

Asking Questions About Climate Change in Jordan: A Dataset Guide



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01 Climate Change

What is it? Why does it matter?





Climate change occurs as greenhouse gas emissions increase



Leads to



Higher surface temperatures, air pollution, food and water insecurity, melting of arctic ice, changes in rainfall



Leads to



Changes in the health of all humans, animals, and plants!

Climate change refers to the gradual warming of the earth due to human activities that lead to changes in weather patterns (temperature, rainfall, wind).

The **main cause** of climate change is due to more **greenhouse gases** in the air because of burning fossil fuels, pollution from transportation, deforestation, or other reasons.

Climate Change Prevention Initiatives

Climate Action Network Jordan is a nonprofit organization that was founded in 2013.

- It was the first agency that specializes in finding solutions for climate change in the Middle East.
- They want to **take action** against climate change by promoting sustainable environment choices.

They have been extremely successful in many projects, partnerships, and research!



Click this link to learn more!



<https://climateaction-now.org/>



02

Research Questions

What kinds of questions are scientists asking about climate change?



What makes a good question?



In order to ask a research question that can be answered by data analysis, you must have data that pertains to the topic!

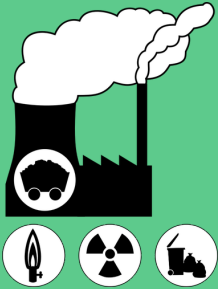
To think like a data scientist you must first consider...

- Is there data available to answer this question?
- How do we get the data?
- What do we do with the data to answer questions?



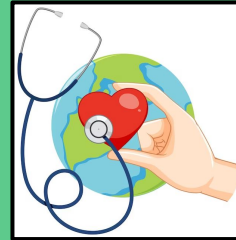
Climate Change Research Topics a DataJam team could explore:

★ Note: there are many different possible research questions for each topic!



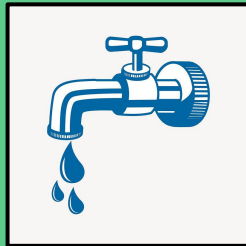
Greenhouse Gases

Example Question:
How have greenhouse gas emissions in Jordan changed over the last 30 years?



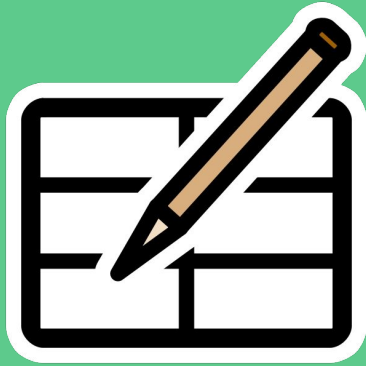
Health

Example Question:
How has Jordanian access to clean water changed and has this impacted the prevalence of a specific disease?



Water Quality/Supply

Example Questions:
How has lake and river water area in Jordan been affected by climate change?
How has rainfall changed throughout regions in Jordan?



03

Datasets

Links to databases to answer research questions

What is a database?

A **database** is an online source (a website) that allows you to **download datasets**.



Databases are important because you have to know:

- where you got the data
- how reputable the source is

We will use the following databases to answer example research questions.

Climate Change Databases

CLIMATEWATCH

Climate Watch offers datasets about greenhouse gases in each country.



[Click here to access!](#)



United Nations

Department of Economic and Social Affairs
Statistics • SDG Indicators Database

The statistics division of the United Nations offers datasets on economic and social indicators for each country.



[Click here to access!](#)



The Hashemite Kingdom of Jordan
The Official Site of the Jordanian e-Government

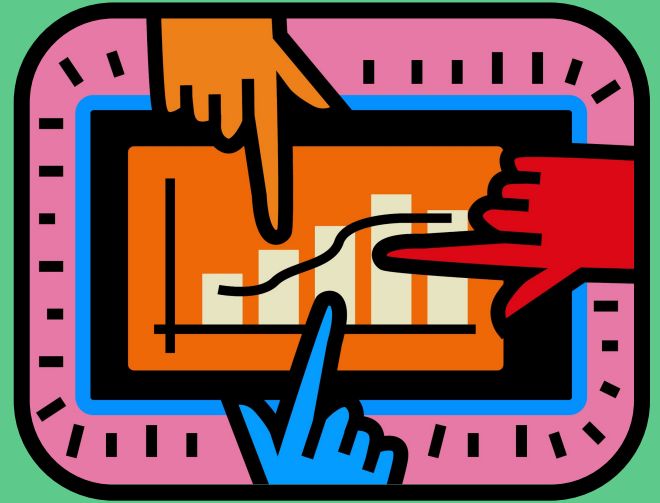
The official Jordanian e-Government website has datasets in arabic from specific Jordan cities and regions.



