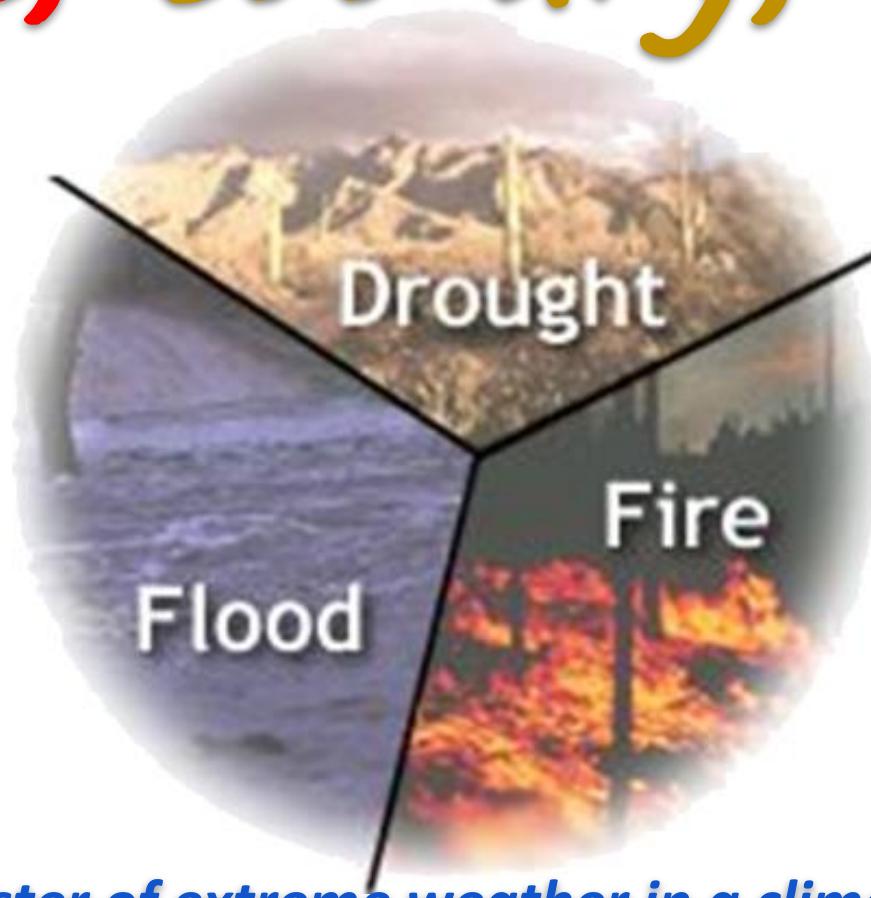


# Too hot, too dry, too wet



*The roller coaster of extreme weather in a climate-changing world  
What we might face and what we can do about it*

Delia Lake/Linda Morris Kelley and Wordsmith Jarvinen/Keith Eric Grant  
February 26, 2022

# Intense Wildfires

December 2021 – January – February 2022

- Winter fire season?
  - Colorado fire, Big Sur, CA
  - Marshall Fire, Boulder, CO
    - Suburban
    - 100 mph winds
    - 1084 homes destroyed
    - Over \$500 million in residential damage
- Summer
  - Waiharara, NZ
    - sending ash up to 50km from the fire ground!



<https://www.teaomaori.news/2000ha-scrub-fires-covering-ngai-takoto>

# Dixie fire, July 2021, Sierra Mountains, CA



Dixie Fire, CA , July 2021. Burned almost 1 million acres.

<https://www.theguardian.com/us-news/2021/dec/25/what-the-numbers-tells-us-about-a-catastrophic-year-of-wildfires>

# Remains of neighborhoods of homes, of families and communities

*Boulder County, CO, and Lytton, BC*



Photo: Hart Van  
Denburg/AP/Shutterstock



<https://www.nytimes.com/2021/07/10/world/canada/canadian-wildfire-british-columbia.html>

# Global wildfires in 2021



July, 2021

<https://www.iccrom.org/news/message-those-countries-currently-affected-wildfires>

# 4 million km<sup>2</sup> burned each year

According to the European Space Agency, “**fire affects an estimated four million square kilometres** (1.5 million sq miles) of Earth’s land each year”.

