released from the Keban Dam upstream is also used by other dams to produce hydroelectricity in a synchronized manner.

All of these dams have started to produce energy together since 1993. This report aims to investigate the causes of decreasing annual energy generation from all three dams between 1993 and 2022. In this study, it was seen that the total electricity produced from these three dams has started to gradually decrease since 1998. In the last 5 years, it has been determined that this energy has decreased by one-quarter compared to the start of production. In the study, the reasons for this decrease were investigated, and the results obtained were presented in this report.

As a result, the total electricity generation from Keban, Karakaya, and Atatürk Dams has gradually decreased by 25% in the last 30 years compared to the energy generation starting years in the early 1990s. The decrease in hydro electrical energy produced from these dams will create economic consequences in Türkiye as well as the hydropolitics of the region. .

It is found that the decline in electrical energy production is in great correlation with the droughts in the region. This shows that a decrease in rainfall and snowfall has led to a decrease in the average annual flow of the Euphrates River in the last 30 years.



This result is compatible with the results of many scientific studies on how the Euphrates and Tigris River flows are affected by climate change and analyses on the average annual snowfall measurements in the Upper Euphrates basin. It is hoped that this report will be beneficial for the hydropolitics of the region as well as climate change adaptation

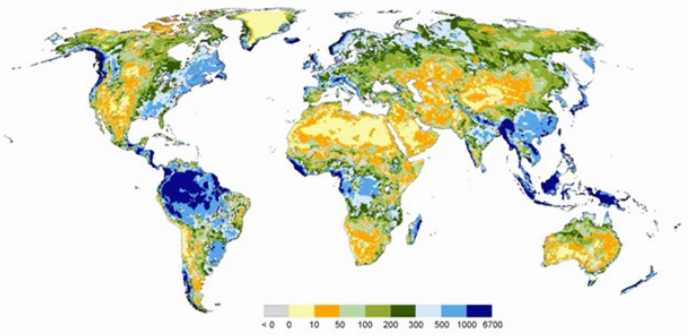
HPA News

Future Threats to Freshwater Resources

The quote at the beginning of this lesson is an unfortunate representation of freshwater management in the present. There are enough freshwater resources globally to support human populations; however, allocating the water to at-risk populations is where freshwater scarcity comes into play. A key example of this quote can be seen in the map below (Figure 1). Nations like Norway have enormous water resources that could support a population much larger than itself, while nations like Yemen on the Southern Arabian Peninsula have hardly enough freshwater to support their population.

Figure 1. Total amounts of renewable freshwater resources.

The changing global climate is expected to greatly impact available water resources. According to NOAA,



"Records and research show that sea level has been steadily rising at a rate of 1 to 2.5 millimeters (0.04 to 0.1 inches) per year since 1900. This rate may be increasing. Since 1992, new methods of satellite altimetry (the measurement of elevation or altitude) indicate a rate of rise of 3 millimeters (0.12 inches) per year" (Figure 2). If the rate of 3 mm (0.12 inches) per year remains steady, it is possible that by 2100 the ocean will be at a height of 300 mm (12 inches) or one foot higher than it was in 2000. If the ocean were a foot higher in elevation, many island nations throughout the world would be forced to abandon their homeland and become environmental refugees in foreign nations. Coastal cities throughout the world would have to spend billions of dollars to prevent the ocean from encroaching on their boundaries.

At this rate of 3 mm (0.12 inches) per year of increased elevation, human populations should be concerned.

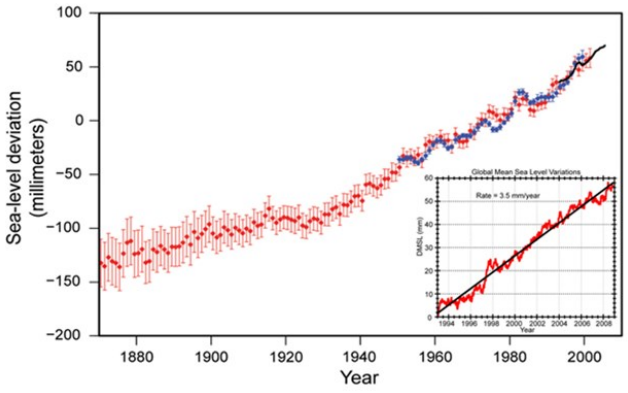


Figure 11.2. Trends in global sea-level rise
Source: NOAA

As global temperatures rise, places like Greenland, which have trillions of gallons of freshwater stored in ice and glaciers, will begin to experience a decrease in the mass of their snow cover as they melt, adding to the rising sea elevation. Besides the expanding ocean taking away valuable land where humans live upon, it can also have other devastating impacts. Storm surges or even high tides would be capable of bringing the saline ocean water into rivers, groundwater, and reservoirs as the ocean expands. These freshwater resources will mix ocean water with freshwater, creating brackish, undrinkable water. Changing climate also will have an impact on freshwater resources. Larger fluctuations in rainfall will result in longer periods of drought, which could drain groundwater and riverine resources. Rainfall fluctuations will also cause stronger floods and storms, which could cause increased saltwater intrusion and pollution of freshwater resources.

