

# Water, War, and Peace: History and Strategies for the Future

*Peter H. Gleick*

UN Water Conference, March 24, 2023



**PACIFIC  
INSTITUTE**



**UN**  
**2023 WATER  
CONFERENCE**

NEW YORK  
22-24  
MARCH  
2023

# Summary

- Violence over water resources in the Middle East has a long history, going back more than 4,000 years and continuing to the present.
- The types of conflict include water as a **trigger**, **weapon**, and **casualty** of conflict.
- The causes of conflict include long-standing political, religious, ideological, economic, *and* hydrologic factors, including now, climate change.
- Reducing the risks of water-related conflict includes technological, economic, and political approaches, and improvements in water management and use.

# Water and Conflict: Critical Issues

- Fresh water is widely shared internationally.
  - Half of all land area on Earth
  - Over 260 “international river basins”, including all major rivers in Africa.
- There is growing competition for water.
  - Rising populations, expanding economies
  - Major inequities and development challenges
  - Growing environmental degradation, including **climate change**
- Efforts to resolve water-related disputes are often inadequate.

# The Water Conflict Chronology

([www.worldwater.org](http://www.worldwater.org))



[The Books](#) [Water Data](#) [Water Conflict](#) [Other Resources](#)

## Water Conflict

In an ongoing effort to understand the connections between water resources, water systems, and international security and conflict, the Pacific Institute initiated a project in the late 1980s to track and categorize events related to water and conflict, which has been continuously updated since. The database, most recently updated in March 2022, presents the information as a chronology and map. Use the links below to explore the chronological list of events or the interactive events map.

Citation: Pacific Institute (2022) Water Conflict Chronology. Pacific Institute, Oakland, CA. <https://www.worldwater.org/water-conflict/>. Accessed: (access date).

## View the Water Conflict Chronology

### [Chronological List](#)

A [table](#) listing conflicts over water that can be filtered by region, conflict type, and date range.

### [Map](#)

An interactive [map](#) showing the geographic location where conflicts over water have occurred and information about each conflict.

*Make a Difference!*  
**DONATE**

“There are few books that can genuinely be described as indispensable. This is one...essential reading.”

–*Financial Times Global Water Report*

# The Water Conflict Chronology

([www.worldwater.org](http://www.worldwater.org))

- 457. Public officials taken hostage after an oil spill polluted local waters (2016)
- 458. Armed guards clash with farmers over drought-struck region of Bundelkhand (2016)
- 459. Islamic State fighters destroy pipeline that provides water for eastern Mosul, Iraq (2016)
- 460. Massive opposition to project that threatens Indian heritage and water supplies (2016)
- 461. Intentional attacks on water infrastructure (2016)
- 462. Stand-off over water rights and use resulting in death (2016)
- 463. Riots over water leave two people dead (2016)
- 464. Attack by the Islamic State on Tishreen Dam on the Euphrates River (2016)
- 465. Water pumping plant attacked in Syria (2016)
- 466. Water pipeline is bombed in Turkey (2016)
- 467. Water wells attacked in Somalia (2016)
- 468. Guard at water well in the Sudan is attacked (2016)
- 469. Disruption of electrical system cuts power to water supply in Damascus, Syria (2016)
- 470. Bombs detonated at hydroelectric power plant in East Java (2016)
- 471. Attack on a local dam in India (2016)
- 472. Water pipeline is damaged in Pakistan (2016)
- 473. Islamic State militants raid Great Manmade River Project pumping station (2016)
- 474. From late 2016 through early 2017, the water supply in Damascus, Syria is periodically cut when springs outside city are attacked (2016-2017)
- 475. Water shortage led to clashes between two



Map data ©2018 Google, INEGI

<http://worldwater.org/water-conflict/>

[View Water Conflict Chronology List](#)  
Copyright 2018 Pacific Institute



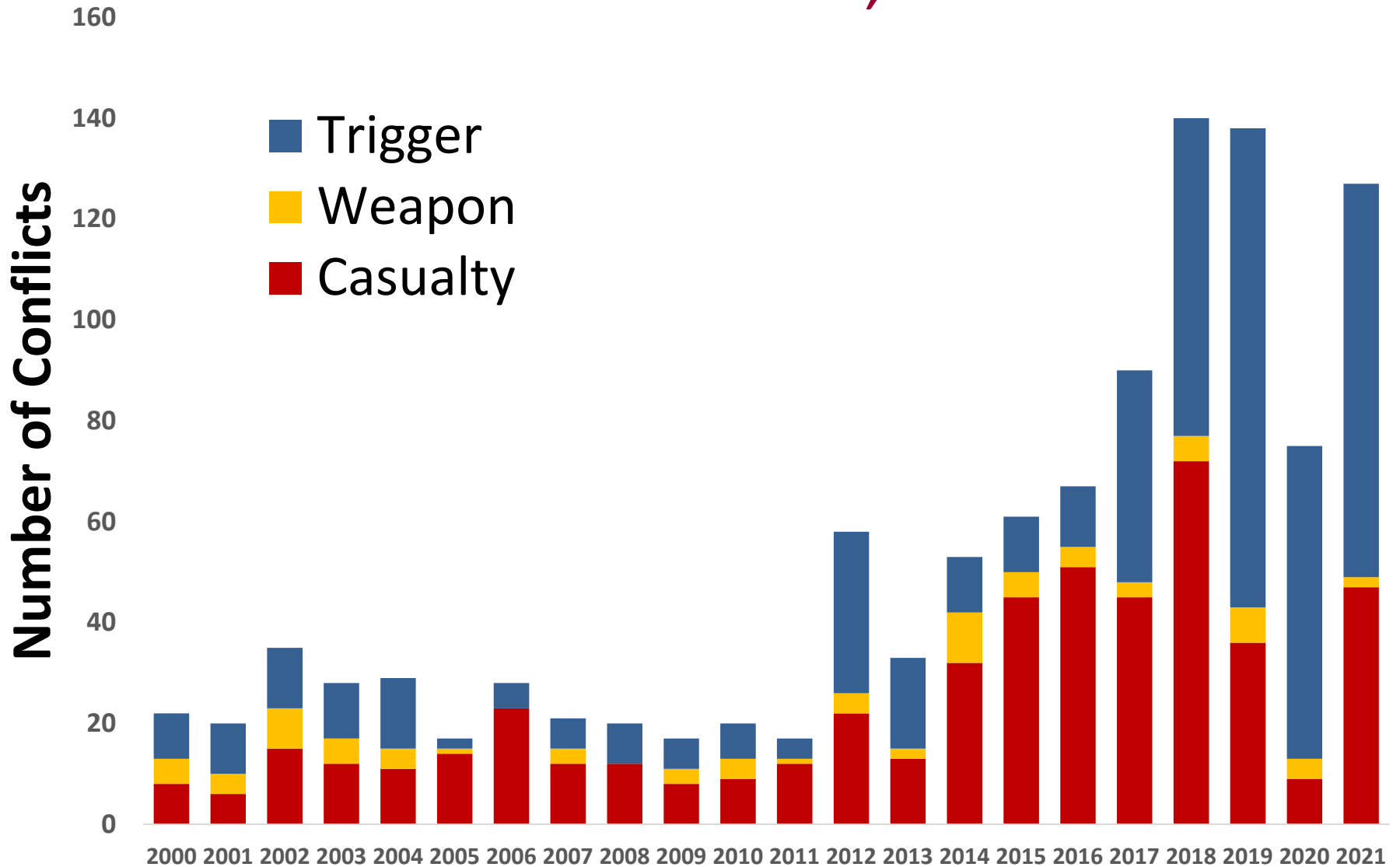
# Water Conflict Categories

- **Trigger:** Water as a trigger or root cause of conflict
  - Pastoralists v. farmers in Africa; scarcity and drought in India and Iran (2018-19)
- **Weapon:** Water as a weapon of conflict
  - Diverting water from villages; opening floodgates on dams (Iraq 2017); attacks on water infrastructure (Ukraine)
- **Casualty:** Water resources or water systems as a casualty or target of conflict
  - WWII, Vietnam, Iraq, Syria, Yemen, Ukraine

Chronology of water conflicts:

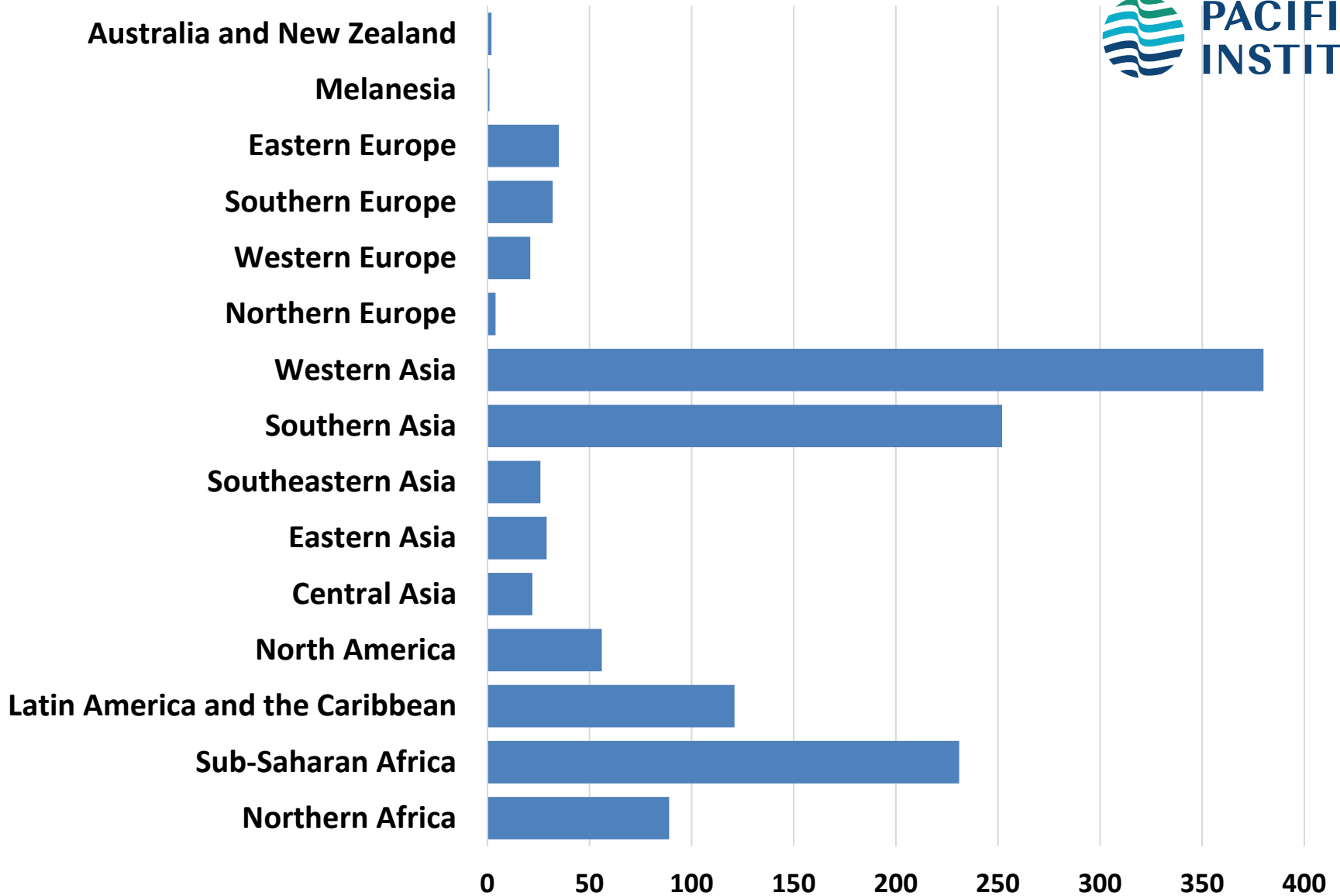
[www.worldwater.org](http://www.worldwater.org)

# Water Conflict Events, 2000-2021



Gleick and Shimabuku. 2023. *Env. Research Letters*.  
<https://doi.org/10.1088/1748-9326/acbb8f>

# Number of Water Conflicts, by Region

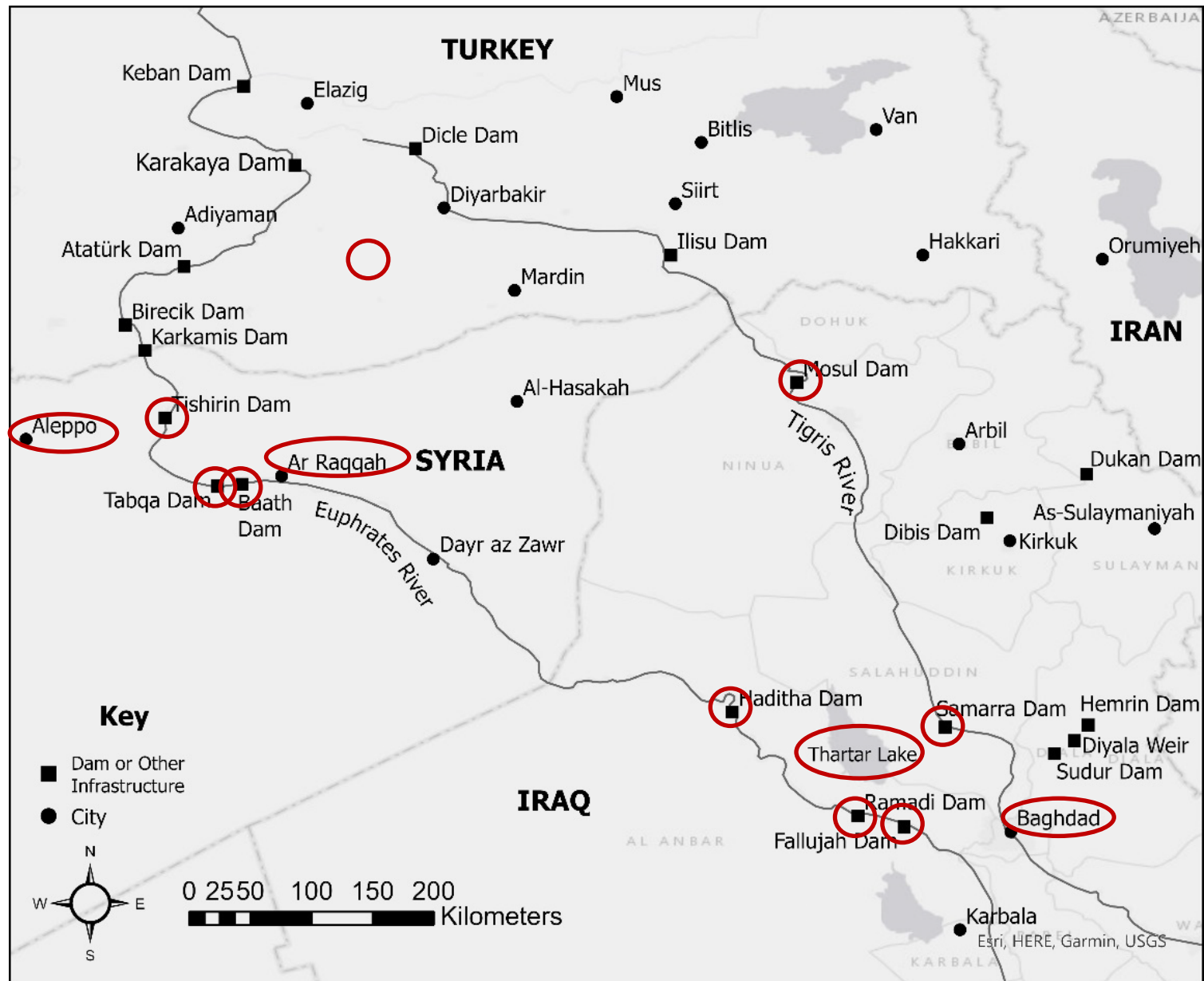




# Weaponizing Water: Syria, Iraq, Ukraine

“ Too often, where we need water,  
we find guns instead.”

—UN Secretary-General Ban Ki-moon



*A map of the major dams in the Tigris and Euphrates watershed. Many of these dams were targets of conflict during the recent violence in the region. Source: Morgan Shimabuku, Pacific Institute.*

MIC Izvestia

Footage shows massive explosion at dam in Kherson

The  
Guardian

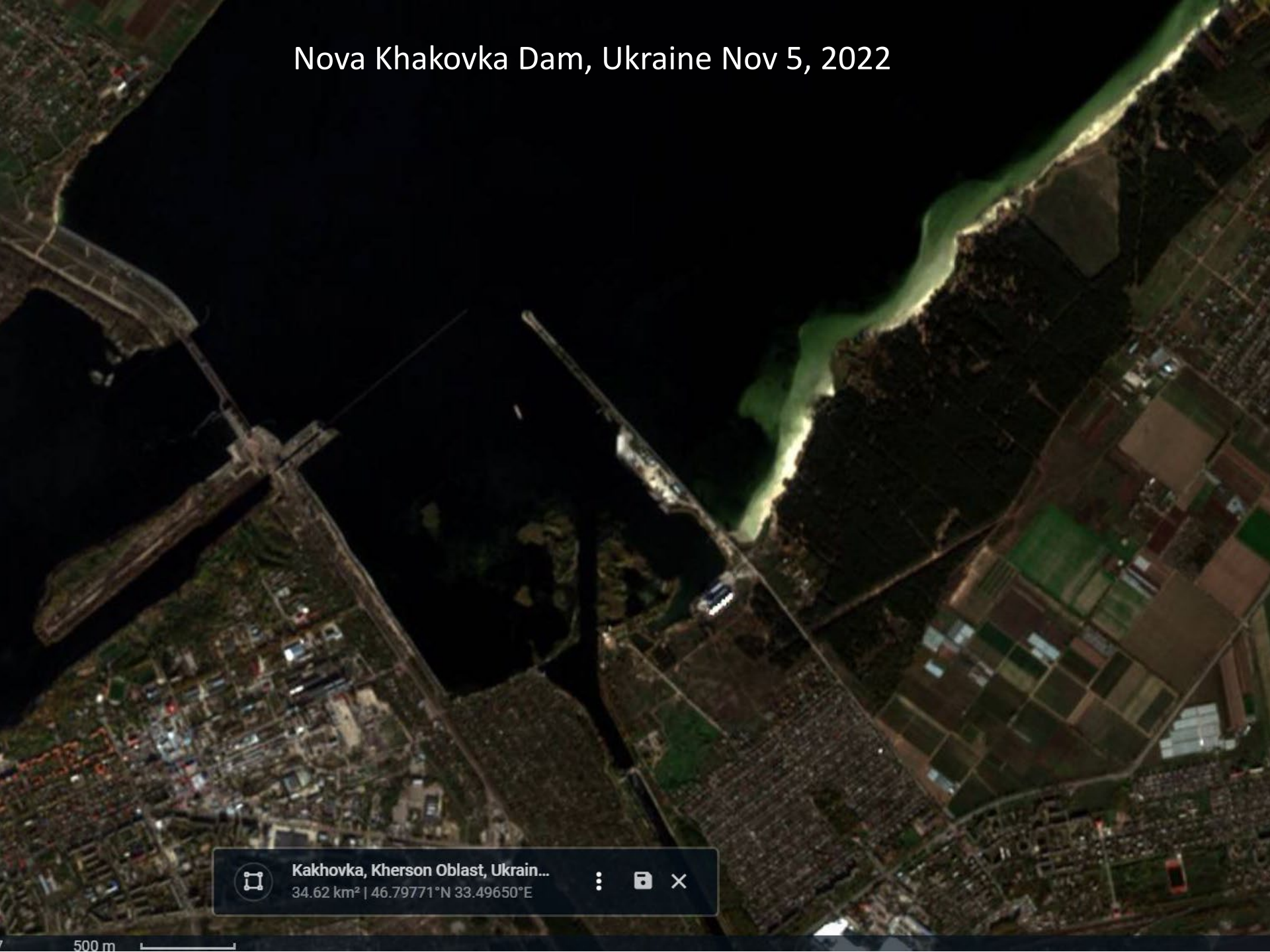
Explosion at Khakovka  
Dam, Nov 11, 2022 (The  
Guardian)



Maxar satellite image,  
Khakovka Dam,  
November 11, 2022

© Satellite image ©2022 Maxar Tech

# Nova Khakovka Dam, Ukraine Nov 5, 2022



Kakhovka, Kherson Oblast, Ukrain...