[Click here to access!](#)

04 Analysis Strategies

Answering 3 example research
questions using datasets



Research Question 1: Using

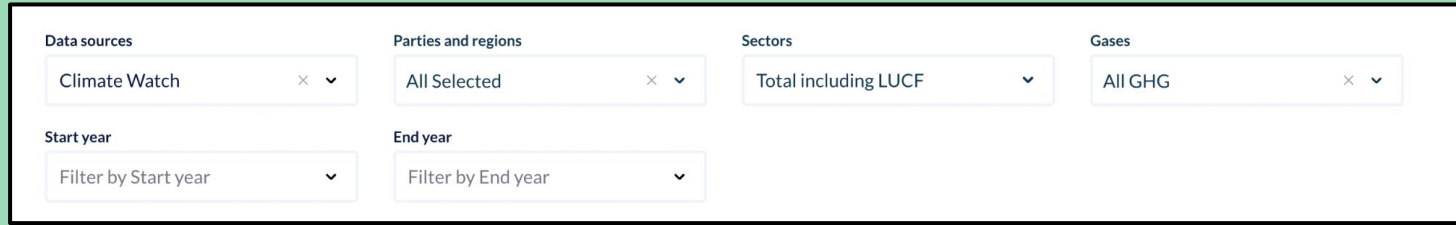
The logo for CLIMATEWATCH, featuring the text "CLIMATEWATCH" in a bold, dark blue, sans-serif font, enclosed within a white rectangular box with a thin black border.

CLIMATEWATCH

How have greenhouse gas emissions in Jordan increased over the last 30 years?

Using the Climate Watch Data Explorer, you can download data of greenhouse gas levels from around the world and filter it!

Introduction to Filters on Climate Watch



The screenshot shows the filter interface of the Climate Watch Data Explorer. It consists of several dropdown menus arranged in two rows. The first row contains four filters: 'Data sources' (set to 'Climate Watch'), 'Parties and regions' (set to 'All Selected'), 'Sectors' (set to 'Total including LUCF'), and 'Gases' (set to 'All GHG'). The second row contains two filters: 'Start year' (set to 'Filter by Start year') and 'End year' (set to 'Filter by End year'). Each filter has a small 'x' icon and a downward arrow indicating it is a dropdown menu.

Parties and Regions: different areas of interest (World, Middle East, Jordan, etc.)

Sectors: different industries that produce greenhouse gases (Energy, Waste, Industrial Processes, Agriculture)

Gases: possible types of greenhouse gases that can be measured (note: All GHG is a combination of all gases)

Start year/End year: to measure the period of time

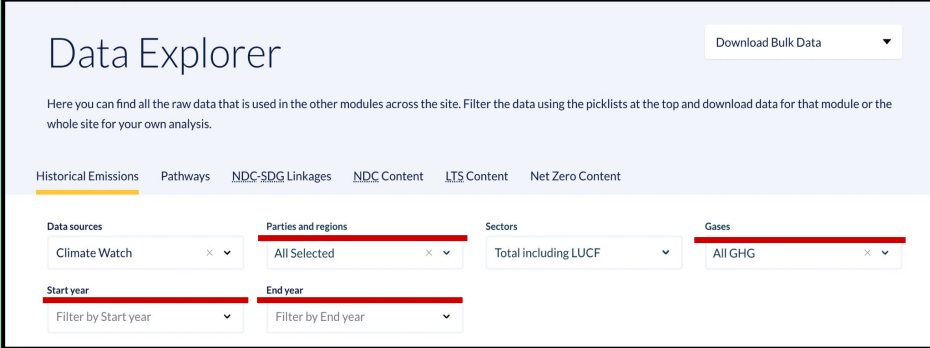
Research Question 1

How have greenhouse gas emissions in Jordan increased over the last 30 years?

