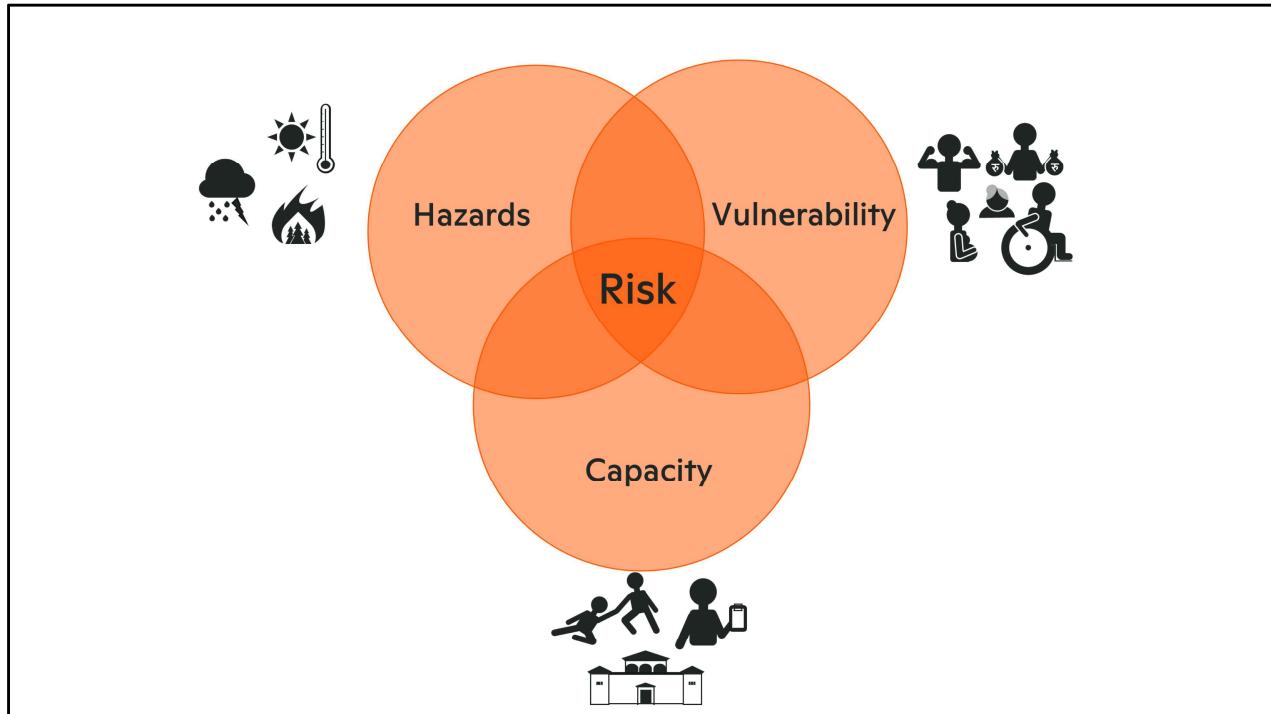


Introduction to Risk Mapping

Woodwell
Climate
Research
Center

Thank you, Bishal sir. Now we are going to talk about what is in the risk maps.

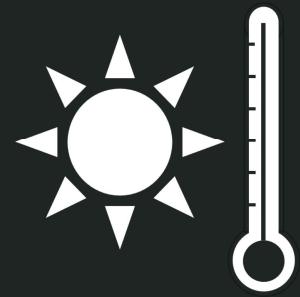


So, when we talk about risk it is important to understand that there are at least 3 parts of risk.

- 1. Hazards.** like fire, or extreme rain, or extreme heat
- 2. Vulnerability.** For example, if people are very rich or very strong and healthy, they have less vulnerability. But, old people or women who are pregnant have a little more vulnerability.
- 3. Capacity.** This is like government or government programs. Or if the community is very strong there is a little more capacity.

In a moment we are going to go into breakout rooms, and in each group I want you to think of 3 Hazards, 3 things that can make you more or less vulnerable, and 3 things that can increase or decrease the capacity of a person or a community. Do not worry if another Group thinks of the same thing.