34.62 km<sup>2</sup> | 46.79771°N 33.49650°E




500 m

# Nova Khakovka Dam, Ukraine February 8, 2023



 Kakhovka, Kherson Oblast, Ukrain...  
34.62 km<sup>2</sup> | 46.79771°N 33.49650°E

# Solutions: Strategies for Reducing Risks of Water- Related Conflicts



## ENDING CONFLICTS OVER WATER

*Solutions to Water and Security Challenges*

PETER GLEICK, CHARLES ICELAND, AND AYUSHI TRIVEDI



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# Strategies for Ending Conflicts Over Water

- Technical (address water scarcity, improve efficiency)
- Economic (improve allocation/use; smart subsidies)
- Management (address institutional failures)
- Political, Diplomatic, and Legal (move toward cooperation; international laws of war)

Source: Report on “Ending Conflicts over Water: Solutions to Water and Security Challenges.” P.H. Gleick, C. Iceland, A. Trivedi. September 2020. *Pacific Institute, World Resources, Institute, Water Peace and Security Partnership.*

## Summary: Water for Peace and Cooperation

- The causes of water conflicts include long-standing political, religious, ideological, economic, and hydrologic factors, **including now, climate change.**
- Just as water has been a source of conflict and violence, it can be a source of peace, cooperation, and sustainable development.
- Some major international rivers have agreements and treaties that allocate the waters among the parties sharing a watershed.
- But the trends are in the wrong direction; and new strategies for cooperation are urgently needed.



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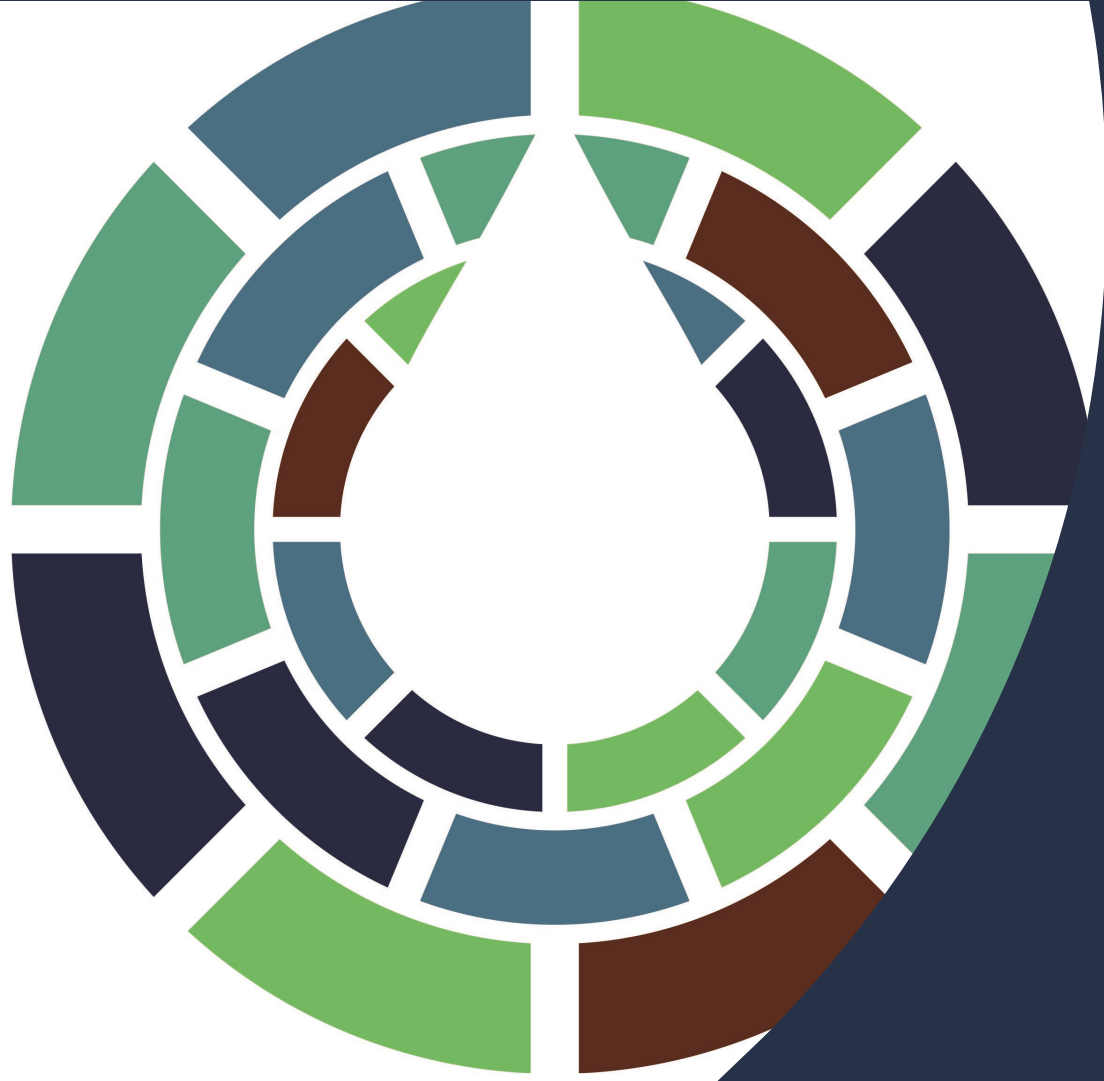
 @petergleick

[www.pacinst.org](http://www.pacinst.org)



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# Water, Peace and Security

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UN Water Conference 2023: Water,  
War and Peace

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Water, Peace & Security Partnership

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Liz Saccoccia

Water Security Associate

World Resources Institute



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# Water Security is National Security

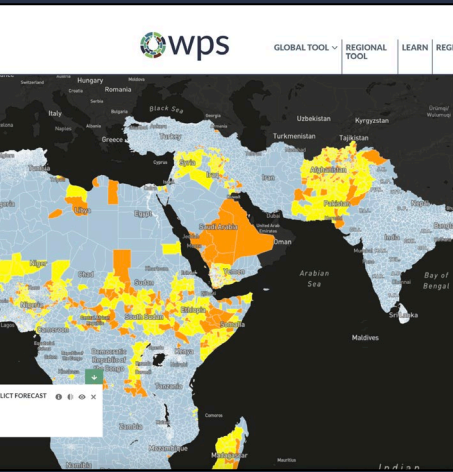
“If Climate Change is a Shark,  
then Water is its Teeth”

– James P. Bruce

“Water Can Be a Pathway to Peace,  
Not War”

- Aaron Wolf

# The Water, Peace and Security (WPS) partnership aims to address water related conflict by:



Developing Tools and Data

The screenshot displays a report titled 'WPS GLOBAL EARLY WARNING TOOL SEPTEMBER 2021 QUARTERLY UPDATE CONFLICT OVERVIEW'. The report includes a sub-section 'CONFLICT OVERVIEW' with text and a small map. The text discusses global conflict trends, mentioning that the number of conflict events increased from 1,000 in 2019 to 1,100 in 2020. It also notes that the number of conflict events in 2020 was higher than in 2019, with a significant increase in the number of conflict events in the Middle East and North Africa region.

Raising Awareness

The screenshot shows an e-learning module titled 'Module 1: Linking Water, Peace & Security'. The module includes a video player and a list of learning objectives. The video player shows a woman speaking, and the list of objectives includes: 'Explain and identify the interlinkages of water, peace and security. Also introduce key concepts and challenges and potential relations (pathways) between water-related risks, human insecurity and conflict', 'Discuss and reflect different angles and perspectives', 'Understand the complexity and variety of water, peace and security, understand what intervening factors could influence the conflict- or cooperation-driving role of water challenges', and 'Engage with the WPS approach, learn about the goals, strategies and approaches'.

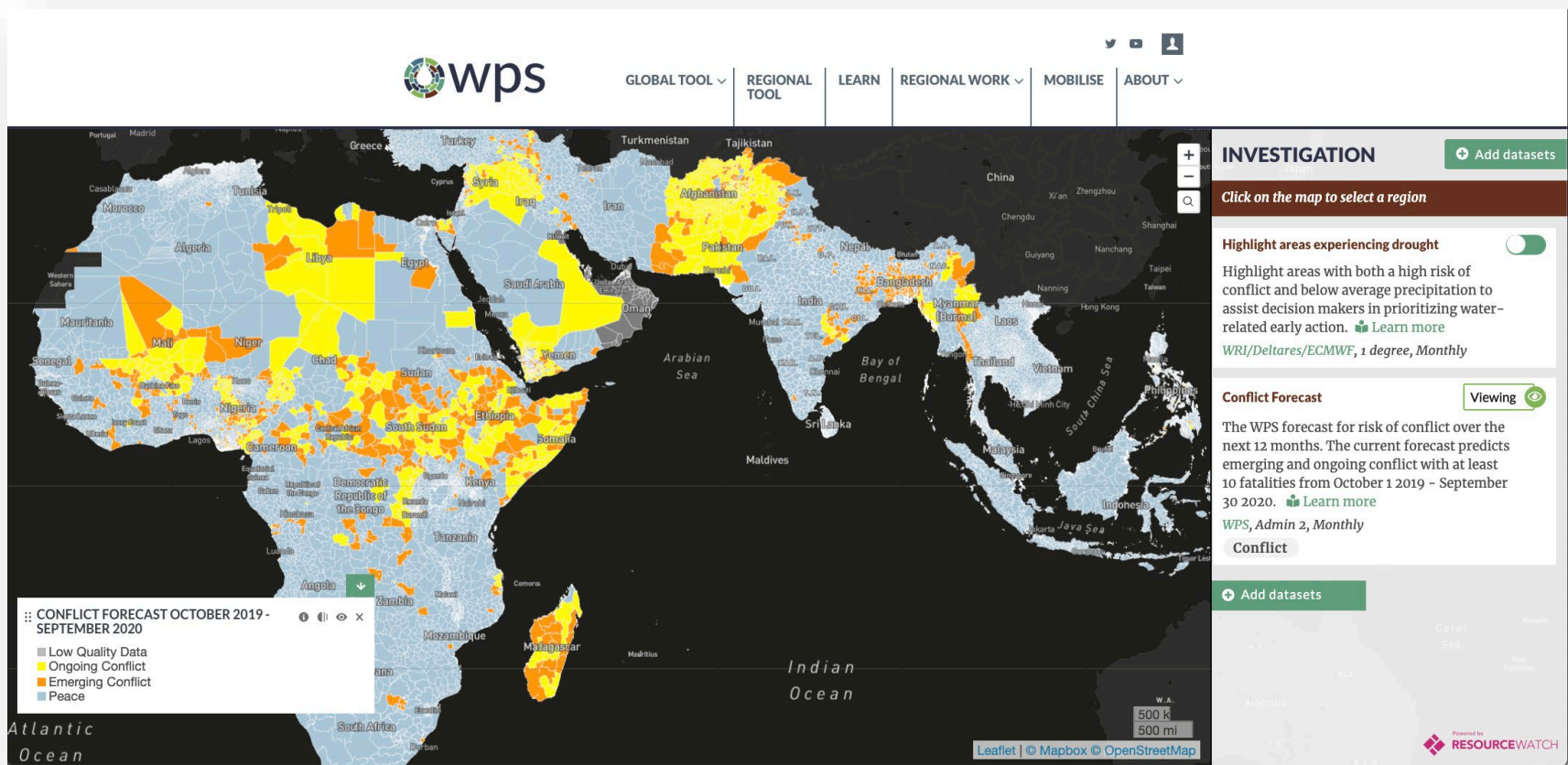
Building Capacity



Supporting Dialogue

... In order to turn vicious cycles of water and conflict into virtuous cycles of water-based peace and cooperation

# 2019 LAUNCH OF WPS GLOBAL EARLY WARNING TOOL



# OVERVIEW

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**Conflict Forecast** to highlight emerging conflict hotspots and prioritize opportunities for water-related interventions

- Long-term conflict risk
- Short-term estimate of intensity and direction

**Regional Causal Models** to better understand the causes of conflict in regions throughout the world

**Global Early Warning Tool** to put it all together and explore the timely, local dynamics underpinning conflict

# OVERVIEW

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# CONFLICT FORECAST: LONG-TERM RISK

What is the risk of deadly armed conflict in the upcoming year?

Do we predict at least 10 fatalities over the next year?



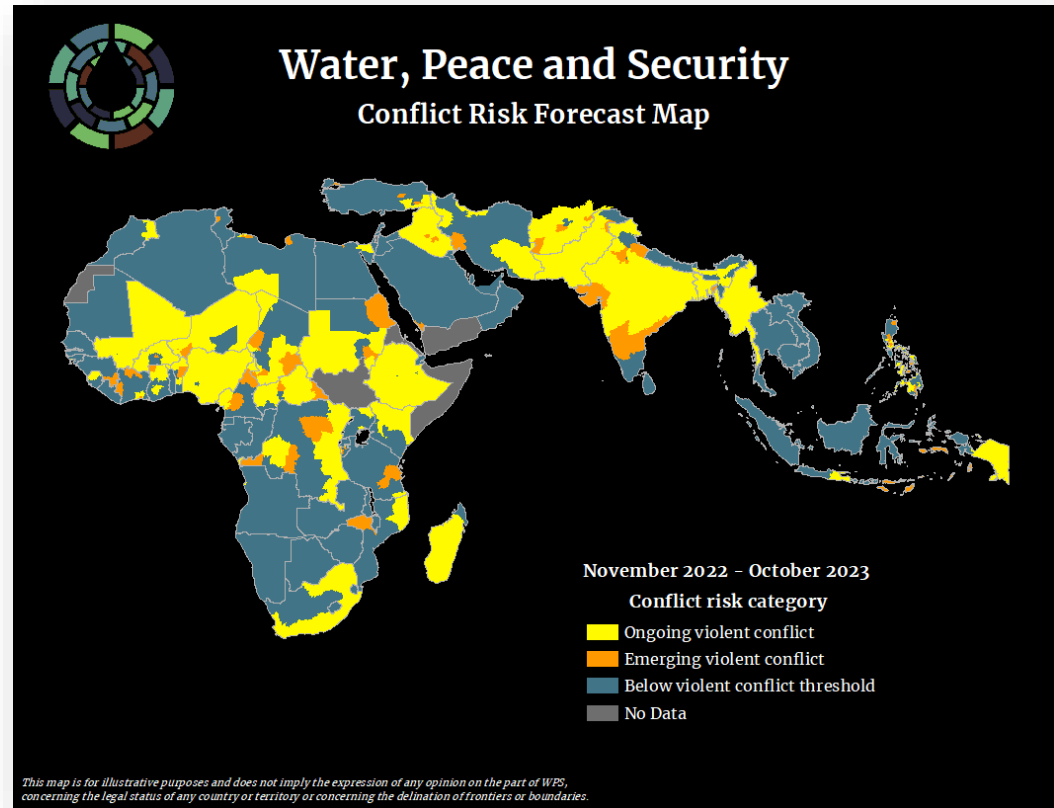
Have there been at least 10 fatalities over the past year?



Risk category: Ongoing, emerging, below the threshold

Useful for:

- Identifying emerging conflict hotspots
- Long-term strategic planning
- Prioritization





# OVERVIEW

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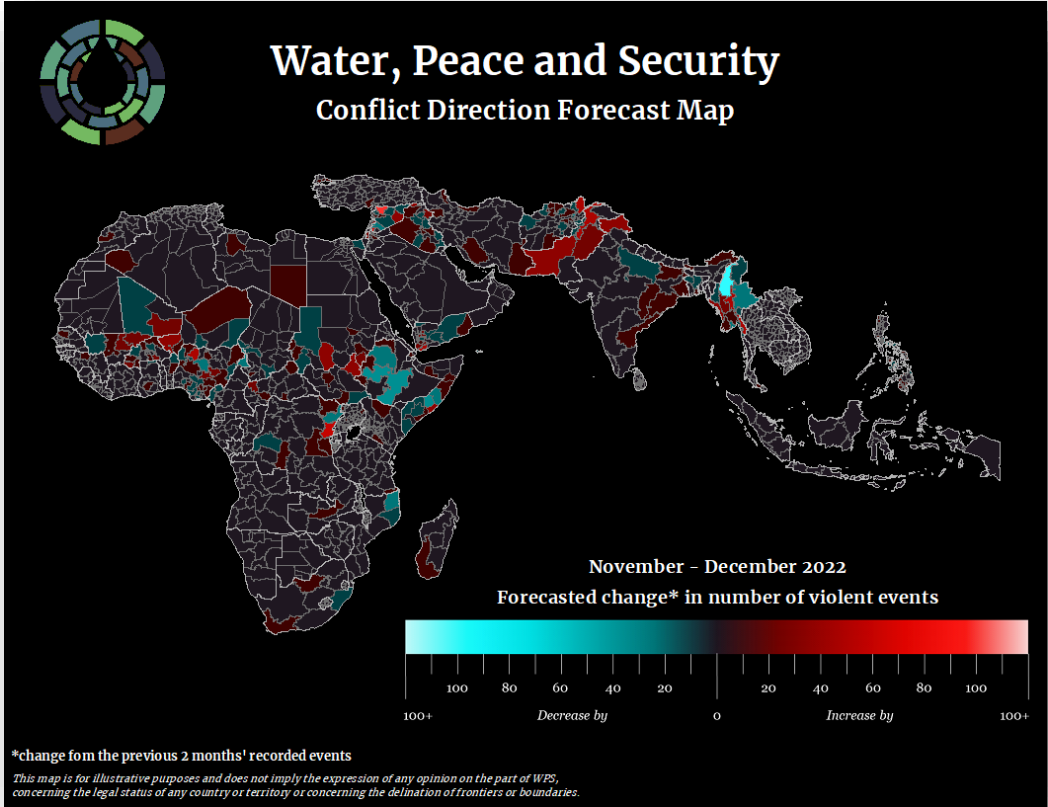
# CONFLICT FORECAST: SHORT-TERM EVENTS

How intense will conflict be in the coming months? Is the situation better or worse?