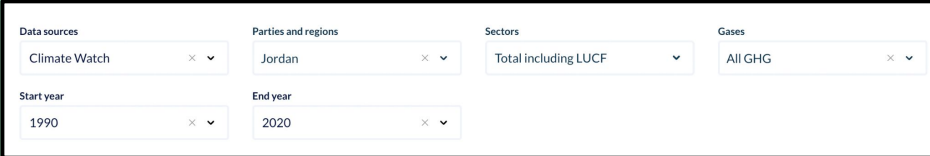
Downloading the Dataset

Step 1: Click this link  [Climate Watch Data Explorer](#)

Step 2 (red): Select the drop down arrow on the [underlined filters](#) and select Parties and regions: Jordan, Gases: All GHG, Start year: 1990, End year: 2020



The screenshot shows the 'Data Explorer' interface. At the top right is a 'Download Bulk Data' button. Below it is a descriptive paragraph. A navigation bar contains several tabs: 'Historical Emissions' (highlighted), 'Pathways', 'NDC-SDG Linkages', 'NDC Content', 'LTS Content', and 'Net Zero Content'. The filter section includes: 'Data sources' (Climate Watch), 'Parties and regions' (All Selected), 'Sectors' (Total including LUCF), and 'Gases' (All GHG). Below these are 'Start year' (Filter by Start year) and 'End year' (Filter by End year) filters. Red underlines are present under the 'Parties and regions', 'Sectors', and 'Gases' filter labels.



The screenshot shows the 'Data Explorer' interface with updated filter settings. The 'Parties and regions' filter is now set to 'Jordan', the 'Sectors' filter is 'Total including LUCF', and the 'Gases' filter is 'All GHG'. The 'Start year' filter is set to '1990' and the 'End year' filter is set to '2020'. A black arrow points from the top screenshot to this one, indicating the transition from the initial state to the selected state.

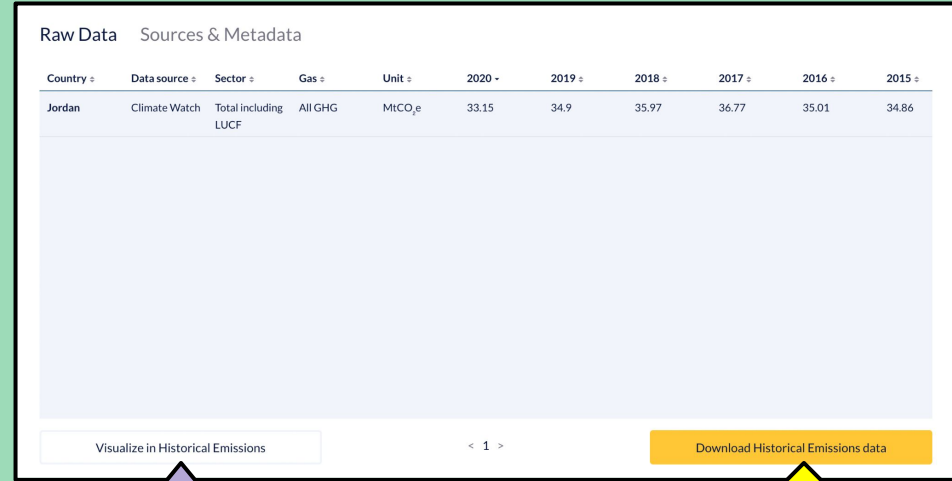
Downloading the Dataset continued

If you want the raw dataset:

Step 3 (yellow): Scroll down to beneath the data on the page, and click the yellow button “Download Historical Emissions Data” on the bottom right **to download**

- ★ It will make you enter information about the project you will be doing, then press download!
- ★ The data will be in your computer downloads in excel format!

To analyze on the website: select the “Visualize in Historical Emissions” tool on the bottom left of the data.



Raw Data Sources & Metadata

Country ▾	Data source ▾	Sector ▾	Gas ▾	Unit ▾	2020 ▾	2019 ▾	2018 ▾	2017 ▾	2016 ▾	2015 ▾
Jordan	Climate Watch	Total including LUCF	All GHG	MtCO ₂ e	33.15	34.9	35.97	36.77	35.01	34.86

Visualize in Historical Emissions < 1 > Download Historical Emissions data

To analyze on the website (continued):

- Once pressing on “Visualize in Historical Emissions”, select the **same filters**, and this graph will appear!
- This graph has greenhouse gases on the y-axis, and years from 1990-2020 on the x-axis
- Hover over specific data points to see exact values

Filters shown again here:



Research Question 1

How have greenhouse gas emissions in Jordan increased over the last 30 years?