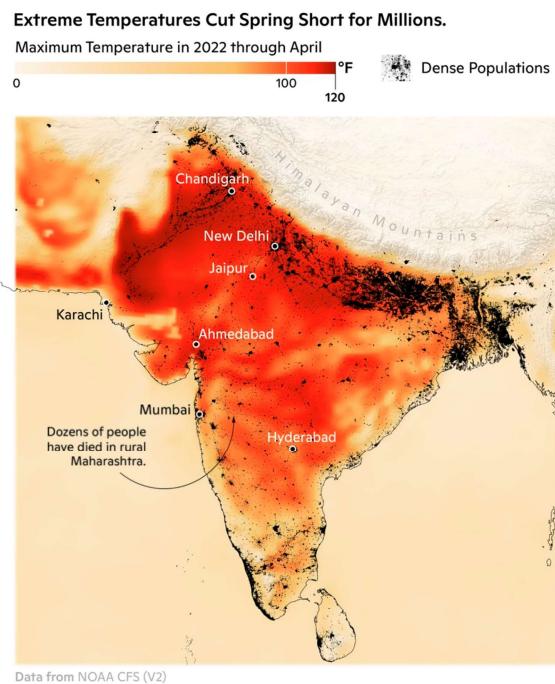
Fantastic! When we are looking at the maps, remember these parts.



Heat

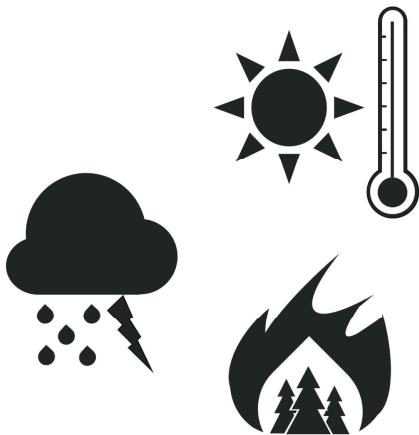
First, heat.

Current data



This is a map from Spring this year. And what do we see?

Current data

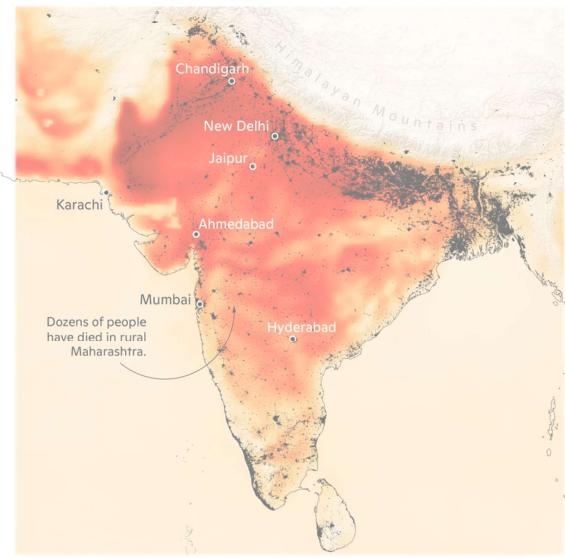


Extreme Temperatures Cut Spring Short for Millions.