How many conflict events do we predict in the coming 2 months?



How does that compare with the previous 2-month record?



# CONFLICT FORECAST: SHORT-TERM EVENTS

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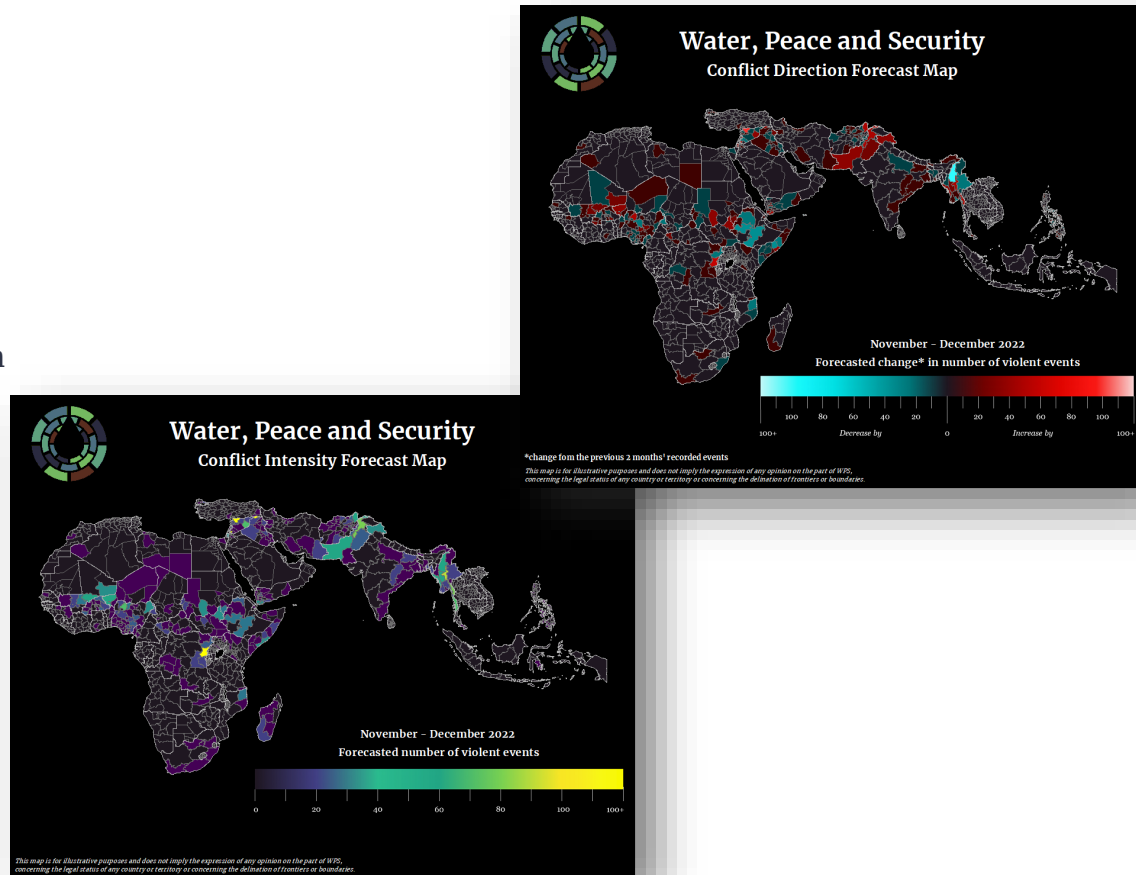
How does that compare with the previous 2-month record?



Event count heat maps of intensity and direction

Useful for:

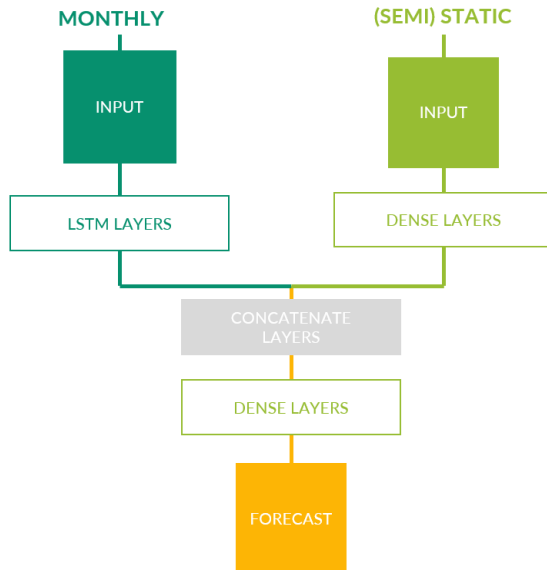
- On-the-ground agile response
- Planning upcoming travel and events
- Benchmarking future conflict in different places



# CONFLICT FORECAST: SHORT-TERM EVENTS

## MODEL STRUCTURE

Long-Short Memory Model (LSTM)



## CONFLICT DEFINITION

Number of conflict events

### ACLED EVENT TYPES USED

Battles  
Violence against civilians

[ACLED Codebook](#)

## DATA USED

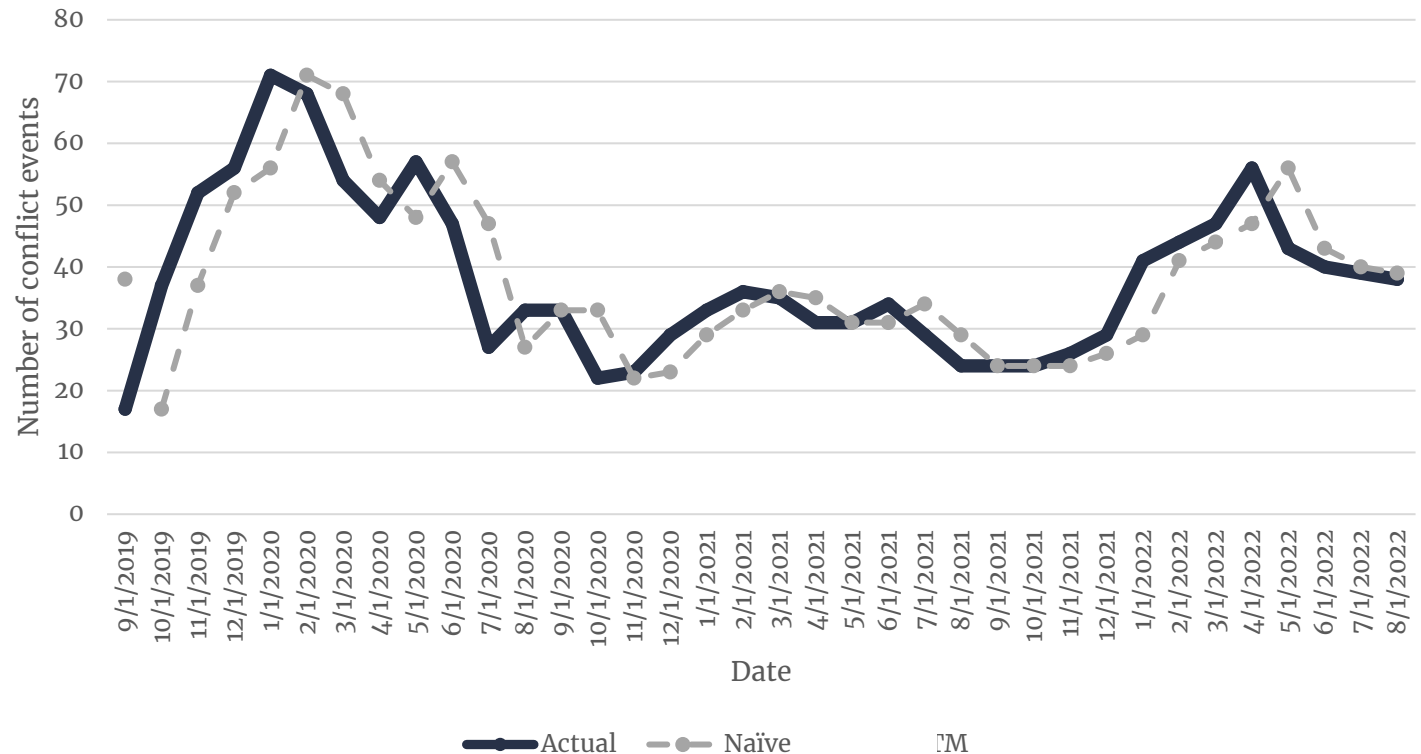
Leave-one-out optimizing

### DATA USED

Population density  
Population count  
Rural population (count)  
Battles (count)  
Violence against civilians (count)  
Rainfed agriculture value (sum)  
3-month precipitation anomalies  
6-month precipitation anomalies  
Seasonal variability

# CONFLICT FORECAST: SHORT-TERM EVENTS

## LSTM Forecast for Mopti, Mali



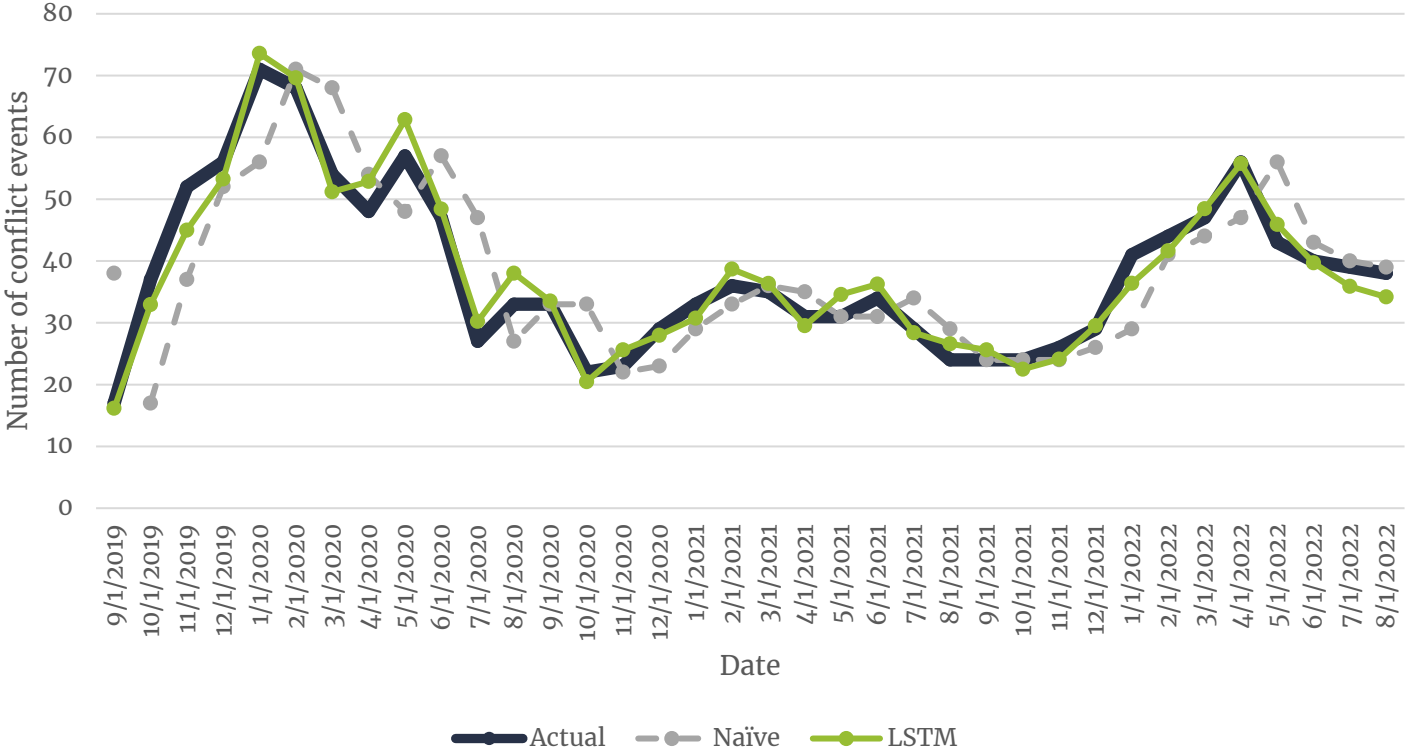
○ Correct with  $\pm 2$  events

○ Is 44% better than taking last month's number of conflicts (naïve model)

○ Is 27% better than taking the average number of events

# CONFLICT FORECAST: SHORT-TERM EVENTS

LSTM Forecast for Mopti, Mali



- Correct with  $\pm 2$  events
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# REGIONAL CAUSAL MODEL

What is the relationship between water and conflict? How strong is that relationship?

Took a cross section of data in time



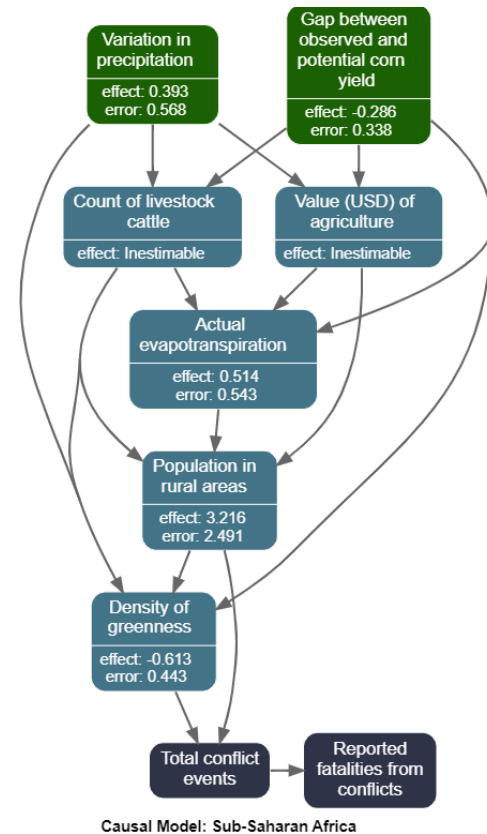
Ran thousands of iterations of statistical experiments, benchmarking them against each other to derive the strongest causal relationships



Visualized the models using causal graphs

Useful for:

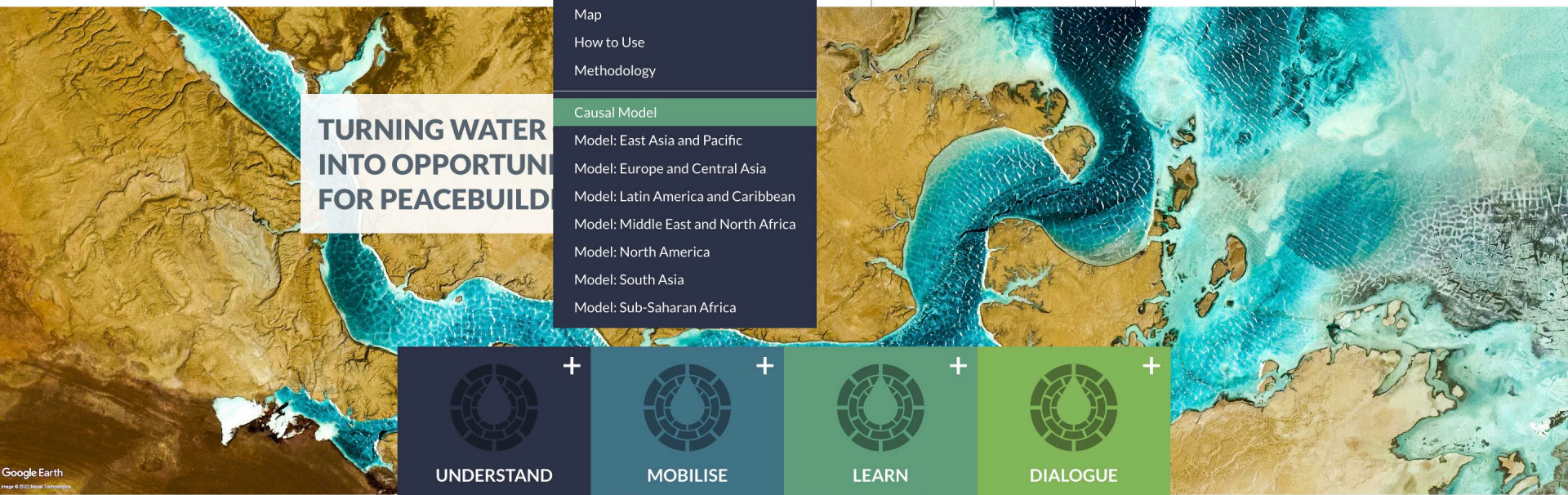
- Understanding the complex connections that underpin conflict
- Identifying which effects have a statistically significant relationship to conflict







- GLOBAL TOOL ▾
- REGIONAL WORK ▾
- TRAINING ▾
- PUBLICATIONS
- ABOUT WPS ▾



# TURNING WATER INTO OPPORTUNITY FOR PEACEBUILDING

- Map
- How to Use
- Methodology
- Causal Model
- Model: East Asia and Pacific
- Model: Europe and Central Asia
- Model: Latin America and Caribbean
- Model: Middle East and North Africa
- Model: North America
- Model: South Asia
- Model: Sub-Saharan Africa

 <b>UNDERSTAND</b> Apply cutting-edge technology and participatory analysis to understand water crises	 <b>MOBILISE</b> Mobilise decision makers and communities to take informed actions	 <b>LEARN</b> Strengthen capacities of stakeholders to address water crises	 <b>DIALOGUE</b> Support dialogue for cooperation and peacebuilding
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Water insecurity is increasing worldwide, straining relations between people, communities and nations. With the right tools and knowledge, Water, Peace and Security can help...

## UNDERSTANDING THE CAUSES OF CONFLICT

### Jump To

[Causal Models](#)[Causal Model 101](#)[Methodology](#)[Regions](#)[East Asia and Pacific](#)[Europe and Central Asia](#)[Latin America and Caribbean](#)[Middle East and North Africa](#)[North America](#)[South Asia](#)[Sub-Saharan Africa](#)

### Causal Models

In order to prevent water-related conflicts, we need to better understand what causes those conflicts and target interventions. WPS has sought to create causal models to identify the causes of conflicts in regions throughout the world. Doing so exposes and quantifies the complex connections that underpin the specific outcome of armed conflict.

Typically, causal inference requires experimentation in a controlled lab-type setting, which is not possible with armed conflict. Instead, we turned to advanced statistical methods and subject-matter expertise to map the relationships between water, food, economics, governance, and community data to armed conflict events and fatalities to understand how water challenges can lead to conflict. We ran thousands of iterations of statistical experiments, testing the causal linkages against a vast variety of hypotheses based on current climate conflict research to establish strong linkages between our input variables and armed conflict. Based on this, we are able to identify factors that contribute to conflict and the extent that they do so. Below we explain how the causal model works in more detail, and you can select links to see the findings from different regions of the world.