## Yearly fires

400,000,000 hectares  
(990,000,000 acres)



About half the size of the US



Larger than the area of India



About four times the size of Nigeria



Source: European Space Agency | August, 18 2021



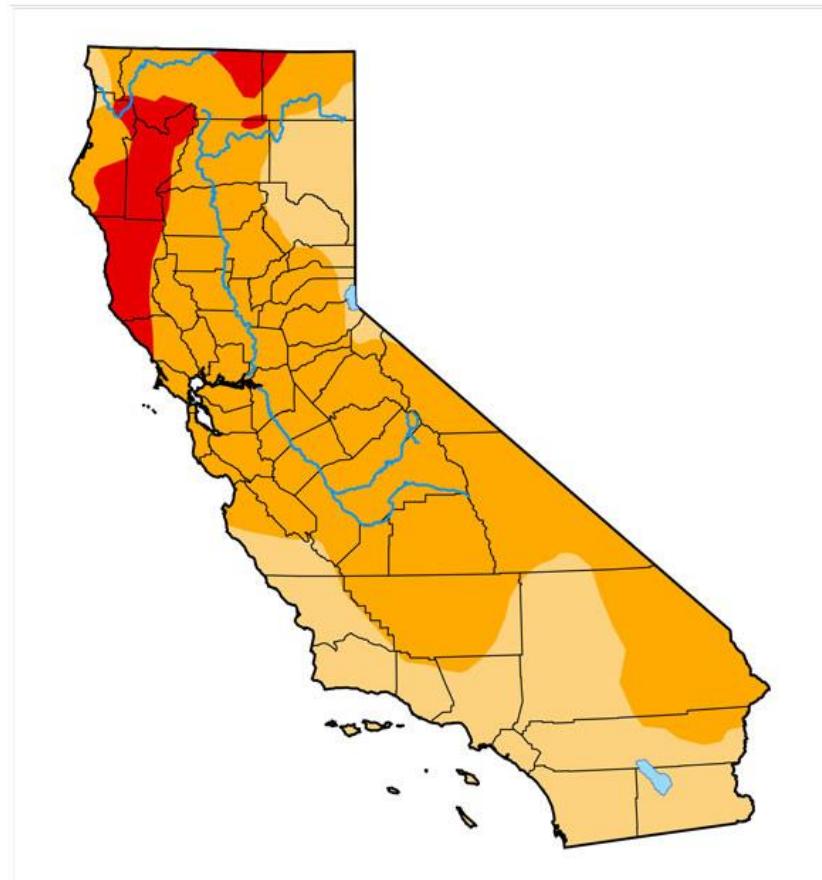
@AJLabs ALJAZEERA

# What's going on in the atmosphere?



# Drought in California, US

## U.S. Drought Monitor California



February 22, 2022

(Released Thursday, Feb. 24, 2022)

Valid 7 a.m. EST

### Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	68.77	6.70	0.00
Last Week 02-15-2022	0.00	100.00	99.57	66.39	1.39	0.00
3 Months Ago 11-23-2021	0.00	100.00	100.00	92.43	80.28	28.27
Start of Calendar Year 01-04-2022	0.00	100.00	99.30	67.62	16.60	0.84
Start of Water Year 09-28-2021	0.00	100.00	100.00	93.93	87.88	45.66
One Year Ago 02-23-2021	0.70	99.30	84.88	56.98	29.54	3.75

### Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. For more information on the  
Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

### Author:

Brad Pugh  
CPC/NOAA



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

The first 2 months of 2022 are the driest in California history, and likely the worst in 1000 years.