Maximum Temperature in 2022 through April



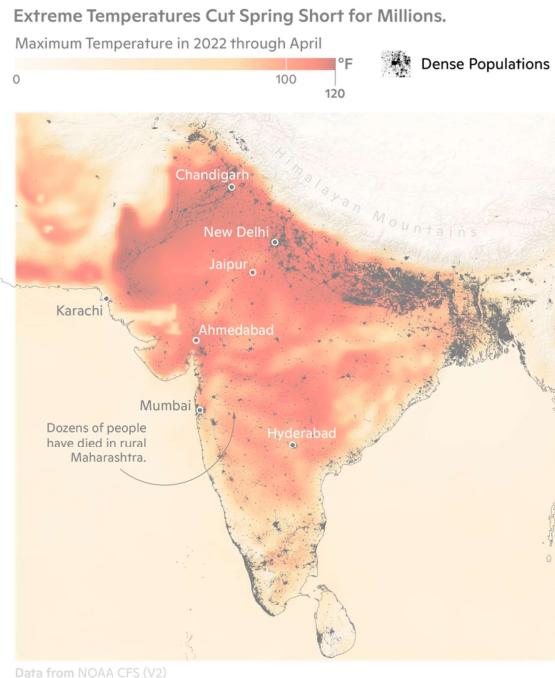
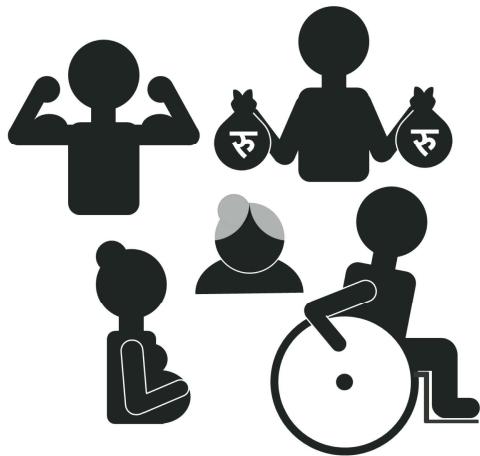
Dense Populations



Data from NOAA CFS (V2)

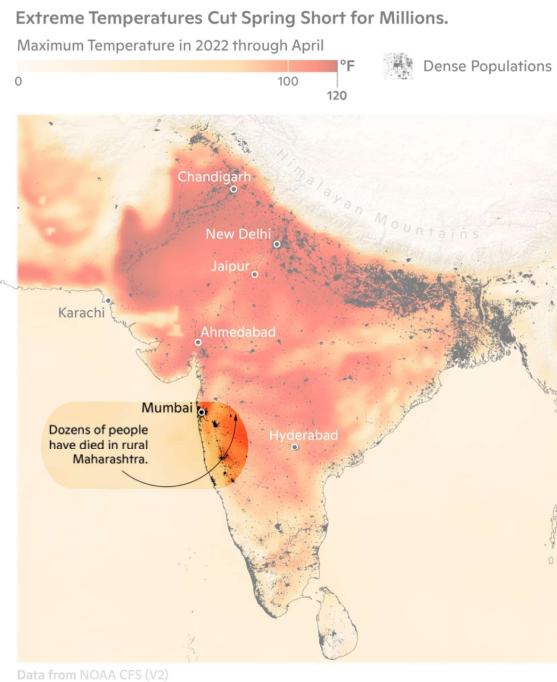
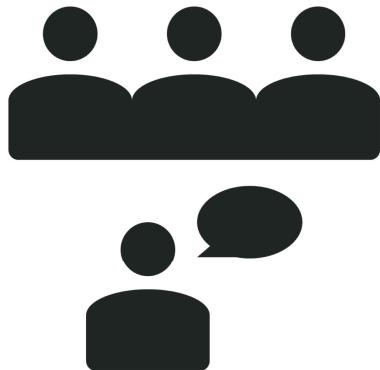
We have hazards...

Current data



... and vulnerability. When it is very hot, you get the 'urban heat island effect' where cities are hotter than farms or forests.

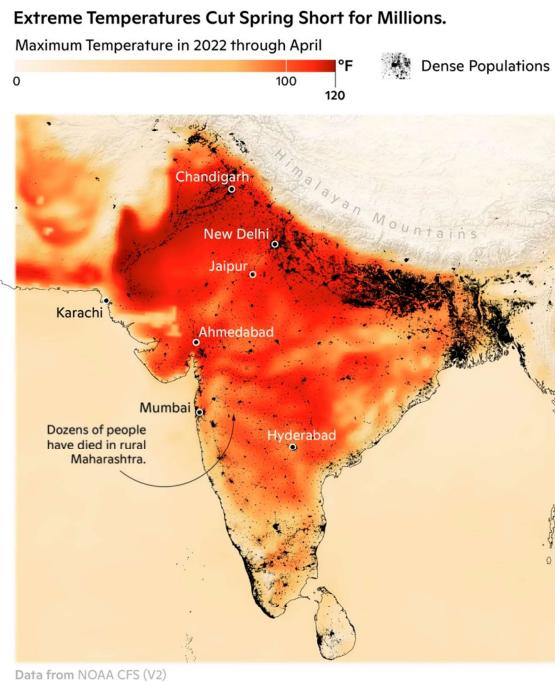
Current data



And this text is about people who died in India because of the heat. You do not need this text, but it helps make the map more human and real. It is very helpful when you are talking to government officials or leaders in the community.