### Causal Model 101

# UNDERSTANDING THE CAUSES OF CONFLICT

Jump To

Causal Models

Causal Model 101

Methodology

Regions

East Asia and Pacific

Europe and Central Asia

Latin America and Caribbean

Middle East and North Africa

North America

South Asia

Sub-Saharan Africa



Middle East & North Africa



North America



South Asia



Sub-Saharan Africa



info@waterpeacesecurity.org  
@WaterPeaceSec

In collaboration  
with the



Ministry of Foreign Affairs  
of the Netherlands



# OVERVIEW

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**Conflict Forecast** to highlight emerging conflict hotspots and prioritize opportunities for water-related interventions

- Long-term conflict risk
- Short-term estimate of intensity and direction

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# GLOBAL TOOL DEMO



POV: Analyst at a government agency worried about water and insecurity in Iraq

The screenshot shows the ReliefWeb website interface. At the top, there is a search bar and navigation links for 'SEARCH', 'UPDATES', 'COUNTRIES', 'DISASTERS', 'ORGANIZATIONS', 'TOPICS', 'JOBS', and 'TRAINING'. Below the navigation, it says 'Informing humanitarians worldwide 24/7—a service provided by OCHA'. The article title is 'Water Crisis in Focus: Streams Run Dry in Southern Iraq'. Below the title, it lists 'News and Press Release', 'Source: IOM', 'Posted: 20 Nov 2022', 'Originally published: 17 Nov 2022', and 'Origin: View original'. There is a 'Primary country:' field. The main image shows a man standing in a dry, cracked field. Below the image, the caption reads: 'Mohsin Faleh standing on his dry farmland. © IOM 2022/Anjam Rasool'. The article text begins: 'Al Hadam, 17 November 2022 – Mohsin Faleh is a 30-year-old farmer from the community of Al Hadam, Missan governorate. His face was weathered and bears the scars of a complex water crisis that is expected to worsen. "I don't remember the last time it rained, I think two years ago," M

The screenshot shows a video player interface. At the top, there is a 'Summary' tab and social media icons for Facebook, Twitter, and a share icon. The video title is 'Basra is Thirsty' with the subtitle 'Iraq's Failure to Manage the Water Crisis'. The date 'July 22, 2019' is displayed. Below the title, it says 'Available In English العربية'. The video content shows a river filled with sewage and trash. Below the video, the caption reads: 'A river in central Basra filled with sewage and trash that feeds into the Shatt al-Arab, the city's main water source, September 12, 2018. © 2018 Alaa al-Marjani/Reuters'. Below the video player, there is a 'Summary' section with the following text: 'For almost 30 years, including during the period of occupation by the US- and UK-led Coalition Provisional Authority, Iraqi authorities have failed to properly manage and regulate Iraq's water resources, depriving the people in Iraq's southern Basra governorate—a population of roughly 4 million—of their right to safe drinking water. Basra's primary water sources are the Shatt al-Arab river and its freshwater canals. But multiple government failures since the 1980s, including poor management of upstream sources, inadequate regulation of pollution and

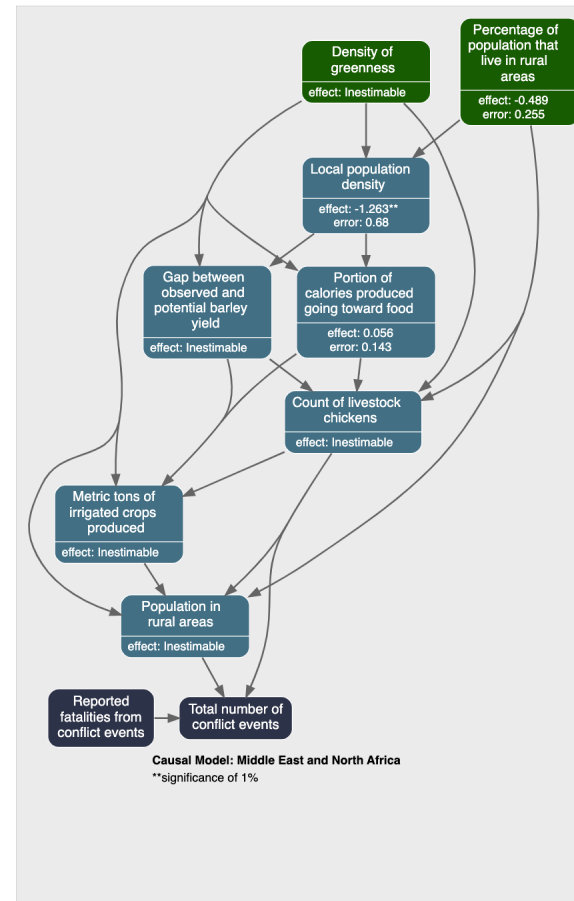
## CAUSAL MODEL: MIDDLE EAST & NORTH AFRICA

### Indirect Causal Relationships

The causal graph shows the causal structure of environmental and other conditions that cause the armed conflict activity. Whereas the causal paths are rooted in vegetation coverage and rural population size, the magnitude of causal effect of the rural population size on the conflict events could not be estimated with sufficient certainty. Additionally, the density of green areas is an important root cause. However, the available data precluded estimation of its effect on the conflict events. The causal structure also shows that all the causal paths between the root causes and armed conflict activity are indirect.

### Mediating Effects

The indirect causal effects on the armed conflict activity are mediated by the remaining variables in the graph, including demographic (population density, rural population) and agricultural variables (portion of calories produced for food, count of livestock chicken, irrigated crop production, production of barley fields). Among these, especially important for the mediation of causal effects on the conflict events is the local population density. Notably, the local population density causes a decrease in the conflict events. The causal effect of the local population density was established at the 1% level of statistical significance.



### My take-aways:

- Crop conditions
- Agriculture

# GLOBAL TOOL DEMO

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POV: Analyst at a government agency  
worried about water and insecurity in  
Iraq

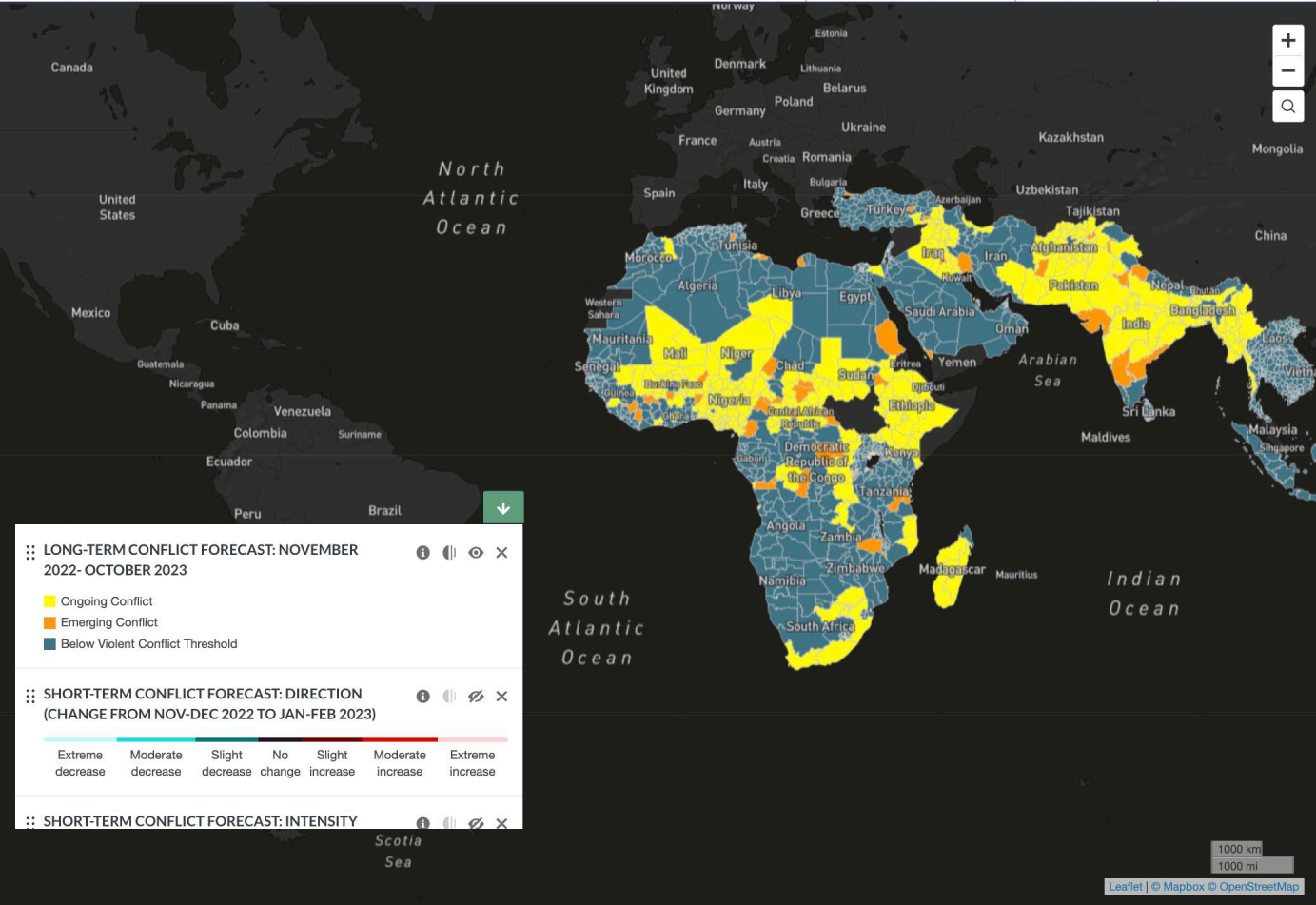
## Iraq

### Background Research

- **Dependent on the the Tigris and Euphrates rivers**
- **Drought/low flow conditions allow salty water to flow upstream**
- **Challenges with water pollution**

### Casual Graph

- **Vegetation health has a causal link to conflict**



### INVESTIGATION + Add datasets

Click on the map to select a region

**Highlight Areas Experiencing Drought**

When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)

*WRI/Deltares/ECMWF, 1 degree, Monthly*

**Long-term Conflict Forecast** Viewing

The WPS forecast for risk of conflict over the next 12 months. The current forecast predicts emerging and ongoing conflict with at least 10 fatalities for the next year. [Learn more](#)

*WPS, Admin 1, Monthly*

Conflict

**Short-term Conflict Forecast: Direction** Viewing

The WPS forecast for the change in the number of conflict events over the next 2 months with at least 1 fatalities compared to the previous 2 months. See the methodology to learn more about how this forecast was created. [Learn more](#)

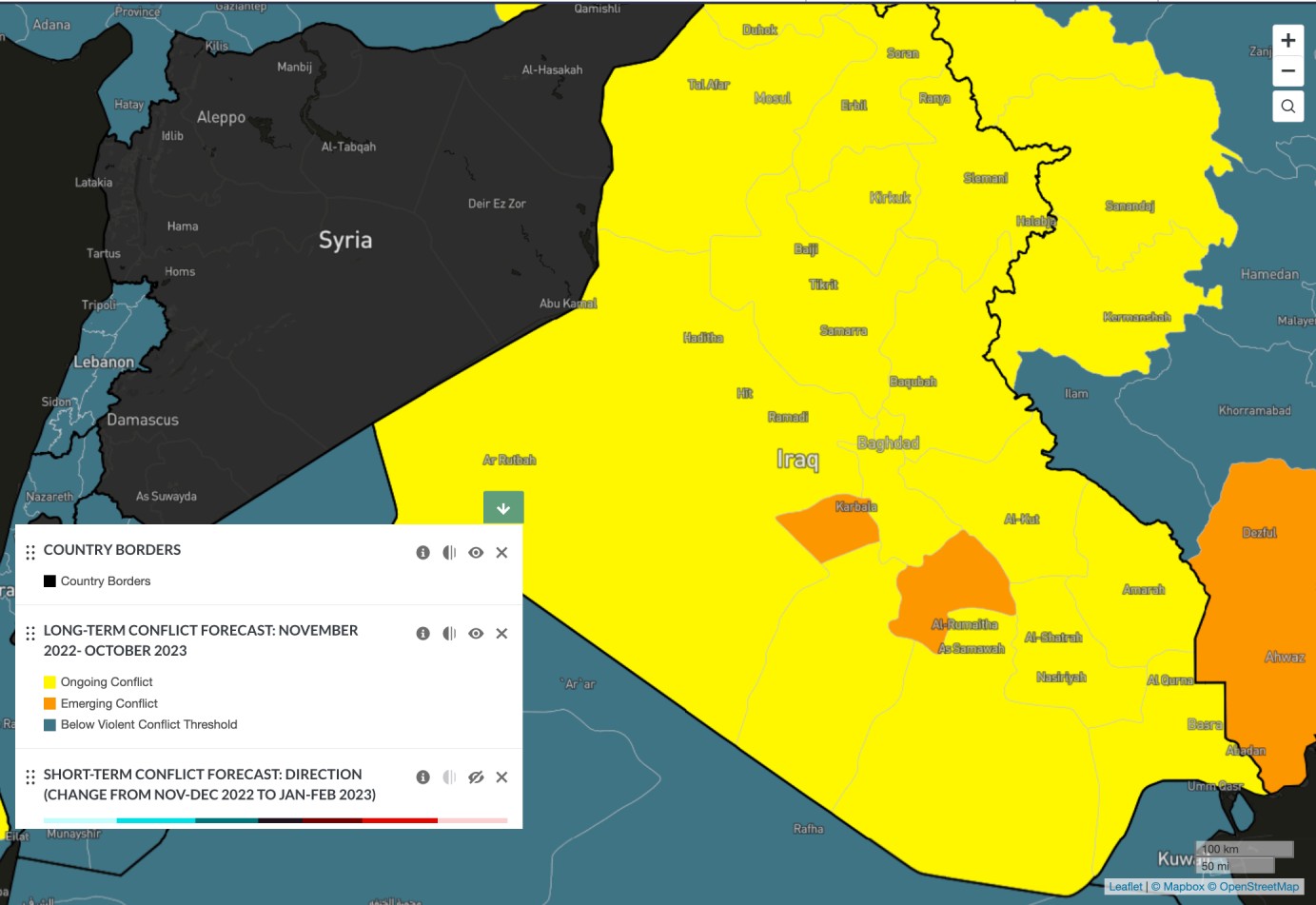
*WPS, Admin 1, Monthly*

Water

**Short-term Conflict Forecast: Intensity** Viewing







**COUNTRY BORDERS**

- Country Borders

**LONG-TERM CONFLICT FORECAST: NOVEMBER 2022- OCTOBER 2023**

- Ongoing Conflict
- Emerging Conflict
- Below Violent Conflict Threshold

**SHORT-TERM CONFLICT FORECAST: DIRECTION (CHANGE FROM NOV-DEC 2022 TO JAN-FEB 2023)**

### INVESTIGATION + Add datasets

Click on the map to select a region

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*WRI/Deltares/ECMWF, 1 degree, Monthly*

**Country Borders**

Country Borders for display purposes only. This map is for illustrative purposes and does not imply the expression of any opinion on the part of WRI concerning the legal status of any country or territory, or concerning the delimitation of frontiers or boundaries. [Learn more](#)

Infrastructure

**Long-term Conflict Forecast**

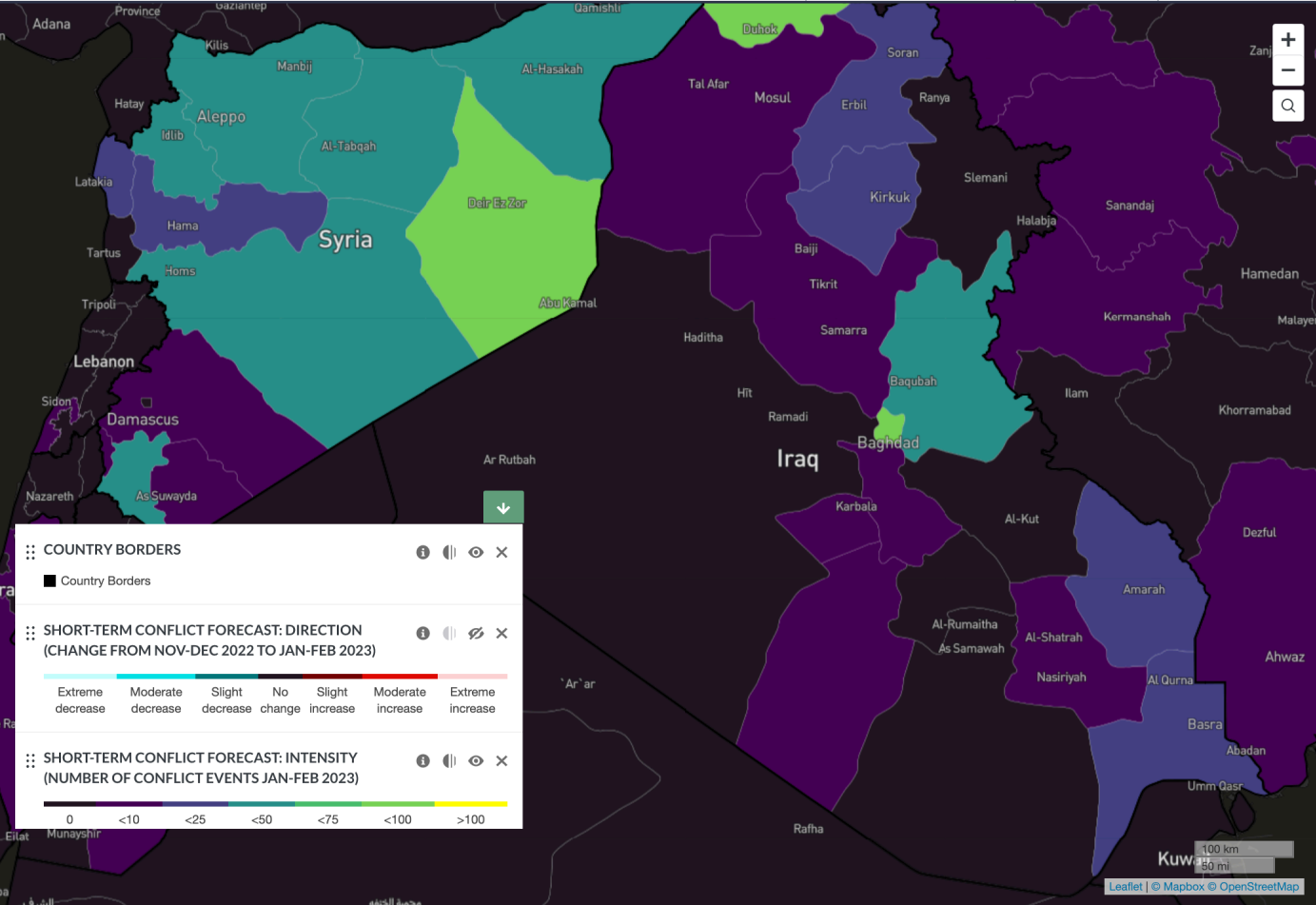
The WPS forecast for risk of conflict over the next 12 months. The current forecast predicts emerging and ongoing conflict with at least 10 fatalities for the next year. [Learn more](#)

*WPS, Admin 1, Monthly*

Conflict

**Short-term Conflict Forecast: Direction**





### INVESTIGATION

+ Add datasets

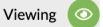
Click on the map to select a region

#### Highlight Areas Experiencing Drought



When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. Learn more WRI/Deltares/ECMWF, 1 degree, Monthly

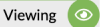
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Infrastructure

