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# A Series of Assessments on Climate Change in the Kurdistan Region and Iraq; High temperature and its consequence

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## Authors

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**Summary :** The North Atlantic Treaty Organization (NATO) Global Warming Modeling predicts that "that over the next decade in Iraq, temperatures will rise by 1°C in the short term and 2°C in the medium and long term, while the whole world is now trying not to rise by 0.5°C." .

## Introduction

The impact of climate change in the Kurdistan Region and Iraq are becoming more visible year after year. Increasing temperatures, the disappearance of the marshes, the burning of forests, the decrease in precipitation and the increase in dusty days are all factors with great economic, political, social and security consequences, above all the demographic decline, the increase in mass migration, the reduction of employment opportunities and the increase in instability. In this context, we will discuss changes and risks in six sections .

Climate change is human-made and nature, that is, huma-made and a product of nature as well, and it is increasing permanently, but a large part of it is Human-made and can be addressed and affected by reducing the natural part or natural climatic events .

Another very important point to note here is that the Kurdistan Region, including Iraq, are not major contributors to climate change, but the consequences are increasing day by day and appearing in the form of disappearance of marshes and forests, decreased days of rainfall and increased days warm to above 50 degrees Celsius .

It is noteworthy that the temperature in the Kurdistan region shows an increase in temperature by two degrees Celsius, while the lowest temperature in winter in some provinces was higher by half to one degree, which indicates a complete change in temperature in the Kurdistan region, which confirms the outcome of the scenarios. and future expectations .

According to the latest report issued by the Intergovernmental Panel on Climate Change ([IPCC](#)) , the extent and severity of desertification has increased in the Middle East and North Africa region over the past decade, especially in Iraq and including the Kurdistan region , as well as according to the latest [NATO assessment report 2023 titled The "Assessment of Climate Change and its Impact on NATO Security"](#) in the case of Iraq on page 18 states that "In recent years, Iraq has experienced periods of extreme heat with temperatures rising for several days above 50 degrees Celsius , and when temperatures reach 50 degrees Celsius, helicopters cannot fly and land easily. Temperatures are expected to exceed 50 degrees Celsius 72 days a year, which means that a fifth of air operations will cease annually .

In the first part of this assessment series, we provide a general explanation of scenarios for high temperatures and their consequences, such as dust storms and rain.

## Scenarios of high temperatures and dust storm in Iraq

The North Atlantic Treaty Organization (NATO) [Global Warming Modeling](#) predicts that "that over the next decade in Iraq, temperatures will rise by 1°C in the short term and 2°C in the medium and long term, while the whole world is now trying not to rise by 0.5°C." .

According to the first scenario, in the short term (2020-2060), the number of days with temperatures above 35°C will reach 160-170 days, while in the long term, the number of days will be more than half a year.

Also, in the second scenario, the number of days with temperatures above 45°C will increase by 40-50 days in the next few decades, and in the short term (2020-2039) the number of days with temperatures above 45°C will rise to 72 days, over the long term (2060-2079), that number will be more than 111 days a year.

In the third scenario that takes the highest temperatures in Baghdad during the months (June, July, and August) as a basis and projections for the coming years, it appears that the highest temperatures during (1995-2014) were 49 degrees Celsius, however, according to the short-term forecasts (2020 -2039) will reach 50 degrees Celsius, and in the medium

term (2040-2059) the daily highest temperature will be 52 degrees Celsius, while in the long term, it will reach 54 degrees Celsius.

According to forecasts, the number of rain-free days, which has a direct impact on drought and dust, is high. In a worst-case scenario in Iraq, there would be about 319 consecutive dry, painless days a year. When approaching Baghdad and its surroundings, the number of days reaches 330 days, or 90% of the days of the year.

## High temperatures and rainfall in the Kurdistan Region

In terms of temperature change in the Kurdistan region, during the past decade, the average temperature rose above two degrees Celsius in the summer seasons, so that the average temperature in Erbil at the governorate level was 33.75 degrees Celsius in July 2009, in Sulaymaniyah it was 31.55 degrees Celsius, and in Dohuk It was 32.6°C, but in July 2021 the average temperature in Erbil was 35.7°C, Sulaymaniyah 35.3°C, and in Dohuk 34.7°C. It was 1.95°C warmer in Erbil, 3.75°C in Sulaymaniyah, 2.1°C in Dohuk, and 2.6°C warmer than the whole Kurdistan region.

