

Context

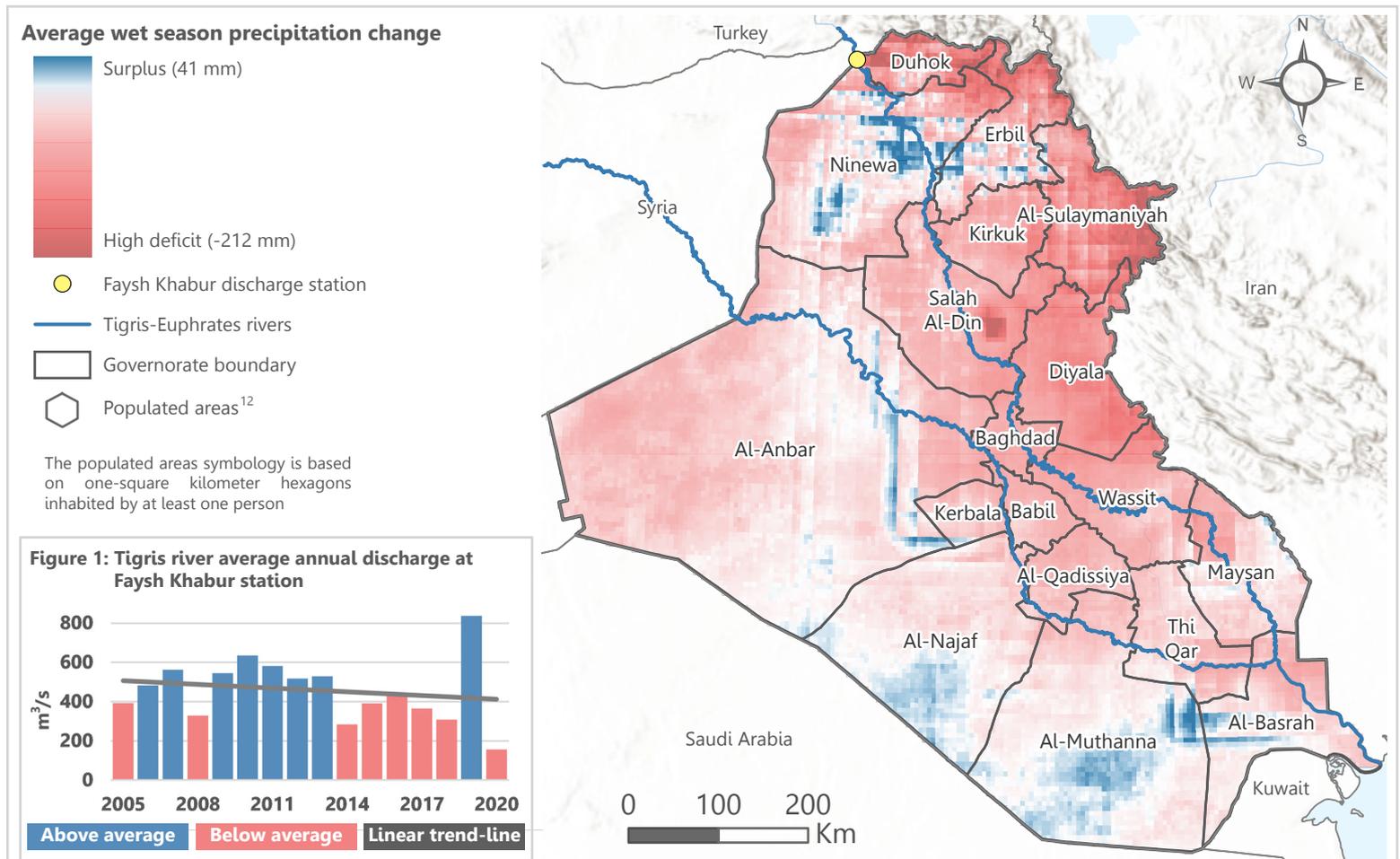
The 2019 Global Environment Outlook 6 (GEO 6) report by the United Nations Environmental Programme (UNEP) classified Iraq as the fifth most vulnerable country in the world to the effects of climate change, including potential reductions in precipitation levels.¹ Reports show that reduced precipitation in Iraq has adversely impacted humanitarian, socio-economic, and environmental conditions through reduced access to water sources for domestic and livelihood purposes (e.g. agriculture), climate-related displacement, loss of biodiversity, and disrupted ecosystems.² To inform the WASH Cluster, partners, and other stakeholders about the precipitation deficit in Iraq, REACH Initiative is conducting regular precipitation analyses using remote sensing data to facilitate evidence-based programming.