#### Short-term Conflict Forecast: Direction

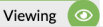


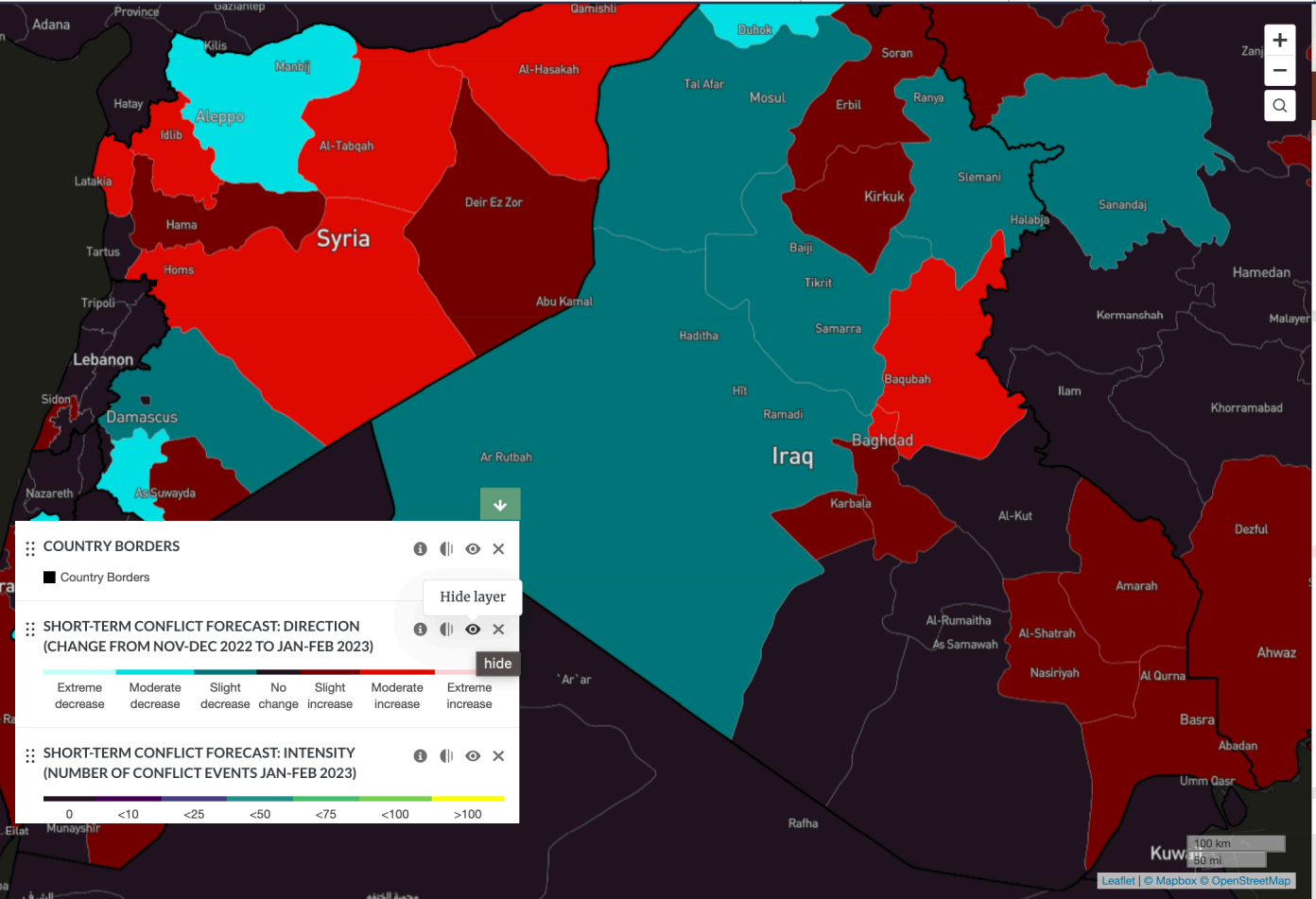
The WPS forecast for the change in the number of conflict events over the next 2 months with at least 1 fatalities compared to the previous 2 months. See the methodology to learn more about how this forecast was created. Learn more

WPS, Admin 1, Monthly

Water

#### Short-term Conflict Forecast: Intensity





INVESTIGATION Add datasets

Click on the map to select a region

Highlight Areas Experiencing Drought
When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation...

Country Borders
Country Borders for display purposes only. This map is for illustrative purposes and does not imply the expression of any opinion...

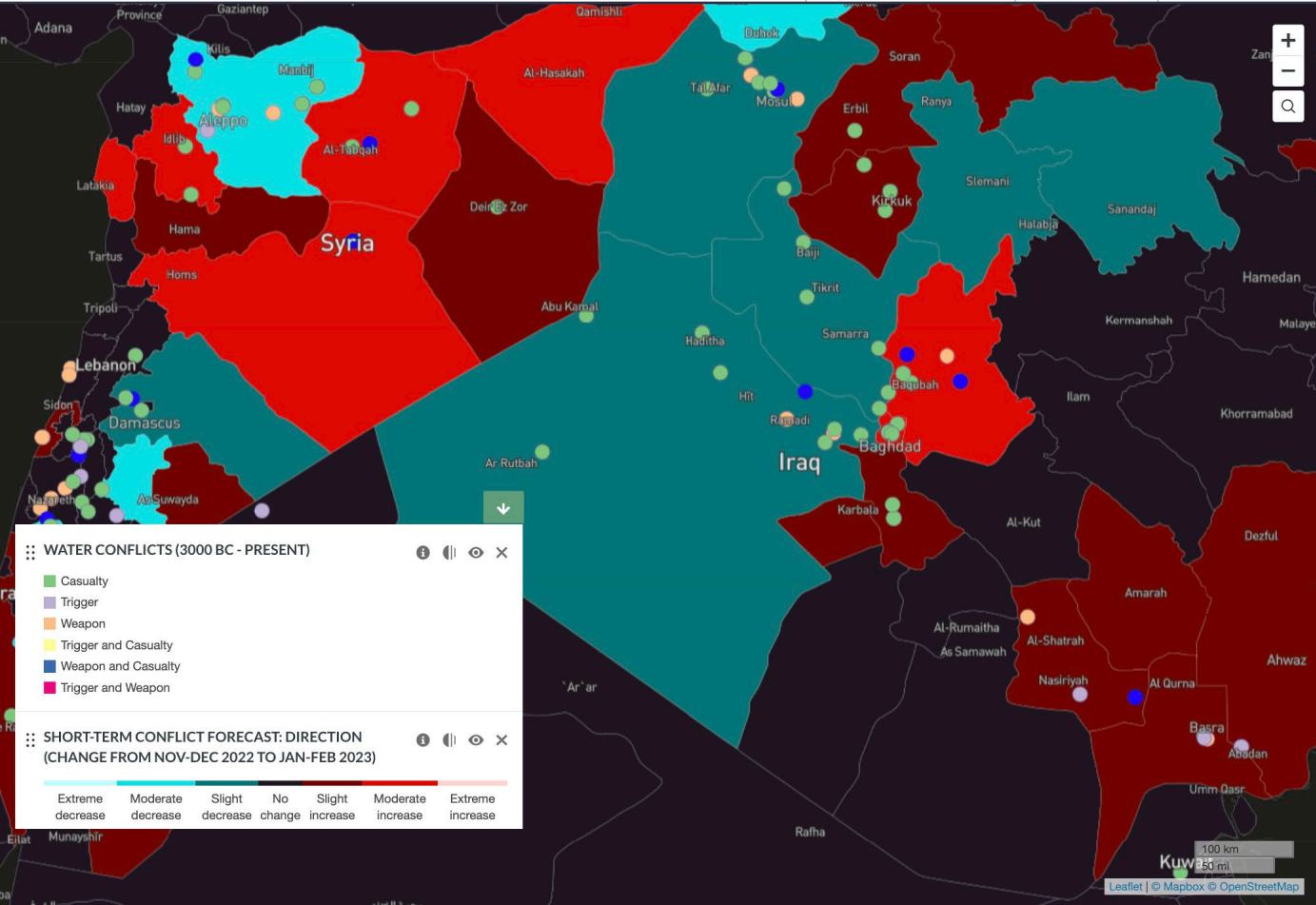
Infrastructure

Short-term Conflict Forecast: Direction
The WPS forecast for the change in the number of conflict events over the next 2 months with at least 1 fatalities compared to the previous 2 months...

Water

Short-term Conflict Forecast: Intensity





**WATER CONFLICTS (3000 BC - PRESENT)**

- Casualty
- Trigger
- Weapon
- Trigger and Casualty
- Weapon and Casualty
- Trigger and Weapon

**SHORT-TERM CONFLICT FORECAST: DIRECTION (CHANGE FROM NOV-DEC 2022 TO JAN-FEB 2023)**

Extreme decrease | Moderate decrease | Slight decrease | No change | Slight increase | Moderate increase | Extreme increase

### INVESTIGATION

Add datasets

Click on the map to select a region

**Highlight Areas Experiencing Drought**

When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)

WRI/Deltares/ECMWF, 1 degree, Monthly

**Water Conflicts**

Location where conflicts over water have occurred. [Learn more](#)

Pacific Institute, Point, Occasional

Conflict

**Short-term Conflict Forecast: Direction**

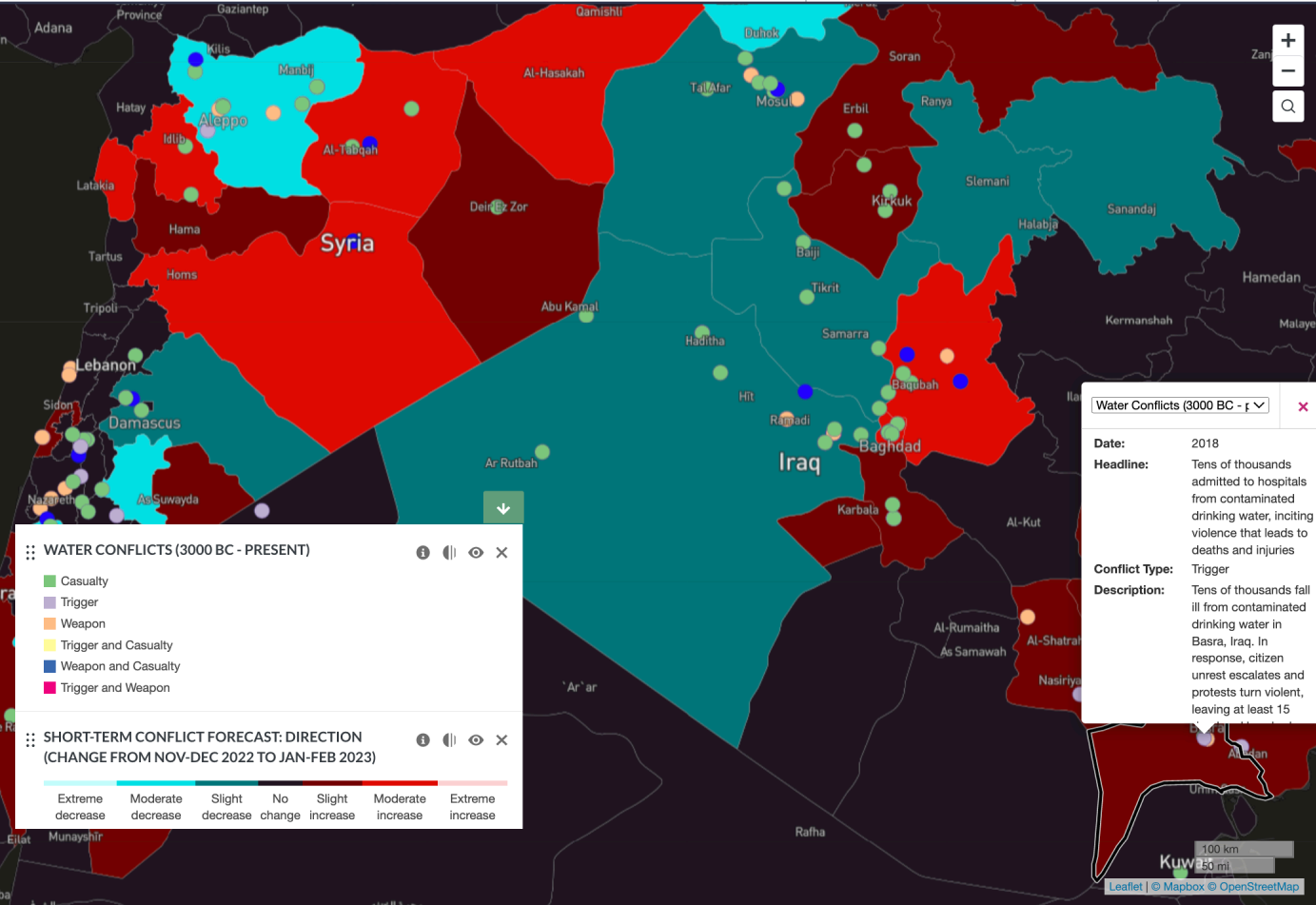
The WPS forecast for the change in the number of conflict events over the next 2 months with at least 1 fatalities compared to the previous 2 months. See the methodology to learn more about how this forecast was created. [Learn more](#)

WPS, Admin 1, Monthly

Water

Add datasets





Water Conflicts (3000 BC - f)

**Date:** 2018

**Headline:** Tens of thousands admitted to hospitals from contaminated drinking water, inciting violence that leads to deaths and injuries

**Conflict Type:** Trigger

**Description:** Tens of thousands fall ill from contaminated drinking water in Basra, Iraq. In response, citizen unrest escalates and protests turn violent, leaving at least 15

### INVESTIGATION + Add datasets

**Al-Basrah, Iraq**  
Download all data for this region Read me

**Highlight Areas Experiencing Drought**

When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)

*WRI/Deltas/ECMWF, 1 degree, Monthly*

**Water Conflicts** Viewing

Location where conflicts over water have occurred. [Learn more](#)

*Pacific Institute, Point, Occasional*

Conflict

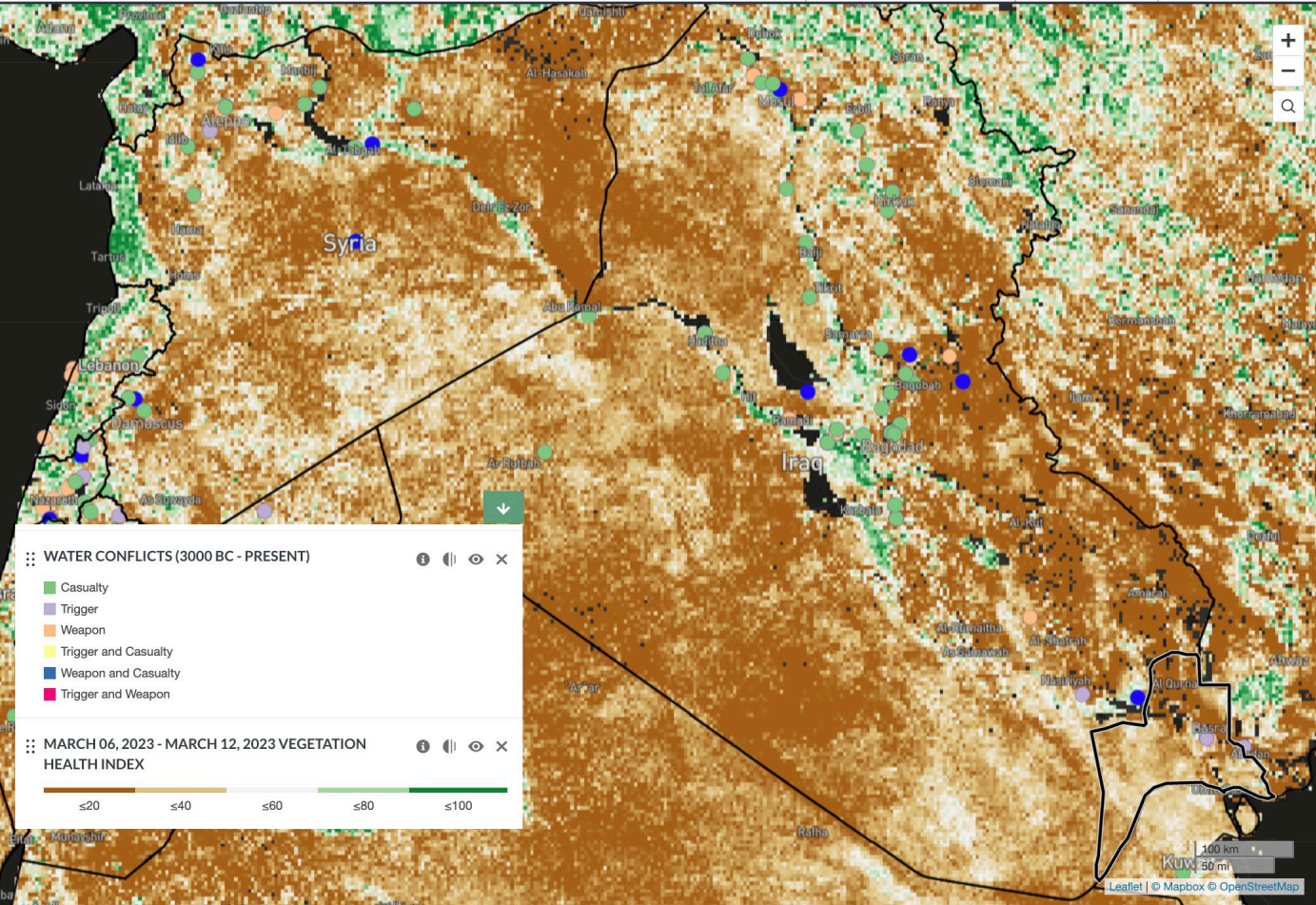
*The dataset is not used as an input to the model and therefore is not available at the administrative level.*

**Short-term Conflict Forecast: Direction** Viewing

The WPS forecast for the change in the number of conflict events over the next 2 months with at least 1 fatalities compared to the previous 2 months. See the methodology to learn more about how this forecast was created. [Learn more](#)

*WPS, Admin 1, Monthly*

Water



### INVESTIGATION

Add datasets

#### Al-Basrah, Iraq

Download all data for this region

Read me

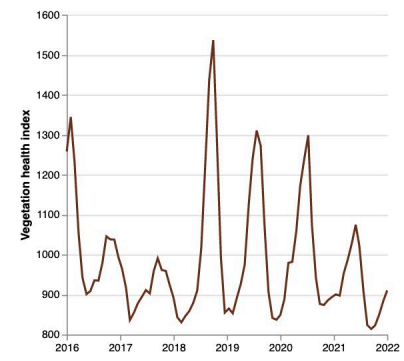
#### Vegetation Health Index

Viewing

Vegetation health index (VHI) of the latest available week. VHI is a proxy that is used to estimate crop condition. Indices below 40 indicate vegetation stress where losses of crop and pasture production might be expected. Indices above 60 indicate healthy vegetation. [Learn more](#)