Answer:

From this graph, we can see that total greenhouse gas emissions have, in general, increased in Jordan from 1990 to 2020, but have decreased from 2017 to 2020.

1990 total GHG: 18.61 million tonnes (Mt)

2020 total GHG: 33.15 million tonnes (Mt)

From 1990 to 2020, total greenhouse gases have increased by 14.54 million tonnes.

Research Question 2:

Using



**United
Nations**

Department of Economic and Social Affairs

Statistics • SDG Indicators Database

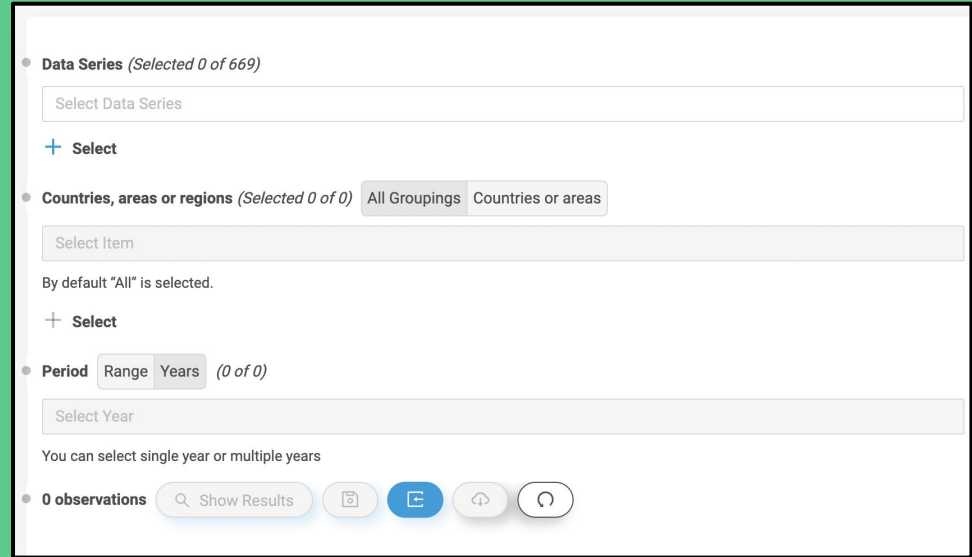
How have water ecosystems, like lakes and rivers, been affected by climate change in Jordan?

Filters on the UN Database

Data Series: numbered sections of which economic or social affairs topic is associated with each dataset

Countries, areas or regions: the area being studied or researched

Period: time period of interest *which contains available data*



The screenshot shows a web interface for filtering data. It has three main sections:

- Data Series (Selected 0 of 669)**: A search box labeled "Select Data Series" and a "+ Select" button.
- Countries, areas or regions (Selected 0 of 0)**: Two tabs, "All Groupings" and "Countries or areas", a search box labeled "Select Item", and the text "By default 'All' is selected." Below this is another "+ Select" button.
- Period (0 of 0)**: Two tabs, "Range" and "Years", a search box labeled "Select Year", and the text "You can select single year or multiple years".

At the bottom, it shows "0 observations" and a row of buttons: "Show Results" (with a magnifying glass icon), a print icon, a blue share icon, a refresh icon, and a circular arrow icon.



For a comprehensive list of the different **data series** that the UN offers, click the link below, scroll down, and download the pdf in arabic.




[SDG Indicators](#)

Research Question 2

How have water ecosystems, like lakes and rivers, been affected by climate change in Jordan?

Downloading the Dataset

Step 1: Click this link  [UN Database](#)

Step 2 (red): select Data Series: 6.6.1: Change in the extent of water-related ecosystems over time

Step 3 (blue): under Countries, areas or regions: select “Countries or areas” and scroll down to select Jordan





Step 4 (purple): Period: select “Range” and to analyze more current data, select 2010 to 2020

Step 5 (yellow): Click “Show Results”



The screenshot shows the UN Database search interface with several annotations:

- A red oval highlights the search bar containing "6.6.1 ×".
- A blue oval highlights the "Countries, areas or regions" section, which includes a dropdown menu set to "Countries or areas" and a search bar containing "Jordan ×".
- A purple oval highlights the "Period" section, which is set to "Range" and shows the years "2010" and "2020".
- A yellow arrow points to the "Show Results" button at the bottom.
- A blue arrow points from the "Countries or areas" dropdown to the "Show Results" button.