Population growth is expected to increase in the coming century with global populations reaching nearly 8.1 billion by 2025, 9 billion by 2050, and nearly 11 billion people by the century's end. Such a rapidly increased global population is expected to place additional stress on freshwater resources. Peoples from water-stressed regions of the world will become environmental refugees. They will be forced to migrate to countries that possess an excess of freshwater, most likely places like the United States or North/Central Europe. In order to protect remaining freshwater resources in the face of decreasing land space and a rapidly increasing global population, effective conservation policies must be developed.

Source : https://www.e-education.psu.edu/geog431/node/713

NASA analysis confirms 2023 as warmest year on record

January 14, 2024 NASA/Goddard Space Flight Center

Earth's average surface temperature in 2023 was the warmest on record, according to an analysis by NASA. Global temperatures last year were around 2.1 degrees Fahrenheit (1.2 degrees Celsius) above the average for NASA's baseline period (1951-1980), scientists from NASA's Goddard Institute for Space Studies (GISS) in New York reported.

"NASA and NOAA's global temperature report confirms what billions of people around the world experienced last year; we are facing a climate crisis," said NASA Administrator Bill Nelson. "From extreme heat, to wildfires, to rising sea levels, we can see our Earth is changing. There's still more work to be done, but President Biden and communities across America are taking more action than ever to reduce climate risks and help communities become more resilient -- and NASA will continue to use our vantage point of space to bring critical climate data back down to Earth that is understandable and accessible for all people. NASA and the Biden-Harris Administration are working to protect our home planet and its people, for this generation -- and the next.

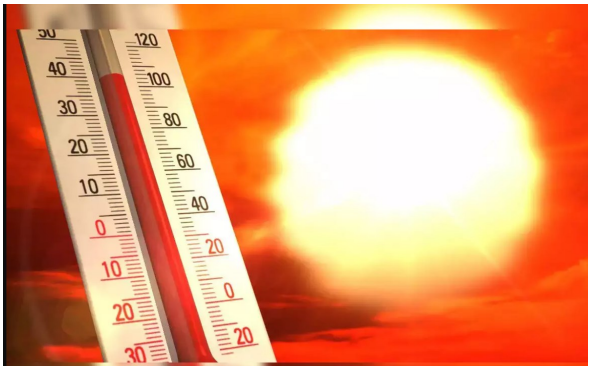
In 2023, hundreds of millions of people around the world experienced extreme heat, and each month from June through December set a global record for the respective month. July was the hottest month ever recorded. Overall, Earth was about 2.5 degrees Fahrenheit (or about 1.4 degrees Celsius) warmer in 2023 than the late 19th-century average, when modern record-keeping began.

"The exceptional warming that we're experiencing is not something we've seen before in human history," said Gavin Schmidt, director of GISS. "It's driven primarily by our fossil fuel emissions, and we're seeing the impacts in heat waves, intense rainfall, and coastal flooding."

Though scientists have conclusive evidence that the planet's long-term warming trend is driven by human activity, they still examine other phenomena that can affect yearly or multi-year changes in climate such as El Niño, aerosols and pollution, and volcanic eruptions.

Typically, the largest source of year-to-year variability is the El Niño -- Southern Oscillation ocean climate pattern in the Pacific Ocean. The pattern has two phases -- El Niño and La Niña -- when sea surface temperatures along the equator switch between warmer, average, and cooler temperatures. From 2020-2022, the Pacific Ocean saw three consecutive La Niña events, which tend to cool global temperatures. In May 2023, the ocean transitioned from La Niña to El Niño, which often coincides with the hottest years on record.

However, the record temperatures in the second half of 2023 occurred before the peak of the current El Niño event. Scientists expect to see the biggest impacts of El Niño in February, March, and April.



"Even with occasional cooling factors like volcanoes or aerosols, we will continue to break records as long as greenhouse gas emissions keep going up," Schmidt said. "And, unfortunately, we just set a new record for greenhouse gas emissions again this past year."

"The record-setting year of 2023 underscores the significance of urgent and continued actions to address climate change," said NASA Deputy Administrator Pam Melroy. "Recent legislation has delivered the U.S. government's largest-ever climate investment, including billions to strengthen America's resilience to the increasing impacts of the climate crisis. As an agency focused on studying our changing climate, NASA's fleet of Earth observing satellites will continue to provide critical data of our home planet at scale to help all people make informed decisions

Open Science in Action

NASA assembles its temperature record using surface air temperature data collected from tens of thousands of meteorological stations, as well as sea surface temperature data acquired by ship- and buoy-based instruments. This data is analyzed using methods that account for the varied spacing of temperature stations around the globe and for urban heating effects that could skew the calculations.

Independent analyses by NOAA and the Hadley Centre (part of the United Kingdom Met Office) concluded the global surface temperatures for 2023 were the highest since modern record-keeping began. These scientists use much of the same temperature data in their analyses but use different methodologies. Although rankings can differ slightly between the records, they are in broad agreement and show the same ongoing long-term warming in recent decades.

Source NASA/Goddard Space Flight Center. "NASA analysis confirms 2023 as warmest year on record." ScienceDaily. ScienceDaily, 14 January 2024. <www.sciencedaily.com/releases/2024/01/240114195023.htm>.

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We need to built a future,
Where people live in harmony with nature

HPA

Think Forward , Lead Forward