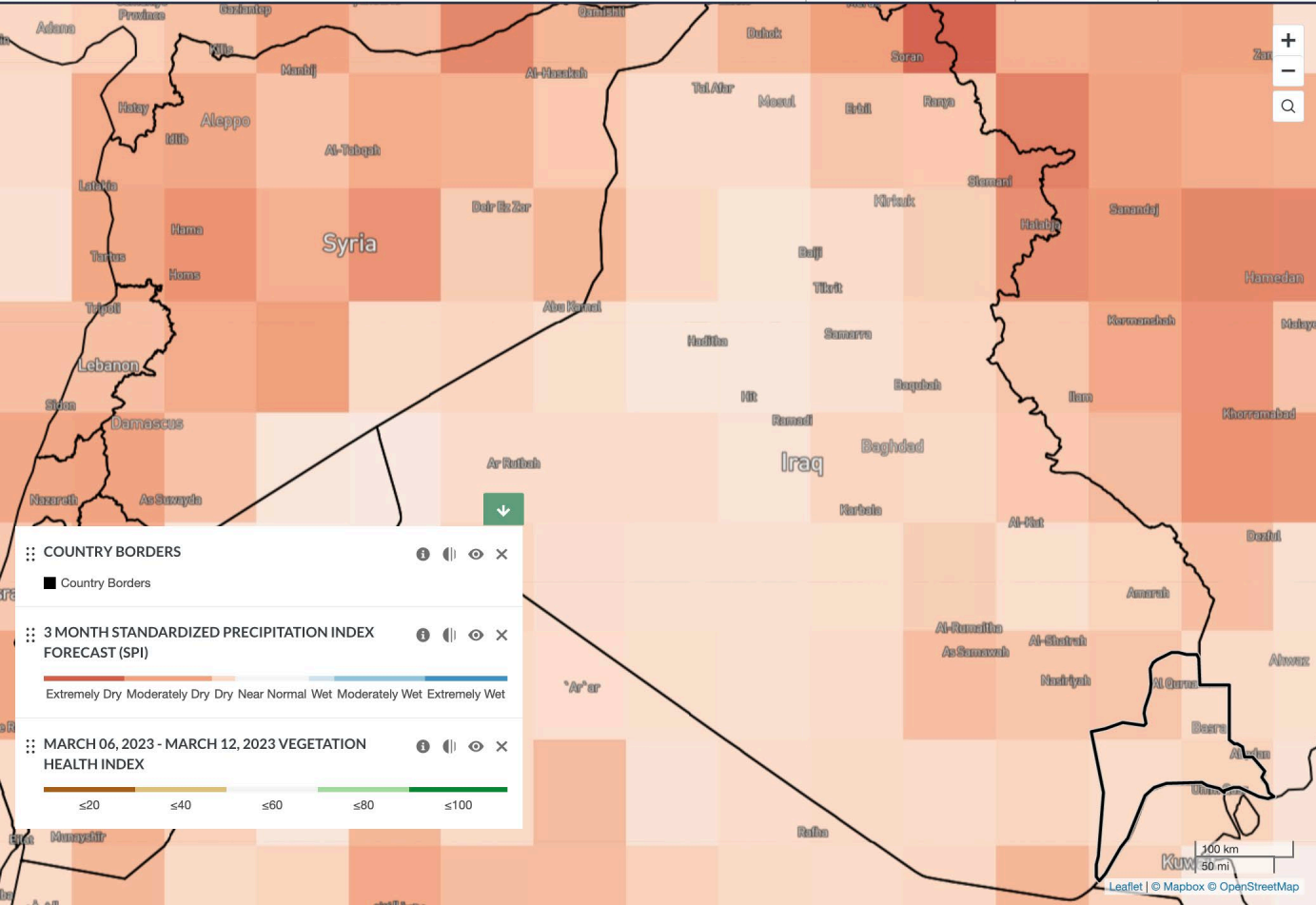
NOAA STAR, 4 km, weekly

Food



Add datasets





### INVESTIGATION

+ Add datasets

#### Al-Basrah, Iraq

Download all data for this region

Read me

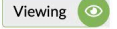
#### Highlight Areas Experiencing Drought



When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)

[WRI/Deltares/ECMWF, 1 degree, Monthly](#)

#### Country Borders

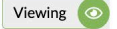


Country Borders for display purposes only. This map is for illustrative purposes and does not imply the expression of any opinion on the part of WRI concerning the legal status of any country or territory, or concerning the delimitation of frontiers or boundaries. [Learn more](#)

#### Infrastructure

The dataset is not used as an input to the model and therefore is not available at the administrative level.

#### 3-month Standardize Precipitation Index Forecast

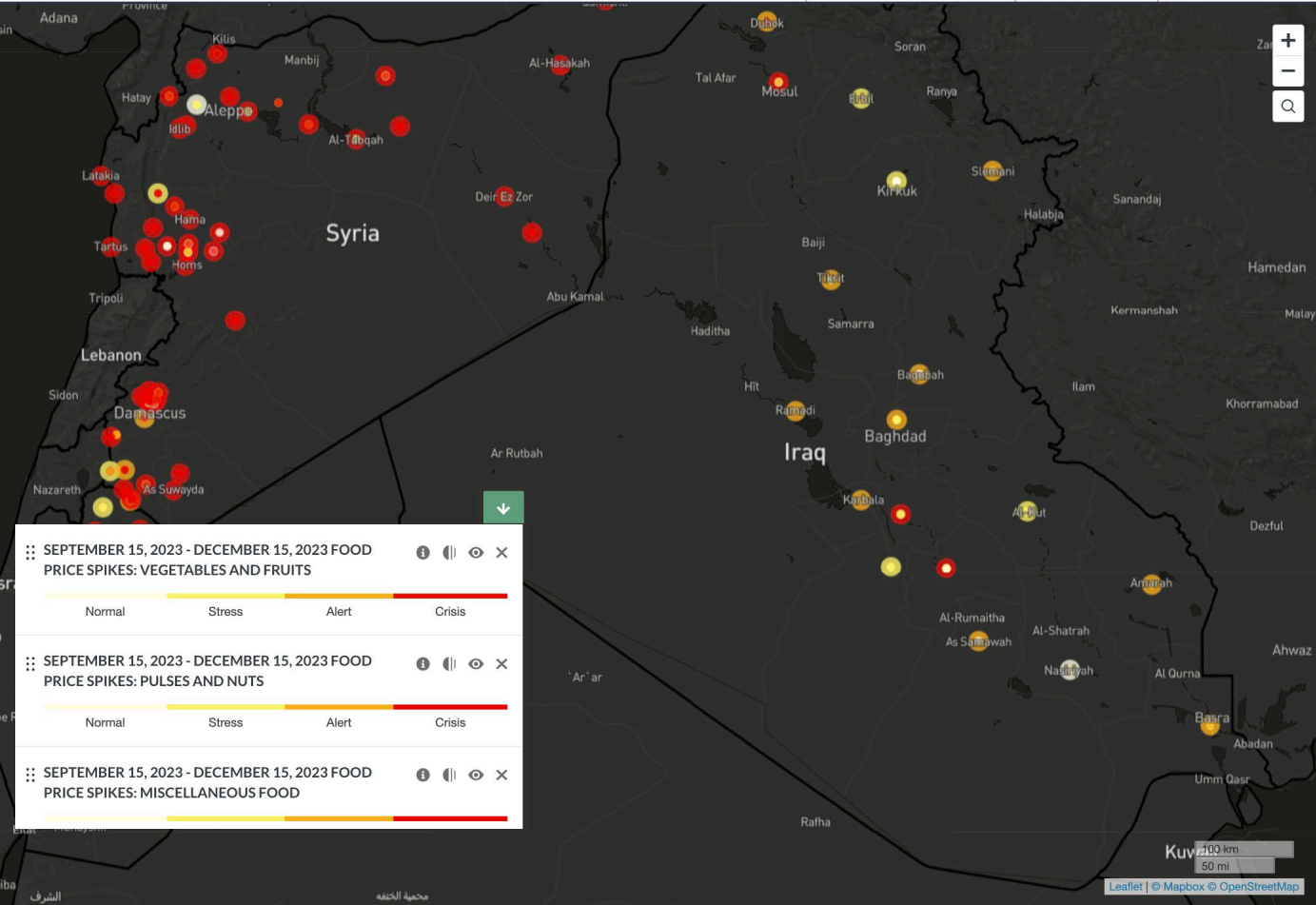


[Learn more](#)

#### Deltares

#### Water

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### INVESTIGATION + Add datasets

Click on the map to select a region

**Highlight Areas Experiencing Drought**

When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)

*WRI/Deltares/ECMWF, 1 degree, Monthly*

**Food Price Spikes: Vegetables and Fruits** Viewing

Food price level above seasonal price trends for vegetable and fruit commodities. [Learn more](#)

*WFP, Point, Monthly*

Food

**Food Price Spikes: Pulses and Nuts** Viewing

Food price level above seasonal price trends for pulse and nut commodities. [Learn more](#)

*WFP, Point, Monthly*

Food

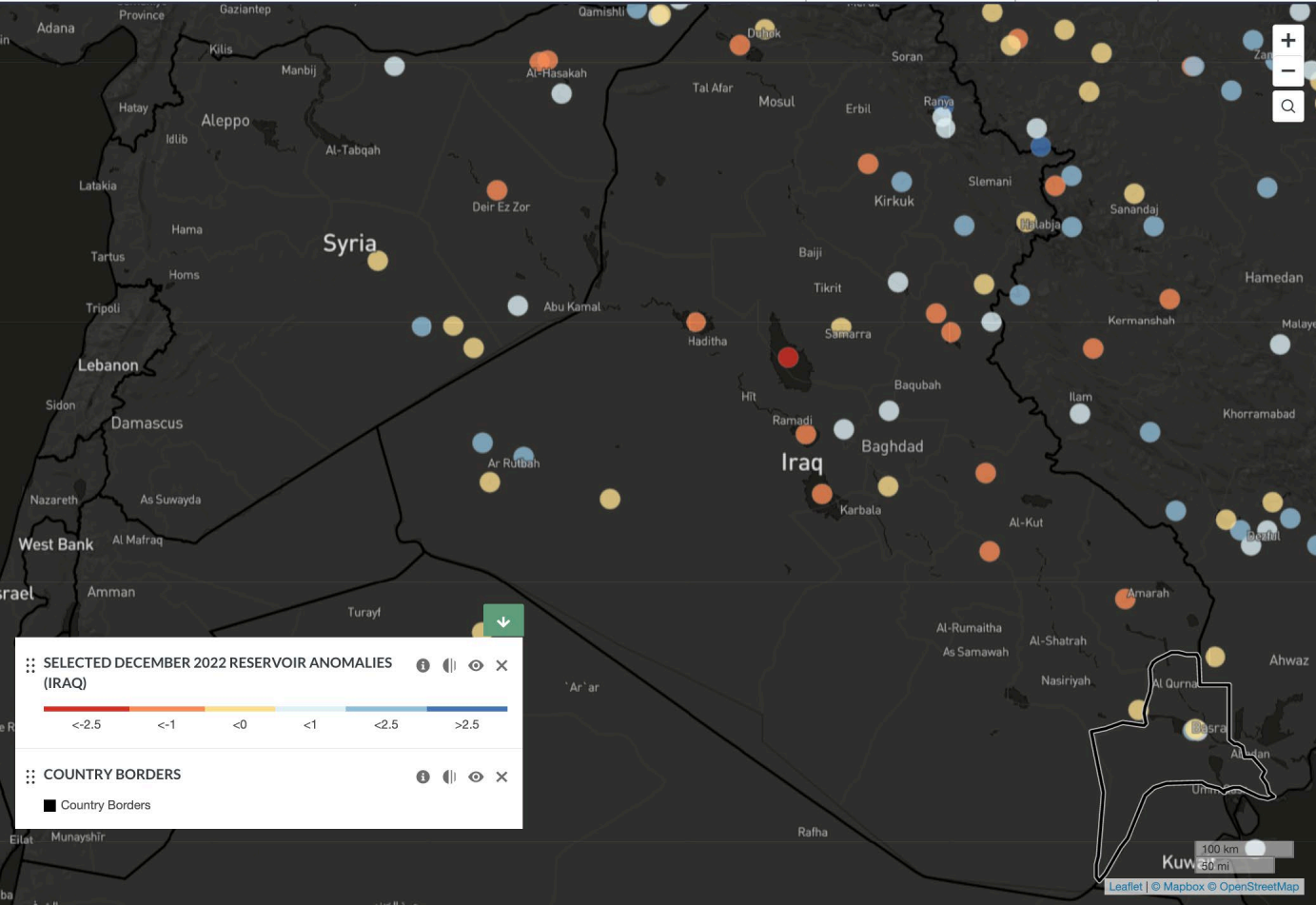
**Food Price Spikes: Miscellaneous Food** Viewing

Food price level above seasonal price trends for miscellaneous food commodities. [Learn more](#)

*WFP, Point, Monthly*

Food





### INVESTIGATION

+ Add datasets

#### Al-Basrah, Iraq

Download all data for this region

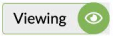
Read me

#### Highlight Areas Experiencing Drought



When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#) *WRI/Deltares/ECMWF, 1 degree, Monthly*

#### Selected Reservoir Surface Area Anomaly



Global Water Watch (forthcoming), is a data platform of free, globally accessible near-real-time information on water. It provides information on thousands of global reservoirs and major river systems, helping decision-makers respond to extreme weather events and manage growing risks of climate change. The anomalies are calculated with data from 1985-present. [Learn more](#) *Global Water Watch, Monthly*

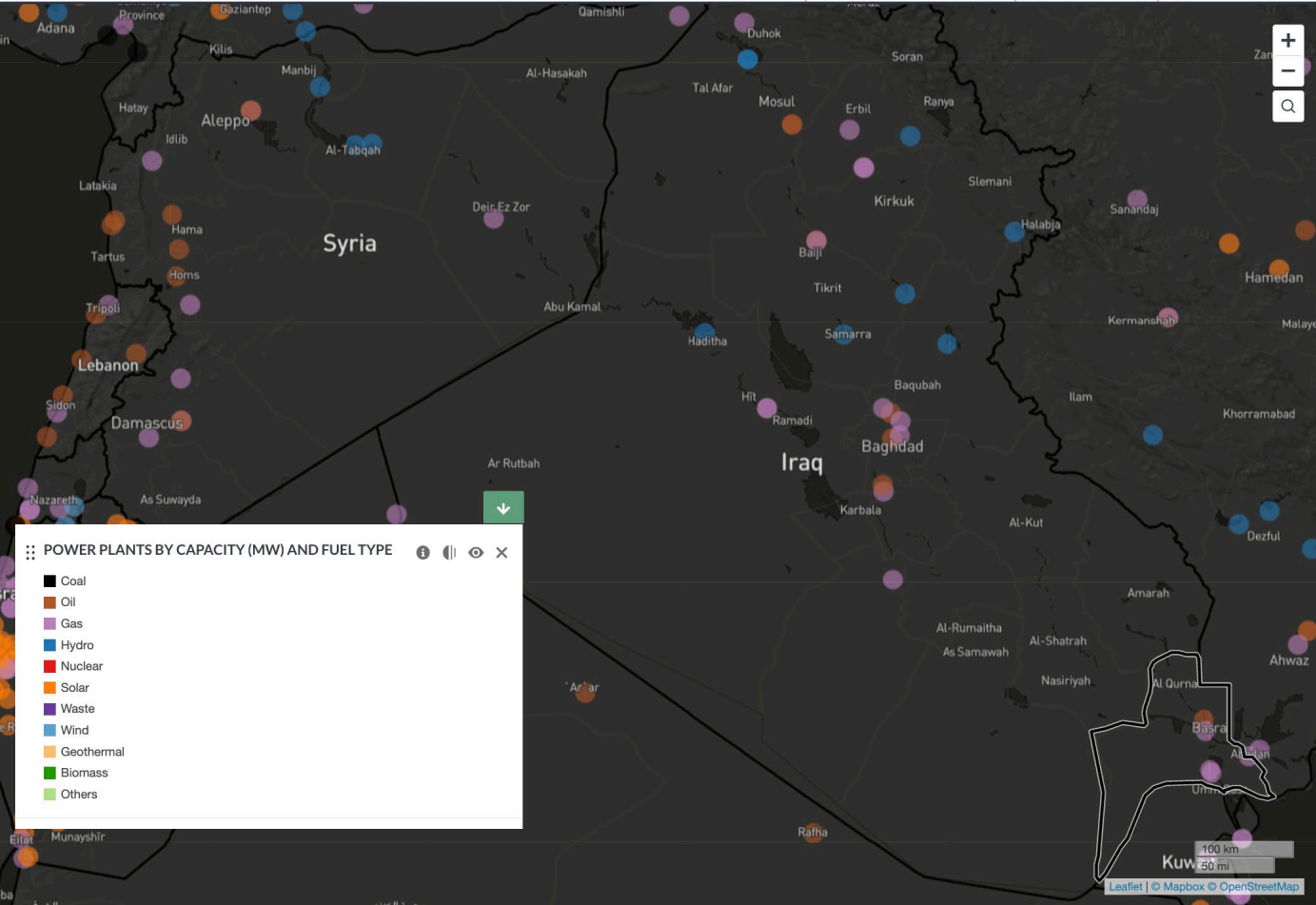
Water

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#### Country Borders



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### INVESTIGATION + Add datasets

**Al-Basrah, Iraq**  
Download all data for this region Read me

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*WRI/Deltares/ECMWF, 1 degree, Monthly*