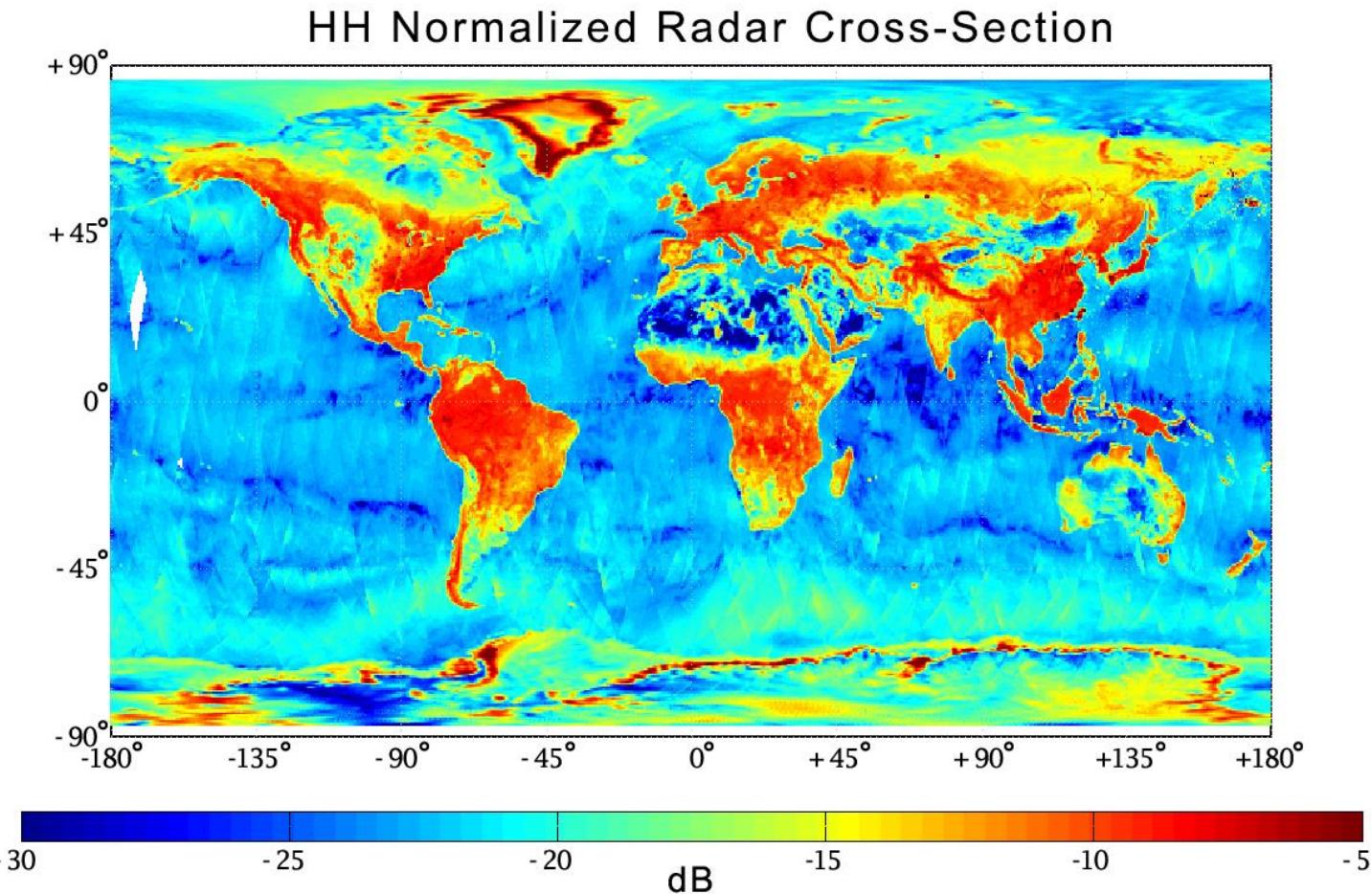
# Variations on a drought theme

- Not all droughts are created equal... nor do they have the same conditions
  - Long-term drought = chronic illness for the land
  - Flash drought = fast onset from extreme heat and wind causing rapid evaporation of moisture in soil