144 observations  Show Results    

Research Question 2

How have water ecosystems, like lakes and rivers, been affected by climate change in Jordan?

Step 6 (green): Scroll down and select 6.6.1, Series: Lakes and rivers permanent water area change (%) labeled EN_LKRV_PWAC

Step 7 (yellow): Preview and press **Download XLS** in the bottom right, and the excel file will be in your downloads!

Indicator 6.6.1, Series : Lakes and rivers permanent water area change (%) EN_LKRV_PWAC

Go to Metadata Search this table... Select years to hide v

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Jordan	0.1111 ^E	0.4780 ^E	0.2563 ^E	-0.2707 ^E	-0.6114 ^E	-0.7415 ^E	-1.0322 ^E	-1.3559 ^E	-1.5659 ^E	-1.7844 ^E	-2.1347 ^E

Previous 1 Next 7 / page v

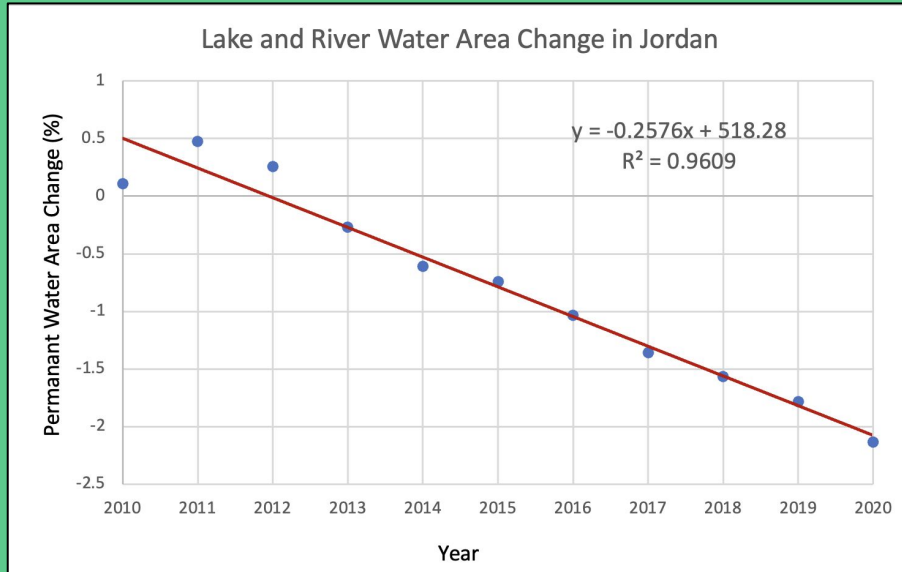
11 observations Download XLS

^(fn)Footnotes ^(E)Estimated data ^(N)Non-relevant

Download dataset here!

Research Question 2

How have water ecosystems, like lakes and rivers, been affected by climate change in Jordan?



Answer:

Using this graph made in excel with the United Nations dataset, we can see that **water area of lakes and rivers has been steadily getting smaller from 2011 to 2020.**

- The R-squared value is high and the slope is negative, so we can conclude there is a **strong negative relationship** between time and lake and river water area change in Jordan.
- Impacts of climate change could be one of the causes of suffering water ecosystems.

Research Question 3:

Using



The Hashemite Kingdom of Jordan


The Official Site of the Jordanian e-Government

How are rainfall levels changing in regions including the Azraq Basin?