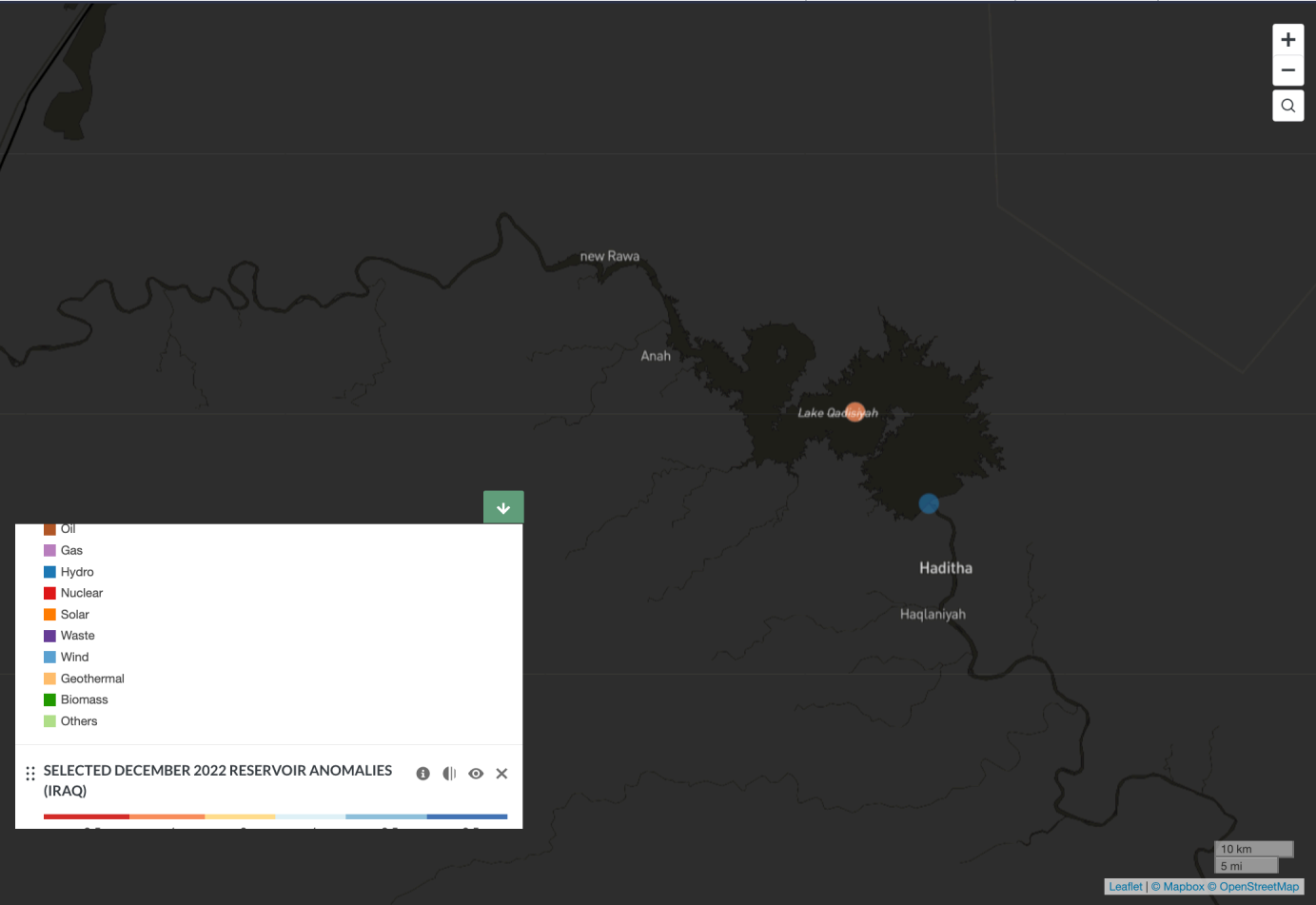
**Power Generation by Fuel Type**  Viewing  
The percentage of the total energy capacity generated by each fuel type. [Learn more](#)  
*Global Power Plant Database, Admin 2, Annually*

**Energy**  
*The dataset is not used as an input to the model and therefore is not available at the administrative level.*

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*Global Water Watch, Monthly*

**Water**





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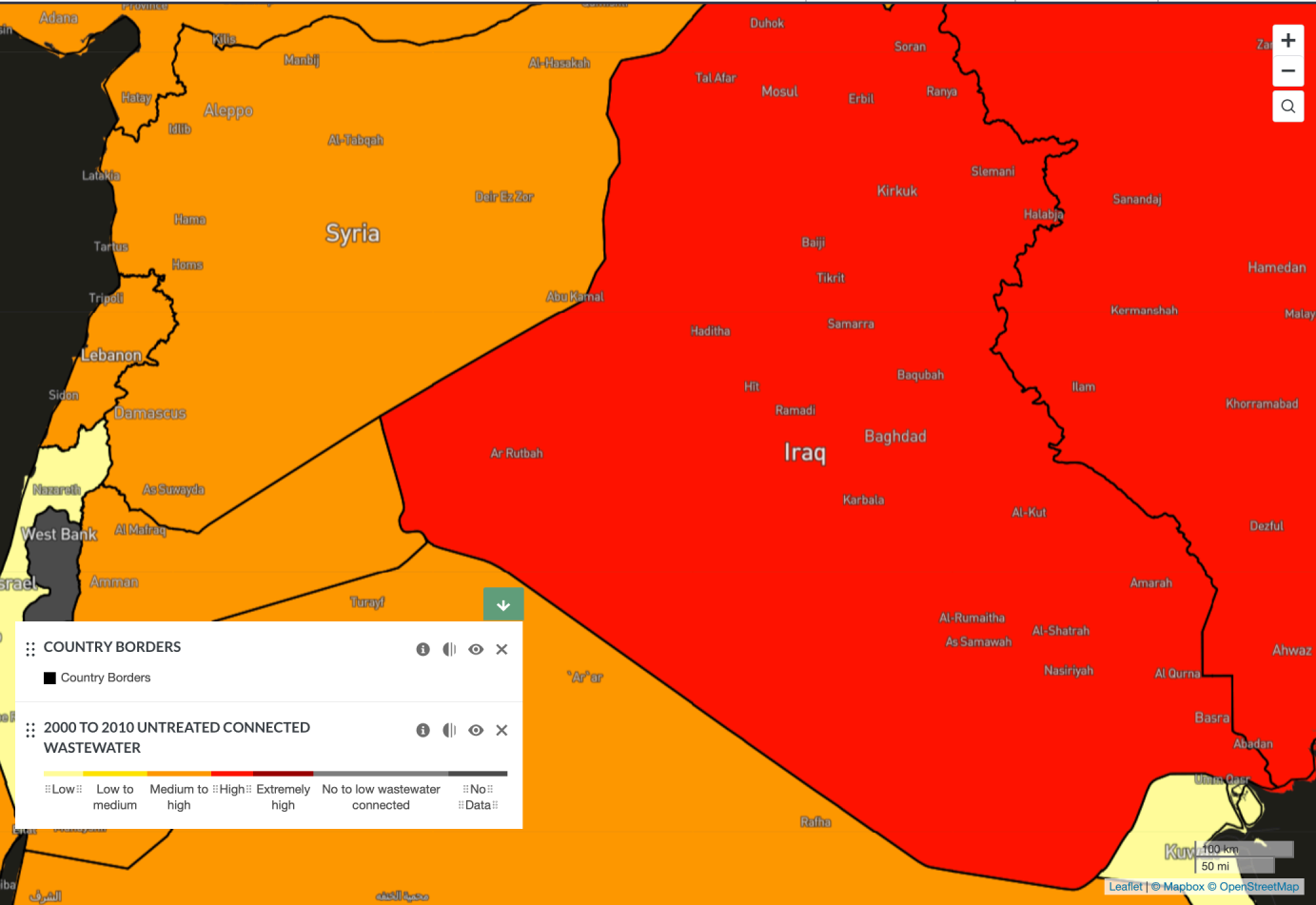
*Global Water Watch, Monthly*

Water

**Country Borders** Viewing

Country Borders for display purposes only. This map is





### INVESTIGATION

Add datasets

Click on the map to select a region

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*WRI/Deltares/ECMWF, 1 degree, Monthly*

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Infrastructure

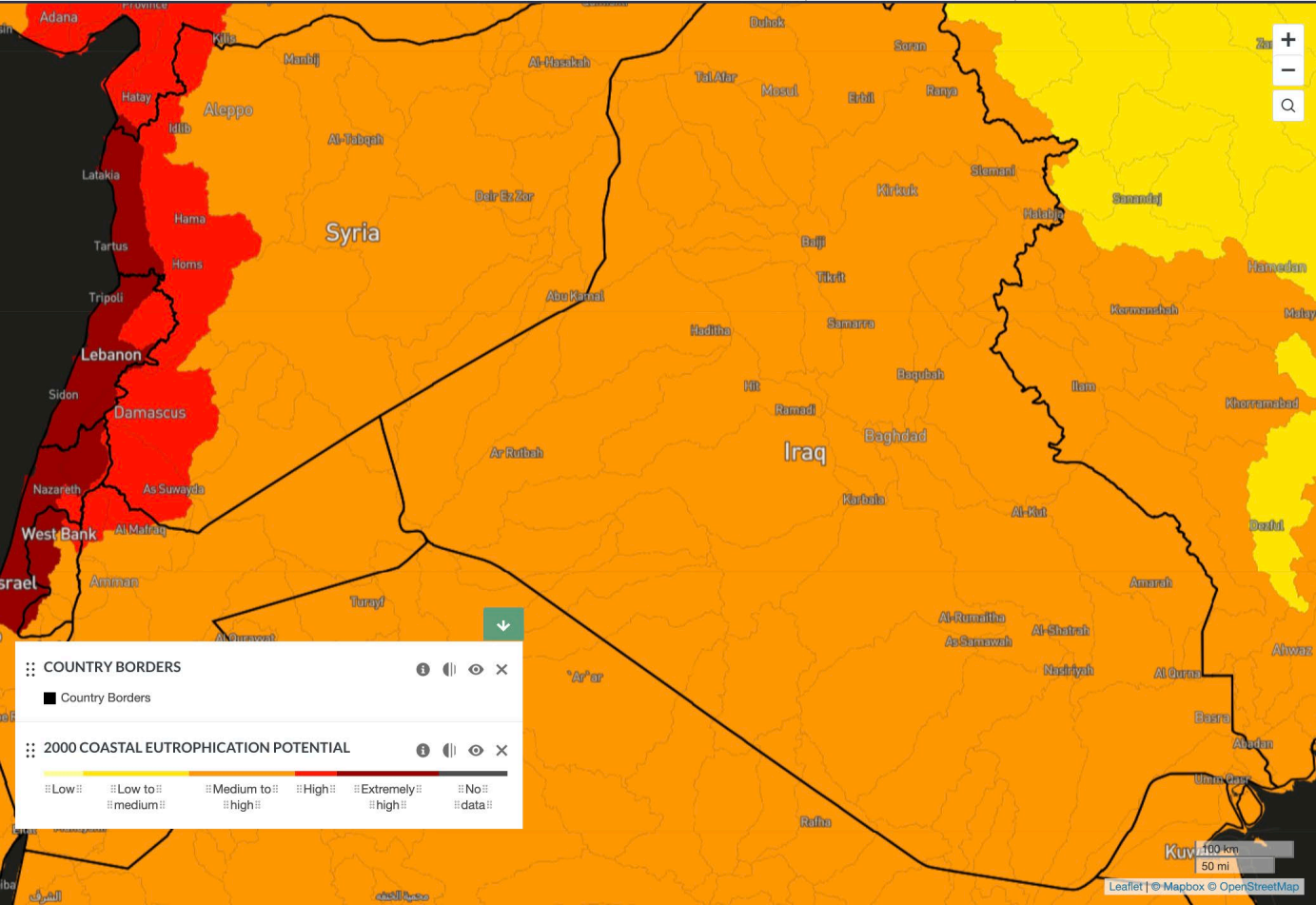
**Untreated Connected Wastewater**

The percentage of domestic wastewater that is connected through a sewerage system and not treated to at least a primary treatment level. [Learn more](#)

*WRI Aqueduct, Admin 1, Baseline*

Add datasets





### INVESTIGATION

Click on the map to select a region

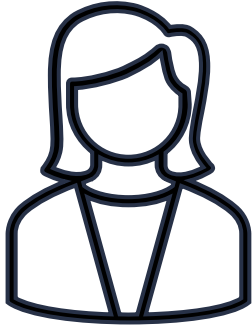
**Highlight Areas Experiencing Drought**  
When overlaid with the conflict forecast map, we can use this to highlight areas with both a high risk of conflict and below average precipitation to assist decision makers in prioritizing water-related early action. [Learn more](#)  
WRI/Deltares/ECMWF, 1 degree, Monthly

**Country Borders**  
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**Coastal Eutrophication Potential**  
The potential for riverine loadings of nitrogen (N), phosphorus (P), and silica (Si) to stimulate harmful algal blooms in coastal waters [Learn more](#)  
WRI Aqueduct, Admin 1, Baseline

# GLOBAL TOOL INSIGHTS

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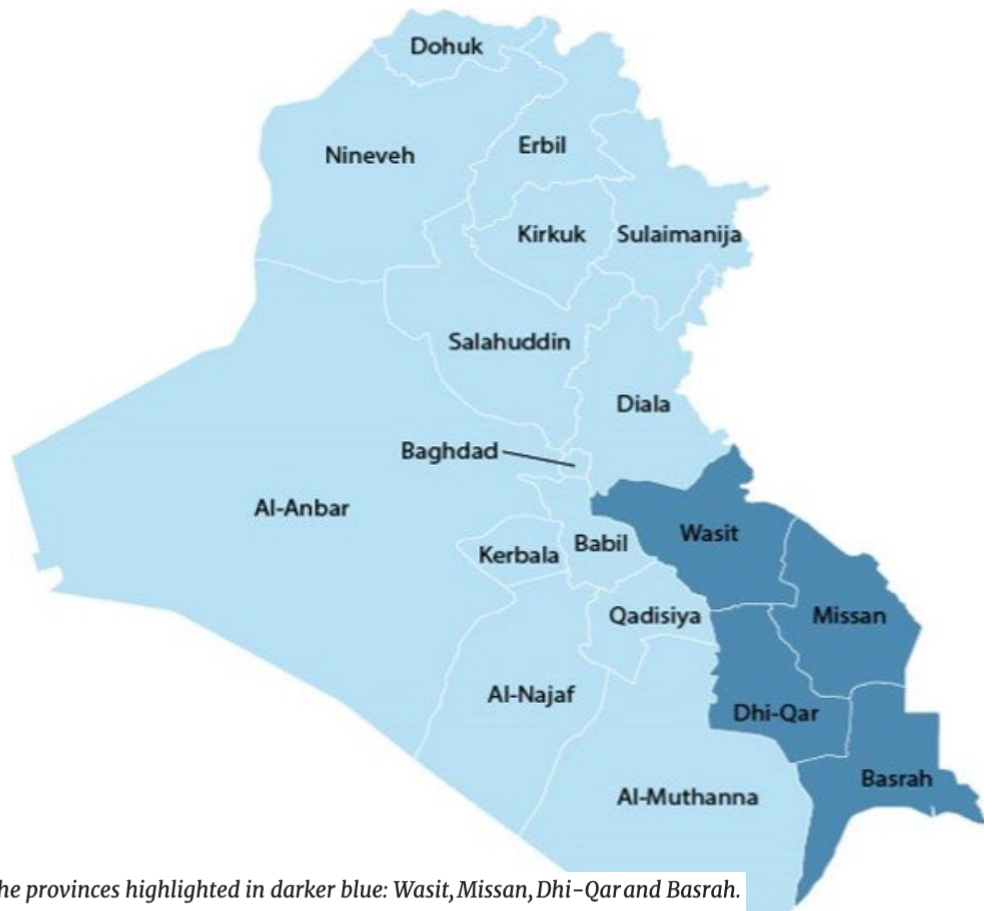


POV: Analyst at a government agency  
worried about water and insecurity in  
Iraq

## Iraq

- Dependent on the the Tigris and Euphrates rivers – **low reservoir storage**
- Drought/low flow conditions allow salty water to flow upstream – **dry conditions expected to continue**
- Food + Energy concerns – **food price spikes + hydropower reservoirs low**
- Challenges with water pollution – **high nutrient pollution and low wastewater treatment**

# NEXT STEPS: LOCAL ANALYSIS + ENGAGEMENT



*WPS Iraq engagement focuses on the provinces highlighted in darker blue: Wasit, Missan, Dhi-Qar and Basrah.*



# Water, Peace and Security



info@waterpeacesecurity.org  
@WaterPeaceSec

In collaboration  
with the



Ministry of Foreign Affairs  
of the Netherlands



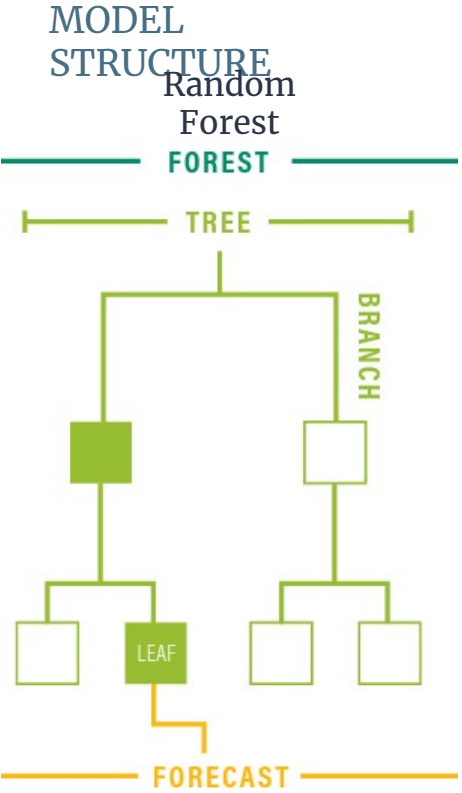
Deltares





# APPENDIX

# CONFLICT FORECAST: LONG-TERM RISK



[Technical Note](#)

## CONFLICT DEFINITION

At least 10 fatalities over a year

ACLED EVENT TYPES USED
Battles
Explosions/remote violence
Violence against civilians
Riots
Violent Protests

[ACLED Codebook](#)

## DATA USED

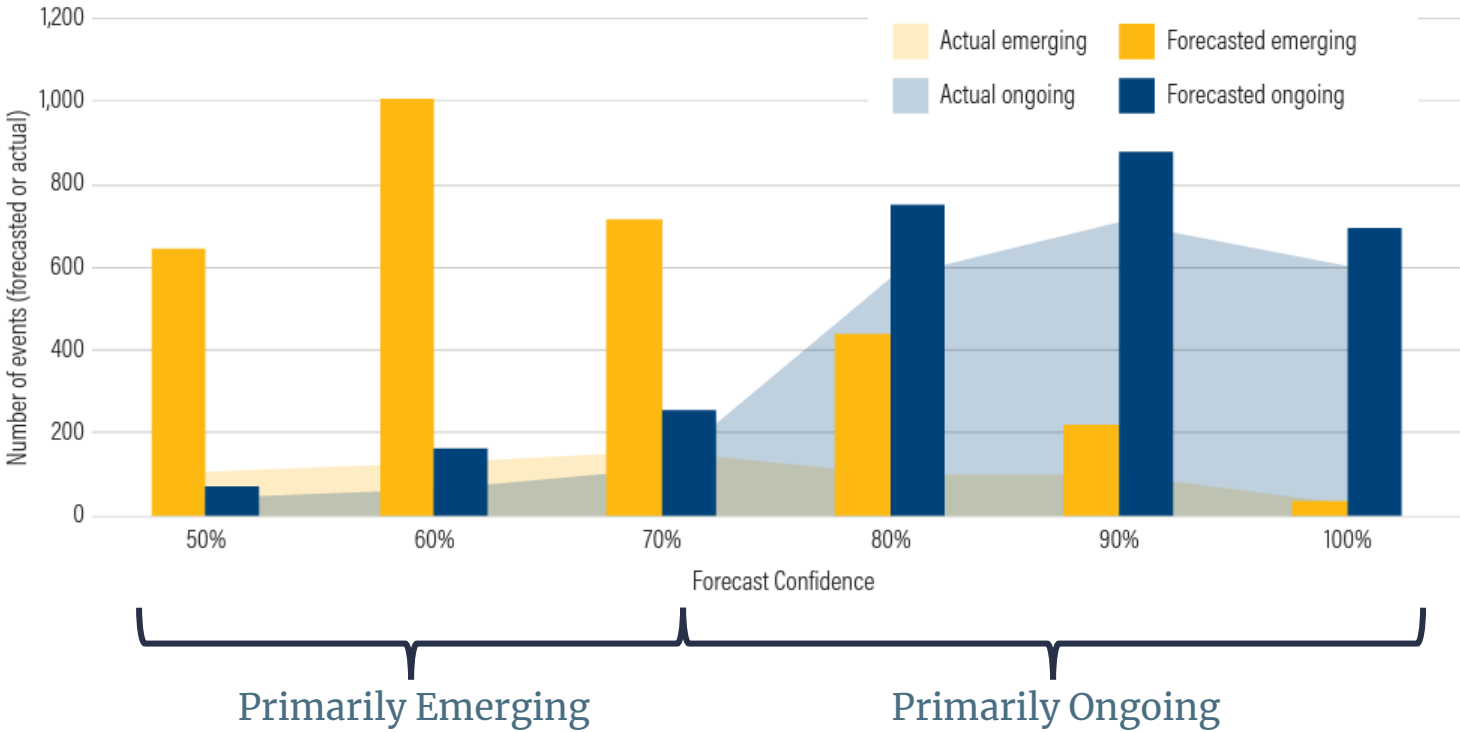
Feature Importance

DATA USED
Percentage of males aged 65+
Percentage of population aged 25-64 males
Percentage of population aged 65+ males
Local population count
Local population density
Rural to urban ratio
Battle (event and fatality counts)
Violence against civilians (event and fatality counts)
GDP
Agriculture value added to GDP
Value of rainfed crops
Access to sanitation
24-month precipitation anomalies
Riverine flood risk
Seasonal and interannual variability