<https://www.ucsusa.org/resources/drought-and-climate-change>

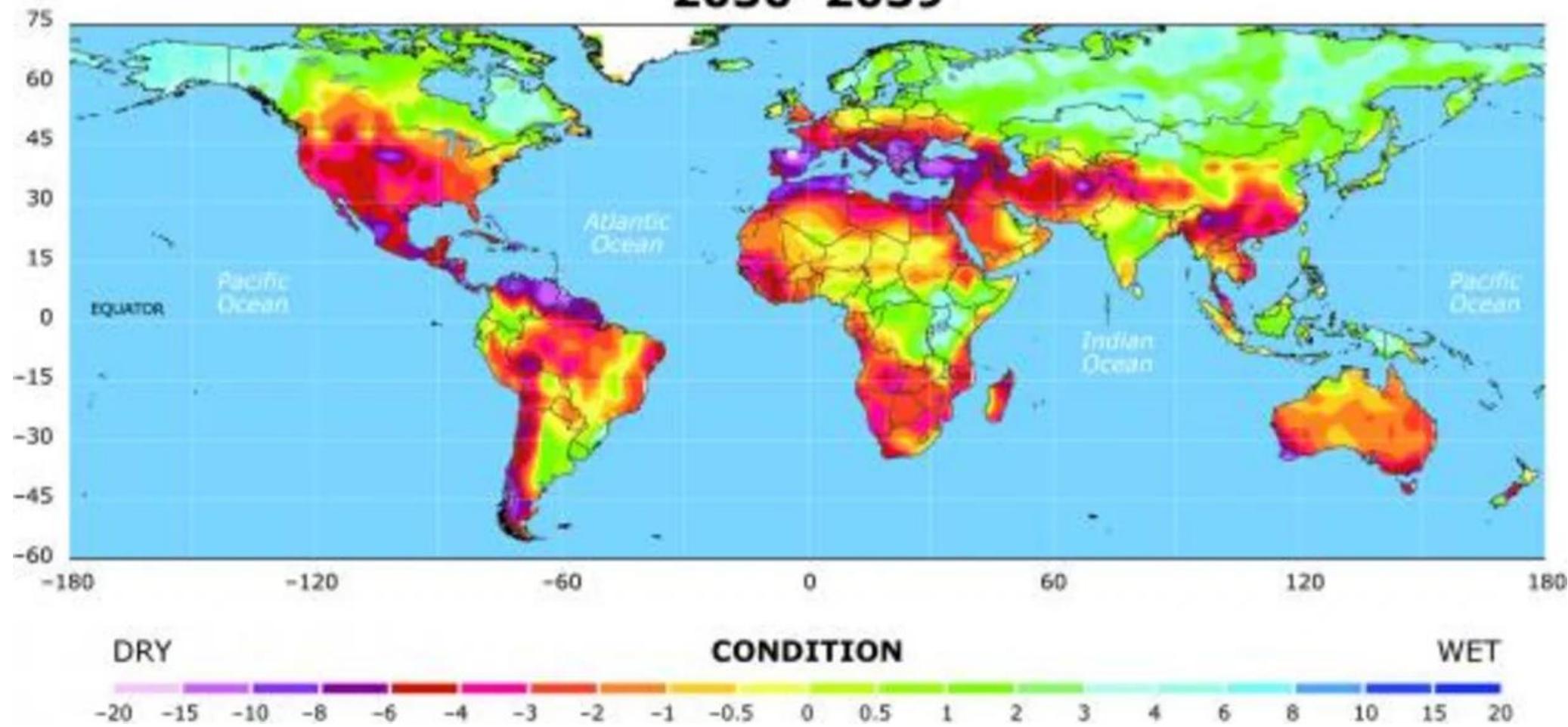
# NASA Soil Moisture Map, 2015



<https://www.nasa.gov/jpl/smap/nasa-soil-moisture-mission-produces-first-global-maps>

# Projection of future drought

2030–2039



# Soil microbes

- Fungi
- Bacteria
- Viruses



<https://www.earth.com/news/soil-microbes-communicate-battle/>

# Flooding and mudslides in 2021



# Liege, Belgium, July 2021



<https://www.bloomberg.com/news/features/2021-07-16/photos-germany-s-record-flooding-show-devastation>