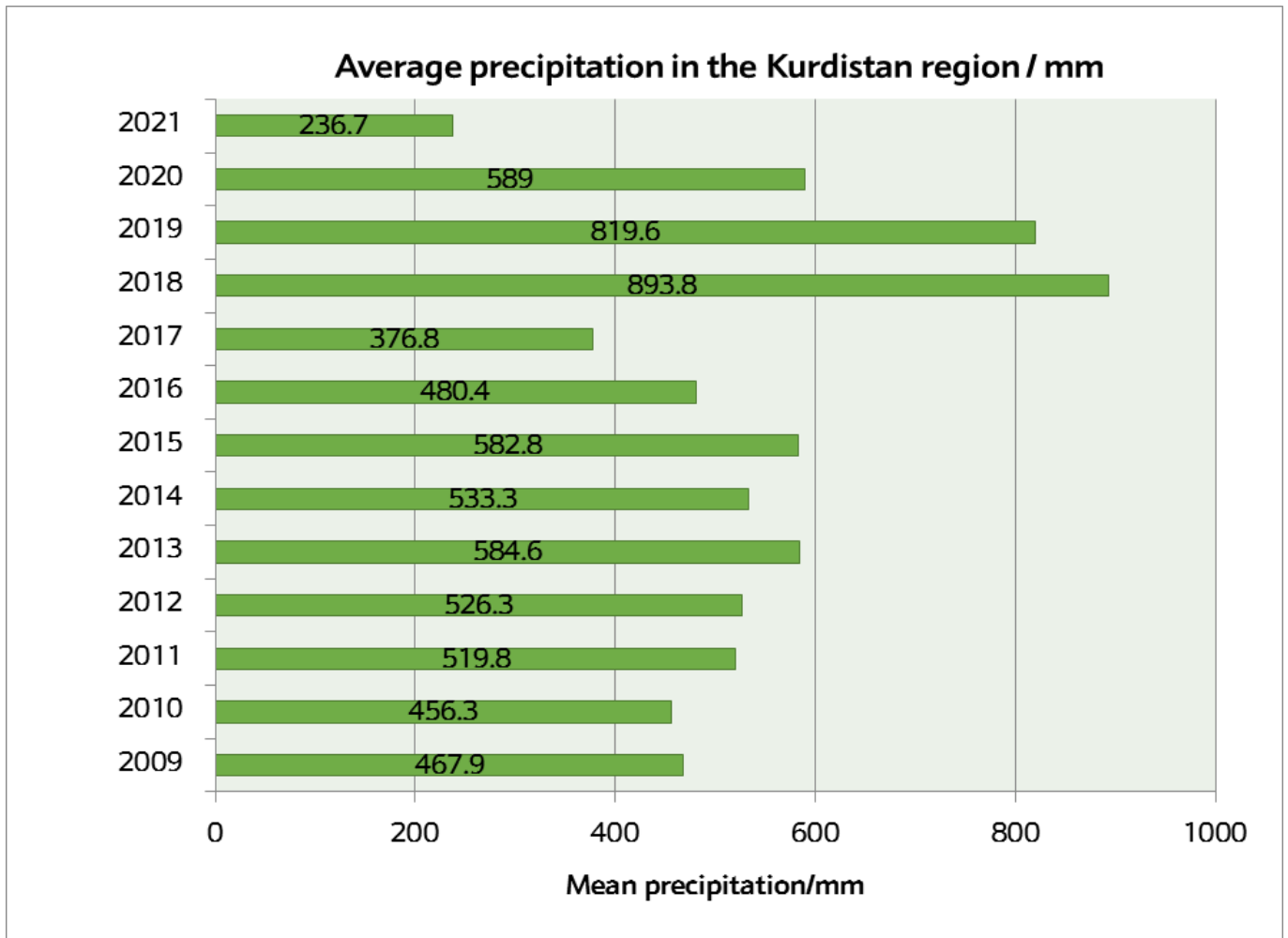
Another interesting difference is the increase in the average annual maximum and minimum temperatures in the Kurdistan Region, which means that the winters were not colder but warmer. For example, in 2009 the average annual minimum temperature was 15.3°C, but in 2021 It became 15.6°C, a decrease of 0.3°C in winter temperatures, see Table 1 for mean annual temperatures.

Table 1: Average minimum and maximum temperatures in the governorates and the Kurdistan Region between 2009-2021.

Year	Temperatures / Celsius	Average annual temperature in Erbil	Average annual temperature in	The average annual temperature in	Average annual temperature in the Kurdistan region
2009	lowest	17	14.3	14.6	15.3
	the above	26	24.7	25.6	25.4
	average	21.5	19.5	20.1	20.4
2021	lowest	16.8	14.9	15.1	15.6
	the above	28.8	28.6	27.9	28.4
	average	22.8	21.8	21.5	22

Note: Due to the lack of 2009 data and errors in the 2021 data, Halabja Governorate is not included.

In fact, this increase in temperatures also means less annual precipitation. Therefore, according to the data of the General Directorate of Meteorology [and Seismology in the Kurdistan Region, the average](#) precipitation decreased in the past decade in the Kurdistan Region by 289.6 mm, although there were wide fluctuations during this period (2009-2021). The difference was 231.2 mm during that period. While the average rainfall in the Kurdistan Region was 467.9 mm in 2009, it will be 236.7 mm in see Graph 1 for the 2009-2021 rainfall in the Kurdistan Region.



## Conclusion

All signs indicate that the consequences of climate change for Iraq will not only lead to record high temperatures, drying up of water resources, disappearance of marshes and burning of forests, but also mass internal migration, desertification of villages and increased urban congestion in the future. years. While there is no infrastructure to accommodate the large number of residents and meet their needs, the population is expected to double in years with temperatures above 50°C and 90% of the days with dust .

Iraq and the Kurdistan region are in some ways a small part of the contributors to climate change, but the consequences of the changes on them are in a way that cannot be ignored, so Iraq can reduce its effects with the help of strong countries and international organizations because human resources and local income can be easily provided and built in the days that do not arrive In which temperatures reach new records and reduce the number of dust days in all parts of Iraq and the Kurdistan Region .

In addition to undermining Social Security, climate change [will destroy hundreds of millions](#) of dollars worth of equipment, including military equipment, food, and factory supplies that cannot be protected from this heat or require new warehouses to be built there .

In the second part of this series, which focuses on the phenomenon of climate change in Iraq and the Kurdistan region, we will focus on the destruction of forests and green spaces on the one hand, and the burning of forests and plains in Iraq and the Kurdistan region. How many acres of forest have been burned? How much will the percentage of desertified land increase and what will be the consequences of that in the future ?