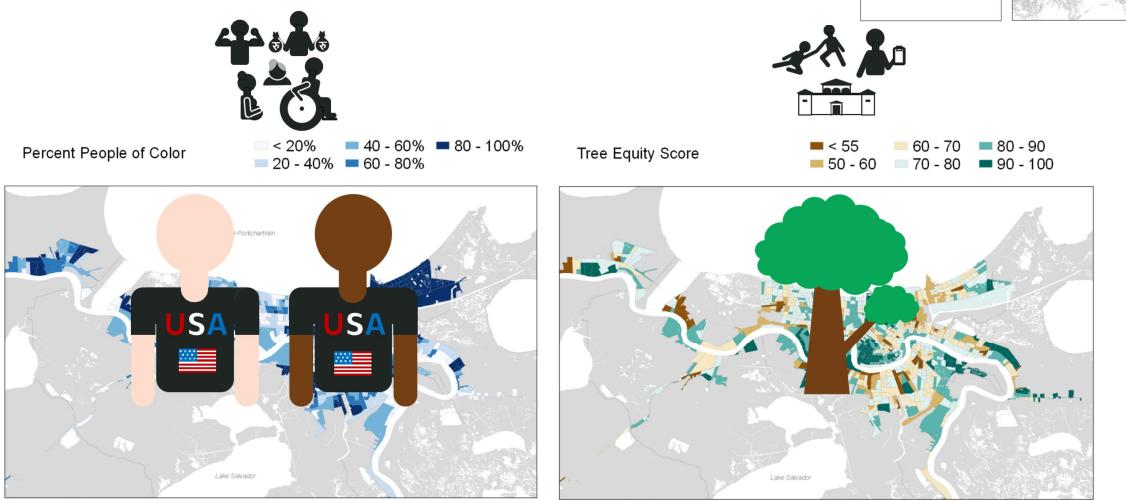
Current data

Where do you see risk?



Where do you see risk?

