

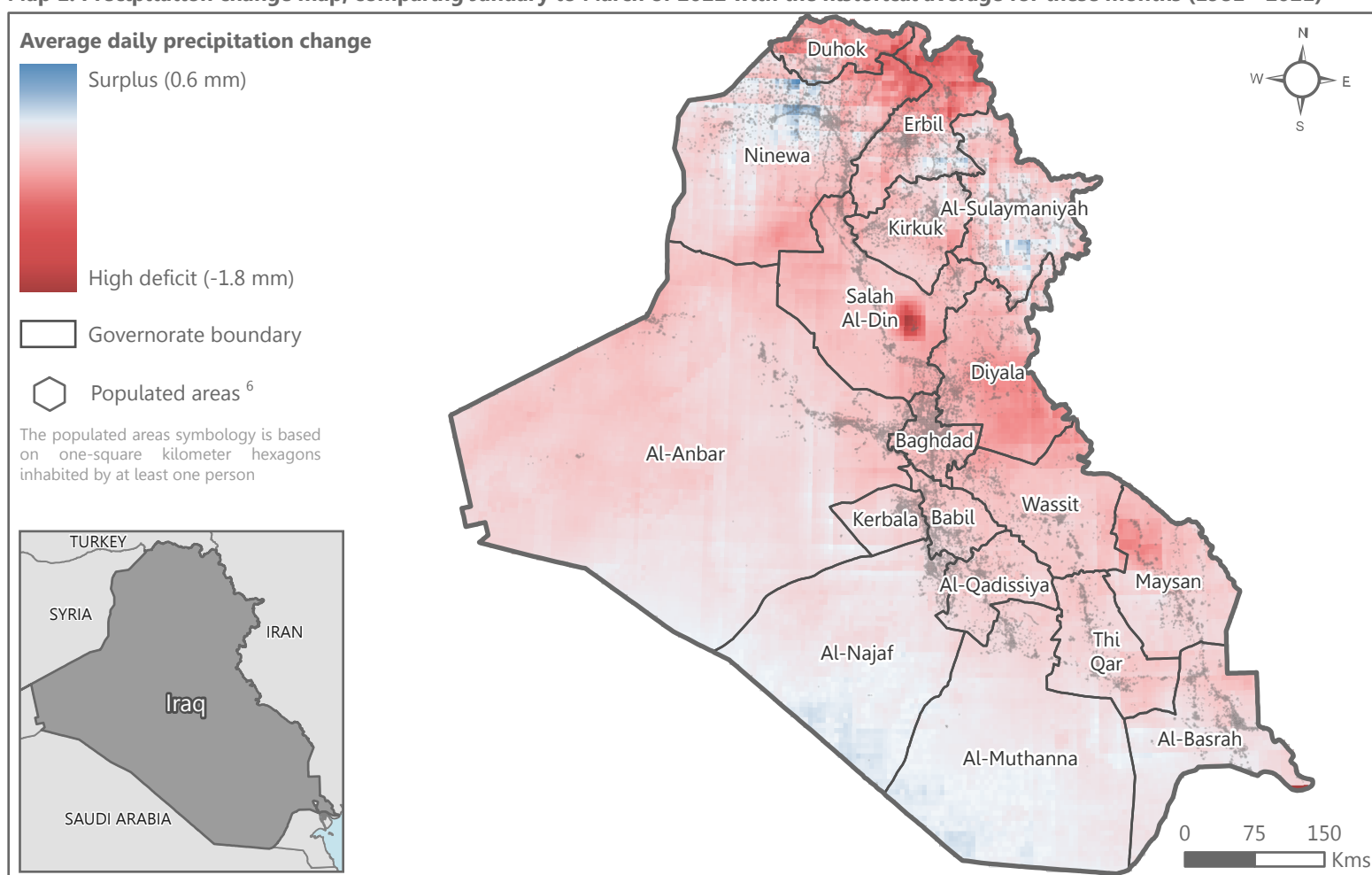
### Context

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.<sup>1</sup> 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.<sup>2</sup> However, detailed information on current precipitation levels and annual rainfall trends is limited. To inform the WASH Cluster, partners, and other stakeholders about the precipitation deficit in Iraq, REACH Initiative is conducting quarterly precipitation analyses using remote sensing data.<sup>3</sup> These regular updates will provide information on the current situation, as well as indications of future trends to facilitate evidence-based programming.

### Findings

The precipitation change map shows the difference in precipitation levels between the first quarter of 2022 (January - March) compared to the historical average (1981 - 2021) of the same period. The areas coloured in blue below represent areas of precipitation surplus, areas in light red show low precipitation deficit levels, and areas in dark red show the highest levels of precipitation deficit. The findings suggest that **areas with precipitation deficit are substantially more widespread than areas with a precipitation surplus in the first quarter of 2022**. This is consistent with the high levels of precipitation deficit recorded throughout 2021.<sup>4</sup> However, **areas with high precipitation deficit have shifted** from eastern parts of Al-Sulaymaniyah and the northern part of Duhok to the northern parts of Erbil and eastern Duhok, and have become more acute in central Salah-Al Din.<sup>5</sup> **Across Iraq, 98% of households are estimated to live in areas with a precipitation deficit in the first quarter of 2022, with the level of average daily precipitation deficit ranging from -0.01 to -1.8 mm.**

**Map 1: Precipitation change map, comparing January to March of 2022 with the historical average for these months (1981 - 2021)**



### 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.<sup>7</sup> To calculate the precipitation deficit, initially, the first quarter average for 1981 to 2021 and 2022 were calculated, and then the 2022 average was subtracted from the historical average.<sup>8</sup> To calculate the volume of water loss, the average pixel value was calculated and multiplied by Iraq's surface area (km<sup>2</sup>) to get the daily water loss, which was subsequently multiplied by the total number of days in the first quarter (89 days). It should be noted that the selected methodology shows the absolute/actual value in order to have a general overview of precipitation change. It is thus not, for example, illustrating the normalized value as a percentage change.

<sup>1</sup>United Nations Environment Programme (UNEP), World Pop hub, [Global Environment Outlook 6 \(GEO 6\) \(2019\)](#)

<sup>2</sup>Kurdistan 24, [Nearly 300 Groundwater wells dried up in Erbil province \(2022\)](#) and Norwegian Refugee Council (NRC), [Iraq's drought crisis and the damaging effects on communities \(2021\)](#)

<sup>3</sup>REACH Initiative, [Precipitation and Temperature Change in Iraq \(November 2021\)](#)

<sup>4</sup>REACH Initiative, [Iraq Precipitation Change \(2021\)](#)

<sup>5</sup>The total volume of water deficit in the first quarter of 2022, compared to the historical average, was around 8.9 billion cubic metres.

<sup>6</sup>World Pop hub, [Iraq Population \(2020\)](#)

<sup>7</sup>The Climate Hazards Center, [Climate Hazards Group InfraRed Precipitation with Station data \(CHIRPS\)](#)

<sup>8</sup>Google Earth Engine analysis code available on demand, email: [iraq@reach-initiative.org](mailto:iraq@reach-initiative.org)