# Erfstadt, Germany, July 2021



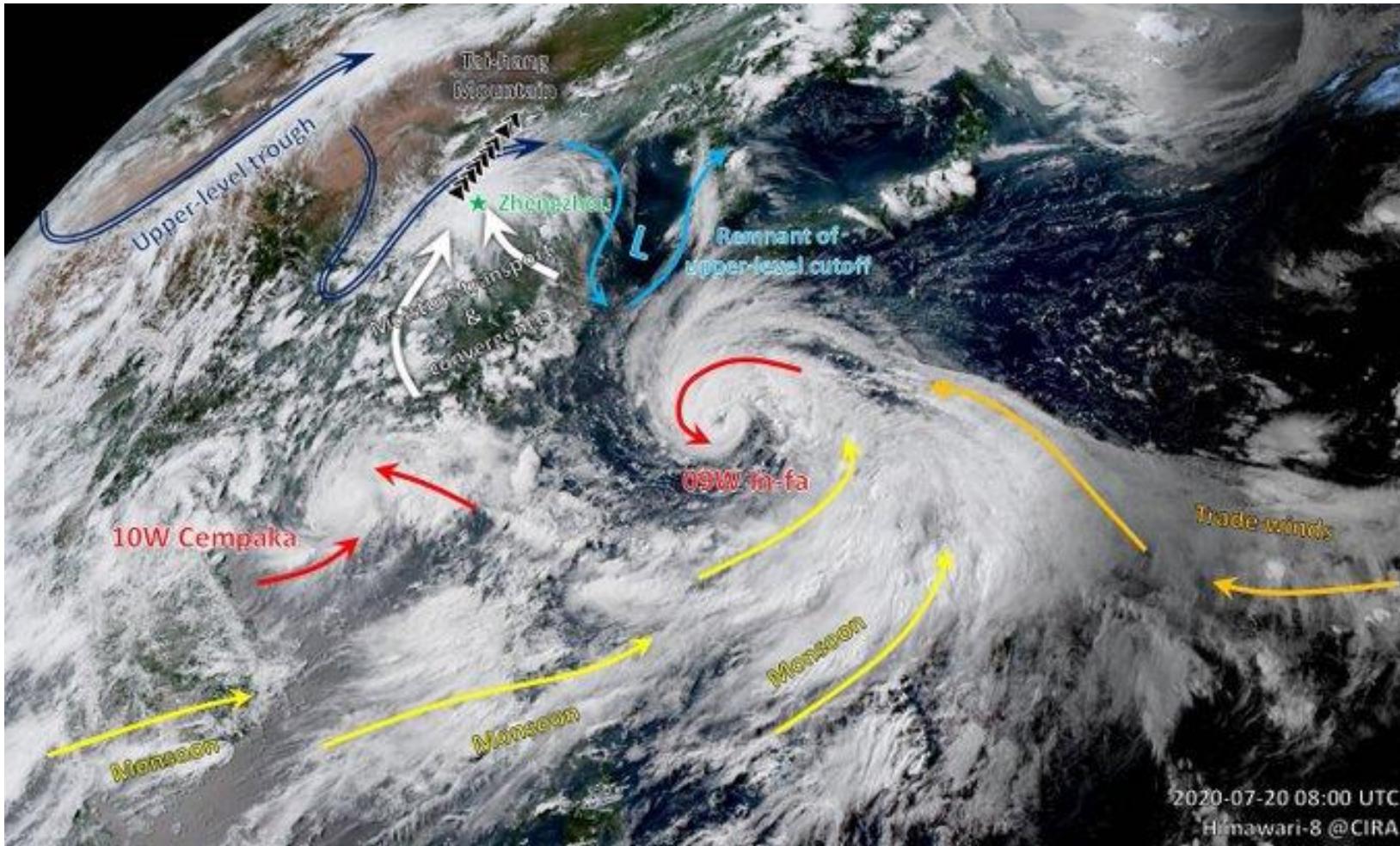
<https://www.bloomberg.com/news/features/2021-07-16/photos-germany-s-record-flooding-show-devastation>