Urban Heat Island

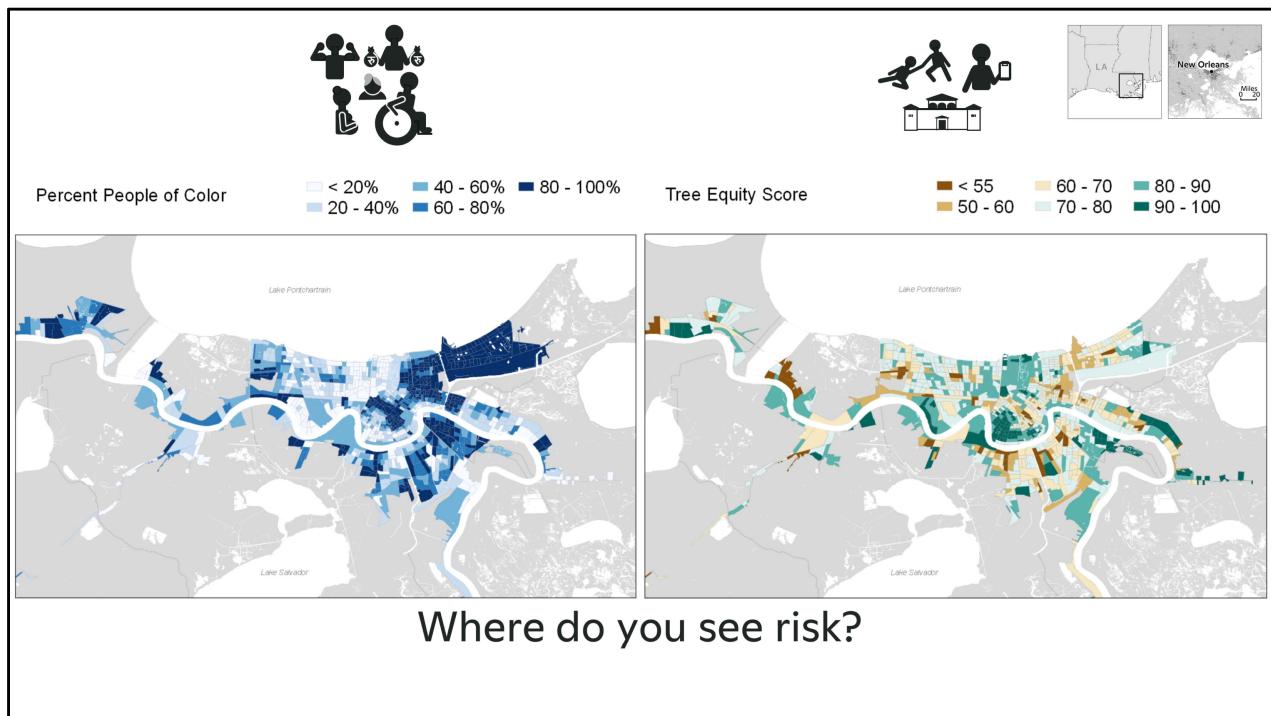


Every country will have a group of people who are more vulnerable than others.

In the United States, people of color have more vulnerability than people who are white. This is because the United States has a bad history.

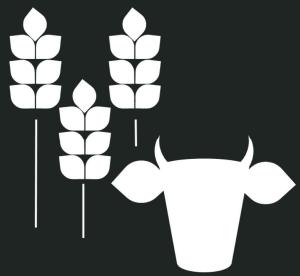
We also know that trees make a neighborhood in a city nicer and help keep the area cool during a heatwave. Here trees are a form of capacity.

When you are talking to local leaders about heat waves they want to know: where is the vulnerability? And where are the places that will need the most help?
So on the map these are the place that are most blue and the most brown.