Findings

The precipitation change map shows the difference in precipitation levels between the wet season of 2021-2022 (October to May) compared to the historical (1981-2021) average for wet seasons. The analysis highlights that areas with a precipitation deficit during the most recent wet season (compared to the historical average) were widespread throughout Iraq. The areas with the highest precipitation deficits were found in the northern region which, historically, have received most precipitation. Southern and central Iraq largely rely on rivers, which include precipitation from northern areas as well as discharge from upstream countries. A reduction in precipitation will likely further impact the water flow of rivers, potentially causing water shortages³ and water quality deterioration for the center and south regions of Iraq.⁴ The calculated average deficit for the analysed period across Iraq is 34.4 mm, which equals to a loss of around 15,000 million cubic meters of water for the most recent wet season.⁵

Implications

In total, agriculture in Iraq employs 18% of the total labour force.⁶ Rain-fed agriculture covers more than half (53%) of Iraq's arable lands and almost all of it lies in the northern region, a region which produces Iraq's most important crops (cereals).⁷ The high deficit in the north, further compounded by reduced river discharge from upstream countries (see figure 1)⁸, negatively impacts the region's rain-fed agriculture, further driving displacement of farmers migrating in search of alternative livelihoods.⁹ Similarly, the limited availability of surface water for irrigation in the centre and south is also causing tens of thousands of families to leave their farms.¹⁰ Recent REACH assessments in sub-districts of Diyala, Ninewa, Kirkuk and Anbar governorates have highlighted that agriculture, livelihoods, electricity, domestic water supply, and IDPs' ability to return were among the areas negatively affected by the water shortage.¹¹ Additional on-ground assessments are required to determine the full extent of the impact of water shortage on affected communities.



Methodology

The precipitation deficit was calculated using satellite precipitation data (Climate Hazards Group InfraRed Precipitation with Station data), processed in Google Earth Engine for the period between 1981–2022.¹³ To calculate the precipitation deficit, initially, the total precipitation for the wet season for 1981 to 2021 and 2022 was calculated, and then the 2022 was subtracted from the historical average.¹⁴ To estimate the total volume of water loss, the average pixel value was calculated and multiplied by Iraq's surface area (km²).

¹ United Nations Environment Programme (UNEP), *Global Environment Outlook 6*, 2019.
² Kurdistan 24, *Nearly 300 groundwater wells dried up in Erbil*, 2022, and Norwegian Refugee Council (NRC), *Iraq's drought crisis and the damaging effects on communities*, 2021.
³ Al-Ansari, *Hydro-politics of Water Resources in Iraq*, 2022.
⁴ Hussein et. al., *Hydrological characteristics of the Tigris River at the Baghdad Sarai station*, 2022.
⁵ This amount is almost twice the size of Mosul dam, the largest dam of Iraq.
⁶ The Guardian, *The green land is a barren desert*, 2022.
⁷ Jaradat, *Agriculture in Iraq: Resources, Potentials, Constraints, and Research Needs and Priorities*, 2002.
⁸ Data were collected from the General Directorate of Dams and Water Reservoirs of Kurdistan (not publicly available).
⁹ The New Humanitarian, *Climate change leaves Iraq's 'breadbasket' with less water, wheat, and farmers*, 2022.
¹⁰ IOM, *Climate-Induced Displacement Central and Southern Iraq*, 2022.
¹¹ Different assessments conducted by REACH, some are published; *Al-Atheem, Al-Qairawan, Al-Adiyah, Jalula, and Markaz Hatra*, and others are yet to publish.
¹² World Pop hub, *Iraq Population*, 2020.
¹³ The Climate Hazards Center, *Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS)*
¹⁴ Google Earth Engine analysis code available on demand, email: iraq@reach-initiative.org