# CONFLICT FORECAST: LONG-TERM RISK

Figure 6 | Number of Ongoing and Emerging Conflicts Displayed per Forecast Confidence

- Predicts 86% of conflict
- Overpredicts emerging conflicts
- Better at forecasting ongoing conflicts





# Water, Peace & Security in Iraq

Irina Patrahau

The Hague Centre for Strategic Studies



Deltares





*“Iraq is emerging from the ashes of war, facing an unprecedented water crisis that is worsened by the compounded effects of climate change, and neighbouring countries’ water policies.”*

*- President Rashid, UN Water Conference 2023*

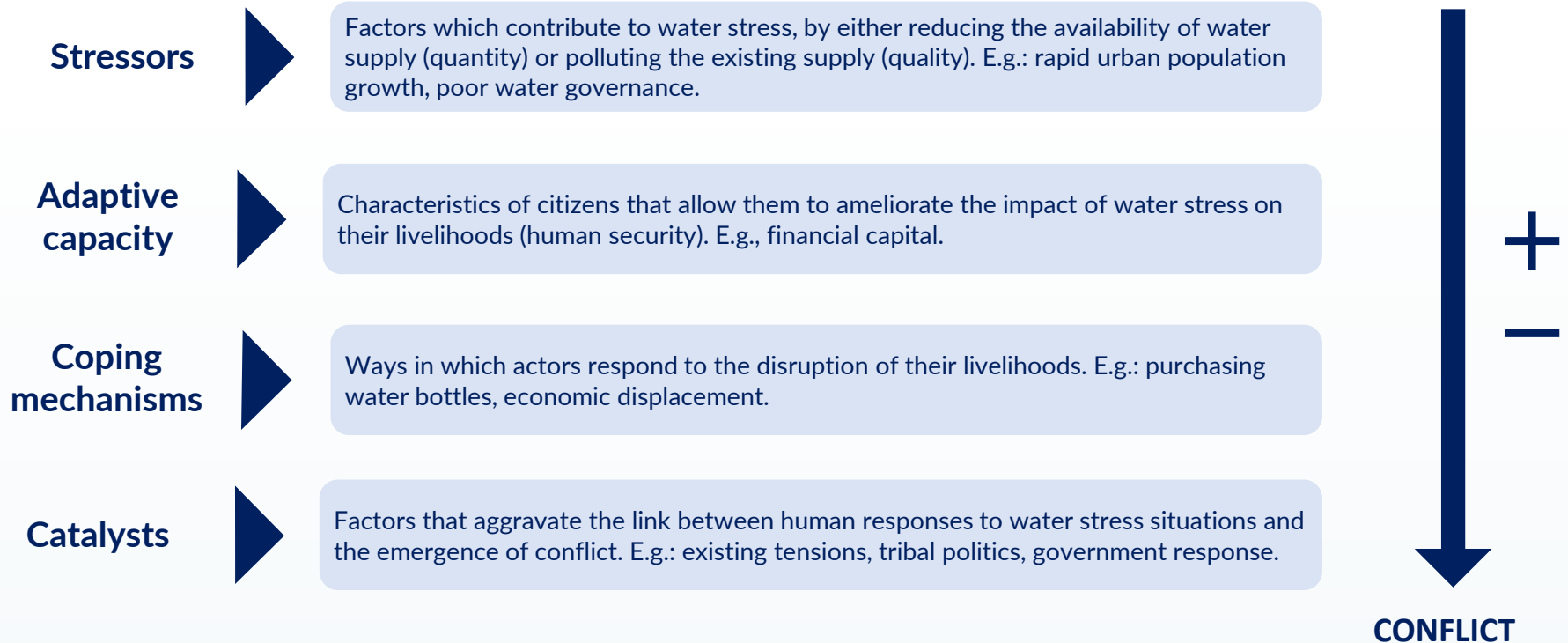


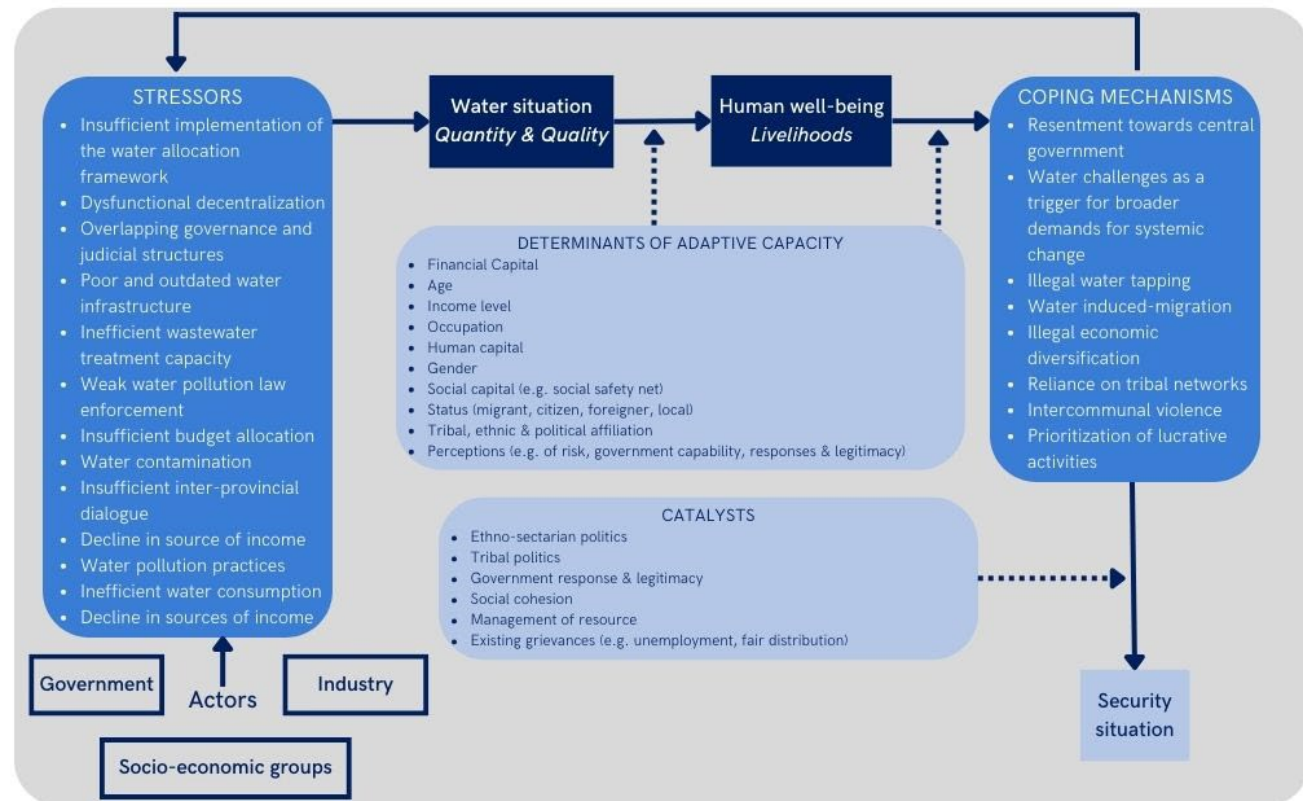


## Water (in)security in Iraq

- **Decreasing water quantity**
  - The Tigris and Euphrates rivers provide up to 98% of Iraq's water supply
  - Since the 1980s, water **supply** flowing through the two rivers has gone down by 80%
- **Decreasing water quality**
  - Water pollution and salinisation impact the supply of freshwater and decrease arable land
- **Natural and anthropogenic causes**
  - Climate change
  - Outdated and damaged infrastructure
  - Inefficient water use
  - Deficient water governance
  - Transboundary challenges
- Increasing water **demand**: population and urbanization

## Water insecurity can lead to conflict









## Water governance as a stressor and obstacle to resilience

### 1. Insufficient implementation of strategic/action plans

- Ministries often seek quick-fix solutions
- Reactive rather than proactive policies
- Need more flexibility to accommodate changing water needs
  - Current allocation framework does not incentivise innovation in water management

### 2. Dysfunctional coordination and integration of responsibilities

- Decentralisation
- Inter-agency and inter-ministerial coordination



## Conflict between authorities

- Non-violent disputes between **federal-provincial authorities** and **provincial-provincial** authorities
  - **Legal complaints**
  - **Political accusations**
- Disputes over the **fair allocation and use** of water resources
- In 2018, there were disagreements between the **federal government and the governorate authorities in Basra** about the construction of a dam near Abu Flous Port

## Conflict between authorities and citizens

- In March 2023, water scarcity triggered clashes between rioters and police in Dhi Qar
- In 2018, Iraqis took to the streets in July 2018, denouncing unemployment, corruption, and poor governance. This escalated to violent protests as a result of the Basra water crisis.
- Rarely exclusively about direct water-related demands
- Interprovincial spill-over of instability
- Catalysts:
  - Perception & existing relations
  - Excessive use of force (by government forces)
  - Tangled power structures



Demonstrations in Iraq's Basra Province in July 2018. Source: [AA/Security forces disperse demonstration in Iraq's Basra](#)

## Conflict over scarce resources

- Direct water-related challenges at **the local level** between **socio-economic actors** (e.g., farmers, herders), based on threat to livelihoods
- Migration of livestock owners in Basra to other arable areas has caused friction over resources, with some herders reporting their cattle being shot
- There are reports of a tribal sheikh in Missan controlling water flows, with local authorities refusing to take action against this
- **Water insecurity is a catalyst to pre-existing tensions**



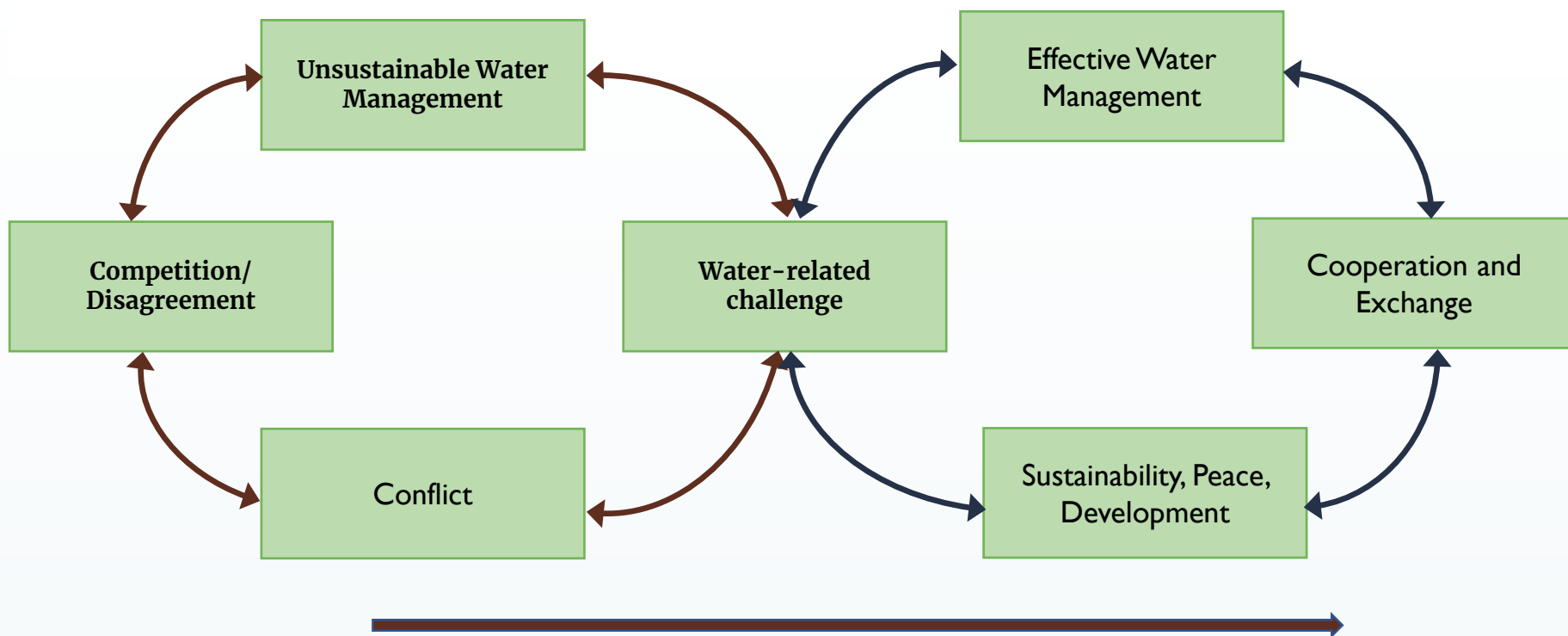
*Basra Marshlands. Source: [The Guardian/How Water Scarcity is Changing South-Iraq](#)*

## Tribalism: a driver and/or mitigator of conflict

- Historical relevance and influence
- Today, **75% of the population** belonging to one of Iraq's 150 tribes
- **Expanding & contracting power** depending on state authority and presence
- **Driver & mitigator** of conflict
  - Tangled power structures
  - Co-opted by governorate security forces
  - Social safety net
  - Traditional conflict resolution mechanisms to deter outbreak or escalation of conflict
- Tribal conflict over water issues are occurring, **pushing latent conflict** into open confrontation

Conflicts between Tribes in Iraq	
Governorate	Example
Basra	The regression of the marshes' water during drought season has spurred disputes between two tribes in the Al-Chibayish marshes, which are part of Dhi Qar and Basrah governorates, in the past.
Missan	In Missan, water-related challenges are also intensifying tribal conflicts and instability. Recent water-related disputes between armed Huraish and Marian tribes resulted in the death of at least twenty-five people.
Dhi Qar	In Dhi Qar governorate, 20 clashes erupted recently between clans due to water scarcity.

## WPS Aim: To turn vicious cycles of water and conflict into virtuous cycles of water-based peace and cooperation



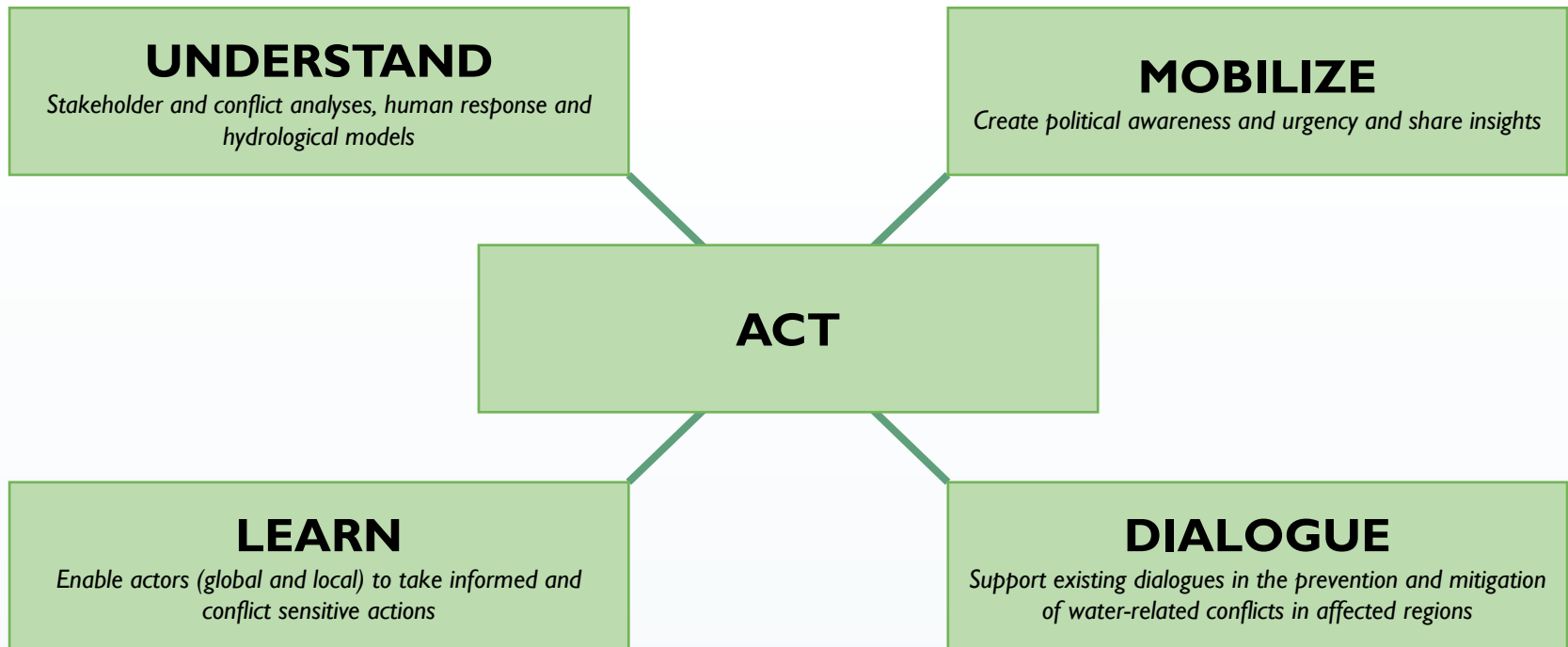
## WPS in Iraq

The WPS consortium engages with government authorities, NGOs, IGOs and local stakeholders in Iraq to build on existing initiatives, pool efforts, identify and fill gaps in knowledge, facilitate action, help strengthen cooperation, and improve communication.



*Map of Iraq showing the selected provinces for the WPS Iraq engagement: Wasit, Missan, Dhi-Qar, and Basrah.*

## WPS Integrated Action Areas







## Take-aways

In Iraq, tangled formal and informal power structures and suboptimal inter-agency cooperation pose challenges to the water sector.

An informed, inclusive and integrated approach that addresses elements of the water-conflict nexus is central to mitigating water-related security risks and building resilience.

WPS supports the development of a shared understanding of water-conflict dynamics and dialogue processes between federal, governorate and local level stakeholders.