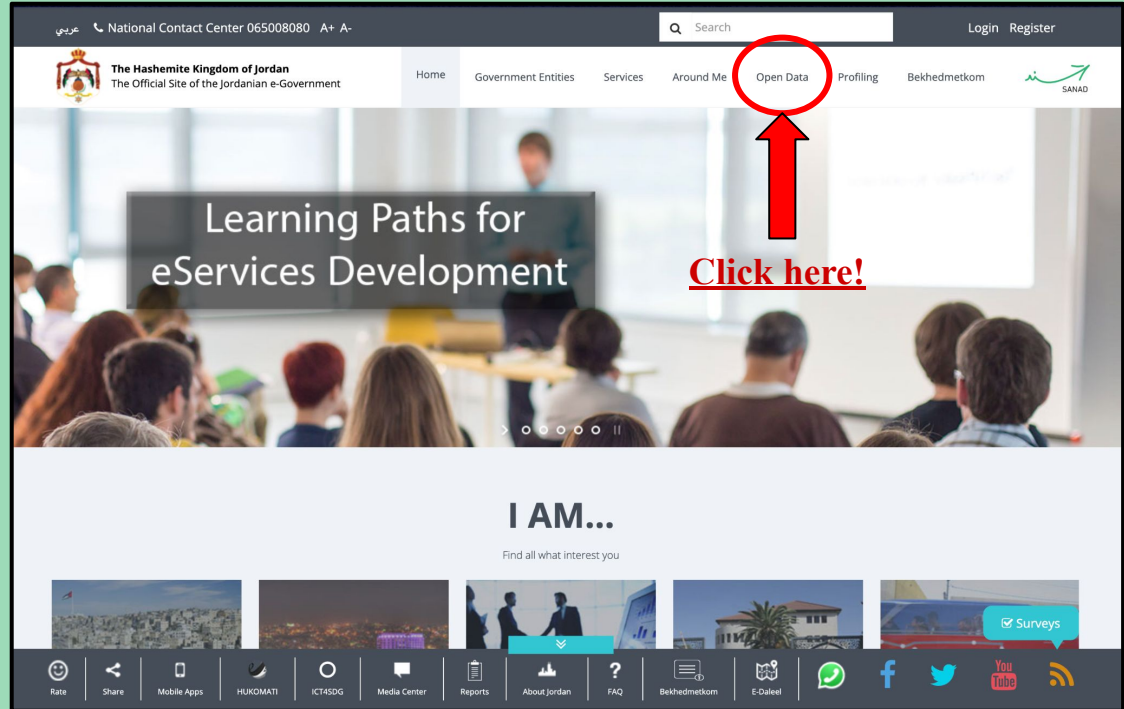
Research Question 3

How are rainfall levels changing in regions including the Azraq Basin?

Downloading the Dataset

Step 1: Click this link  [Official Jordanian Government](#)

Step 2 (red): From the home page, select the “Open Data” tab



Downloading the Dataset continued

Step 3 (blue): Click the thermometer above “Environment and Weather”

Step 4 (purple): search for “Statistics of Rainfall” in 2020 and click!

The Hashemite Kingdom of Jordan
The Official Site of the Jordanian e-Government

Home Government Entities Services Around Me Open Data Profiling Bekhedmetkom

Home > Open Data

Open Data

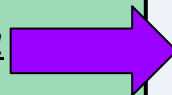
This platform represents the Open Government Data platform that reviews the Open Datasets that government entities possess in open and machine-readable formats, so that according to the conditions mentioned in the [Jordan Open Government Data License](#), the use of those Datasets published on the platform, re-use and redistribution by anyone and in any place for any purpose, according to the [Open Government Data Policy](#) issued by the Council of Ministers on 1/8/2017. In addition to the [Instructions for publishing Open Government Data on the Open Government Data platform](#) issued by the Council of Ministers and published in the Official Gazette number (5561) on 2/17/ 2019.

To ensure the quality of open government data, the Jordanian government on 9/22/2020 approved the [Open Government Data Quality Framework](#), which seeks to establish a general framework that guarantees the quality of open government data. Governmental entities can also Benefit from the work outputs of the Ministry of Digital Economy and Entrepreneurship to institutionalize the process within its institution as follows:

1. Internal Procedure for assurance of open government data quality
2. Process workflow of the open government data quality
3. Open Government Data Quality Assessment Form

All	Education and culture	Health	Economy and business	Environment and Weather	Tourism and Archeology
2512	219	104	369	120	120
101	19	5	29	9	6

Click here!