# Zhengzhou, China, July 20, 2021



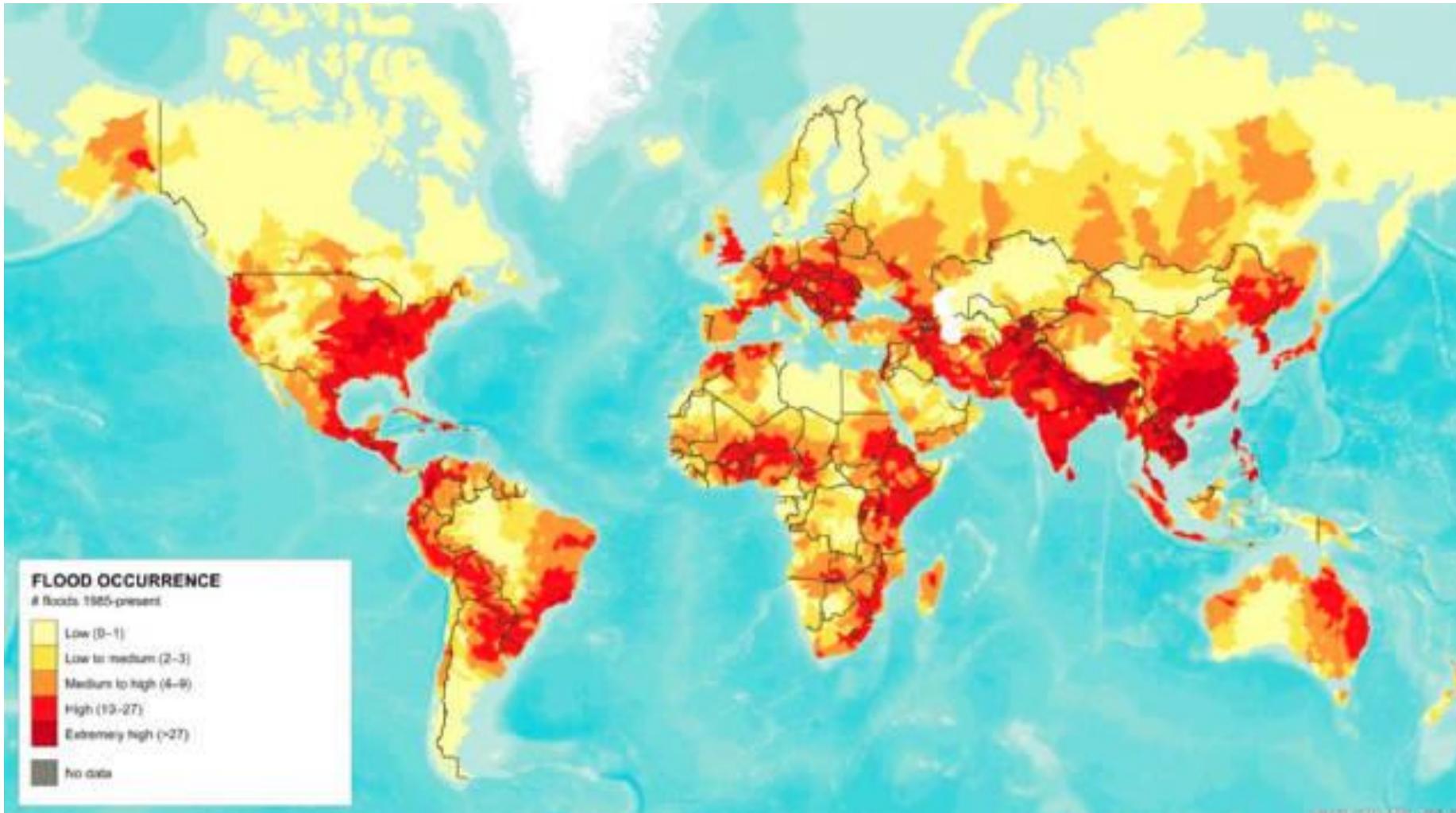
<https://yaleclimateconnections.org/2021/07/extreme-rainfall-in-china-over-25-inches-falls-in-24-hours-leaving-33-dead/>

# July 21, 2021



[https://twitter.com/Minghao\\_Zhou/status/1417714731826270209?ref\\_src=twsrctfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1417714731826270209%7Ctwgr%5E%7Ctwcon%5Es1\\_&ref\\_url=https%3A%2Fd-33549709631458736221.ampproject.net%2F2202142035002%2Fframe.html](https://twitter.com/Minghao_Zhou/status/1417714731826270209?ref_src=twsrctfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1417714731826270209%7Ctwgr%5E%7Ctwcon%5Es1_&ref_url=https%3A%2Fd-33549709631458736221.ampproject.net%2F2202142035002%2Fframe.html)

# Water risks and flood-prone areas



<https://deezfloods.weebly.com/location.html>

# Mudslide - I-70, Glenwood Canyon, CO



<https://www.nbcnews.com/news/us-news/mudslide-scenic-colorado-highway-tests-limits-aging-infrastructure-era-climate-n1278771>

# Mudslide - British Columbia, November 2021



<https://www.thestar.com/news/canada/2021/11/15/trapped-between-mudslides-in-bc-people-are-banding-together-to-help-each-other.html>

# Burn scar - Angora Fire, Lake Tahoe, CA (June 2007)



<https://earthobservatory.nasa.gov/images/18555/angora-fire>

# We are failing ourselves, and the rest of the inhabitants of our planet

We are suffering from a failure of imagination. Among other things,

- We imagine human-centric solutions
- We imagine non-human causes
- We imagine parts, ignoring the whole



We ask many questions that mask root problems

**What questions should we be asking?**



# Where might we start?

- **Problems that are outcomes of our successes**

- Agriculture production
- Eradication of mosquito-borne diseases
- Housing
- Fossil fuels
- Transportation

- **Recovery and restoration**

- Stop forest clear cutting
- Smart building and rebuilding

- **Designs for multi-solving better lifestyles**

- Homes
- Business
- Food/agriculture
- Mobility – technologies, and migration
- Energy sources, transmission, and use
- Collaborations – solve pressing problems of today in ways that better prepare us for a future where humanity can thrive

- **Scaling solutions**

- **Cease human warring against nature**