Sort By Most Downloaded

Last Update 10-02-2020

1860 Downloads

Downloading the Dataset continued

Step 5 (yellow): select the download button of the first listed dataset

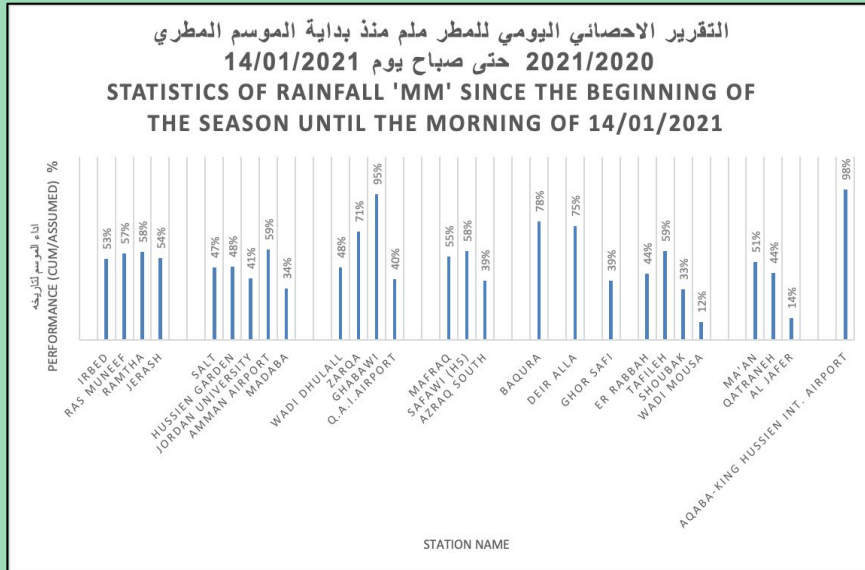
★ The excel dataset will be in your downloads!

Dataset Opened in Excel:

Station	المعدل الموسمي Seasonal Mean	الهطول خلال ساعة 24 Rainfall	الانطار المتراكمة التاريخية Cumulative up to date	المجموع الافتراضي التاريخية Assumed Cumulative	اداء الموسم تاريخية Performance % (cum/Assumed)	ما تحقق من الموسم Realized % (cum/season)	اسم المحطة	المنطقة
Irbid	449.2	1.0	98.5	184.9	53%	22%	ايربد	المنطقة الشمالية
Ras Muneef	586.8	5.5	141.6	250.4	57%	24%	راس منيف	
Ramtha	225.7	1.0	54.5	94.0	58%	24%	الرمثا	
Jerash	339.9	0.5	56.5	105.5	54%	17%	جرش	
Average	400.4	2.0	87.8	158.7	55%	22%	المعدل	
Salt	514.8	2.5	106.4	224.4	47%	21%	السلط	المنطقة الوسطى الغربية
Hussien Garden	475.6	3.5	104.0	216.5	48%	22%	حدائق الحسين	
Jordan University	521.8	5.0	90.3	222.4	41%	17%	الجامعة الأردنية	
Amman Airport	245.6	1.0	60.6	102.6	59%	25%	مطار عمان المدني	
Madaba	326.6	2.0	45.9	135.9	34%	14%	مدبا	
Average	416.9	2.8	81.4	180.4	45%	20%	المعدل	
Wadi Dhulali	133.4	0.0	28.5	59.6	48%	21%	وادي الضليل	المنطقة الوسطى الشرقية
Zarqa	125.2	0.0	39.4	55.3	71%	31%	الزرقاء	
Ghabawi	87.6	0.0	35.2	36.9	95%	40%	غابوي	
Q.A.I.Airport	150.0	0.5	25.0	62.9	40%	17%	مطار الملكة علياء الدولي	
Average	124.1	0.1	32.0	53.7	60%	26%	المعدل	
Mafraq	149.0	0.4	37.5	68.7	55%	25%	المفرق	المنطقة الشرقية
Safawi (HS)	71.0	0.0	19.4	33.4	58%	27%	السفوي	
Azraq South	59.2	0.0	10.0	25.7	39%	17%	الأرزق الجنوبي	

Research Question 3

How are rainfall levels changing in regions including the Azraq Basin?



Example Graph from Excel using performance percentage (y-axis) and region names (x-axis)

Note: Performance percentage of stations is measured by the cumulative rainfall of the season over the assumed/expected rainfall.

Answer:

As we can see from this graph, all stations during the 2020/2021 season had less rainfall than they were expected to have.

Specifically, the **Azraq South** received **39%** of the rainfall it was expected to receive.

This shows that **unexpected, severe drought** is a frequent problem in almost all regions of Jordan, with the exception of Aqaba-King Hussien International Airport and Ghabawi, which had 98% and 95% of the expected rainfall.

Research Question Tips

1

First, pick a topic you are interested in! (air pollution, water supply, health, etc.)

2

Use the databases to see if there is available data to answer a question about your topic!

3

If there is, use data analysis to answer the question!
If not, you may need to modify your question.



Conclusion



Analyzing questions about climate change informs researchers about the health and the wellbeing of the **whole world!**

Researchers use these to answer how to move forward with climate change prevention. **Anyone can be a part of making a change!**

Get Researching!

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