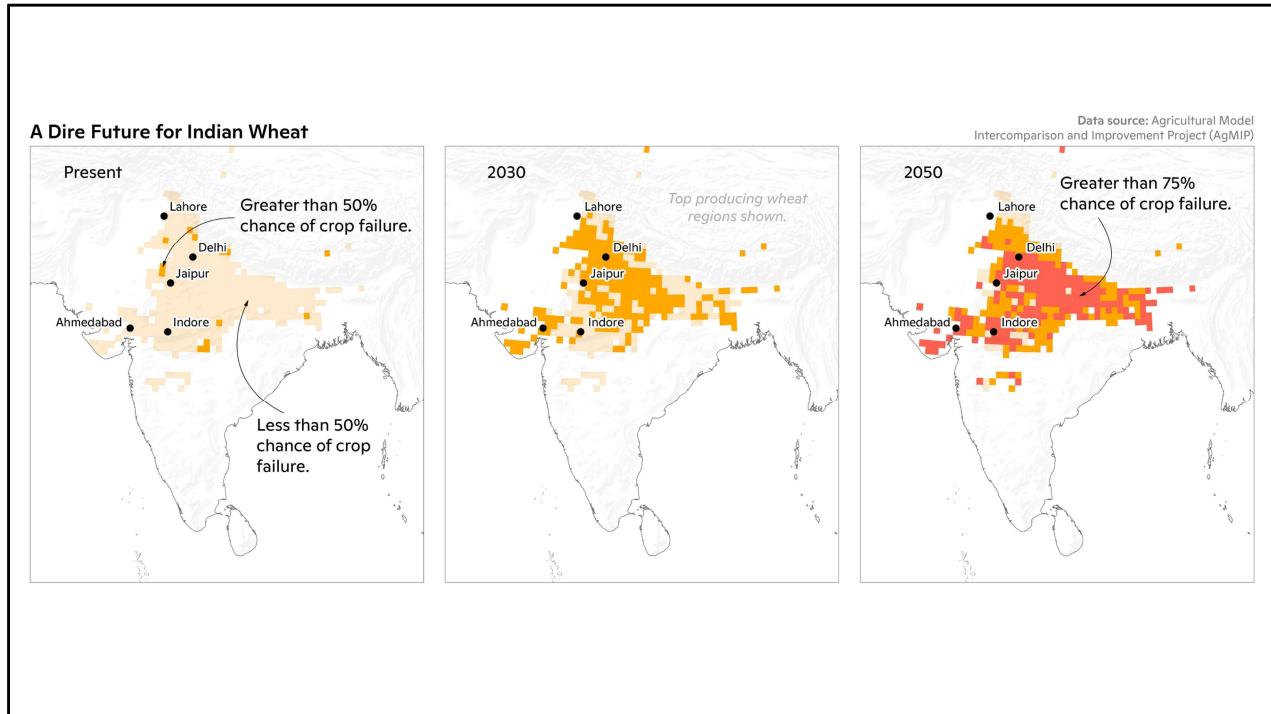


What are the places that are very blue and also very brown?

In general the neighborhoods where there are more black and brown people there are less trees.



Agriculture



Here we have 3 maps for the probability of a year of wheat failures. Notice that there is no traditional legend, but the map still shows each of the 3 colors' meanings. This was a more informal map for Twitter.

Who is going to have problems?



Flooding

1-in-100 year flood New Paltz, New York, USA

Table 1. Historical (2001-2020) return period of future rainfall events.

	2041-2060 	2071-2090 
1-in-100 year	1-in-67 year	1-in-25 year



Many times when you talk about extreme storms you hear the term 1-in-100 years. The chance of a storm happening during 2001-2020 is the same as rolling a 100-sided die every year to see if you get a 1. If you get a 1, you flood. ...

Look at the same size storm in the future... it becomes more likely. In New Paltz, New York, by 2071-2090, they will be rolling a die with fewer faces and still hoping to not get the 1.

1-in-100 year flood New Paltz, New York, USA

Table 4. Number of buildings (% change) in model domain flooded (water depth greater than 15 cm).

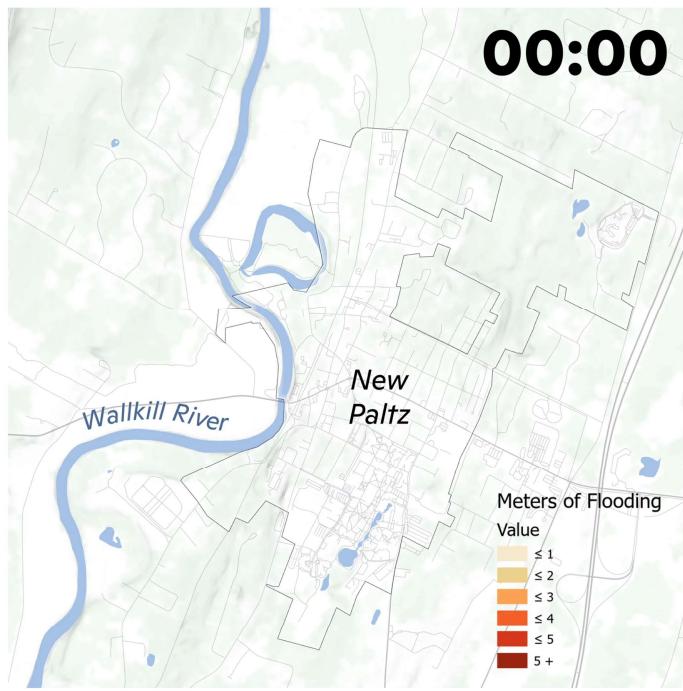
	Present	2041-2060	2071-2090
1-in-100 Year	957	1,071 (+12%)	1,282 (+34%)



Future Flooding First 24 hours

Table 4. Number of buildings (% change) in model domain flooded (water depth greater than 15 cm).

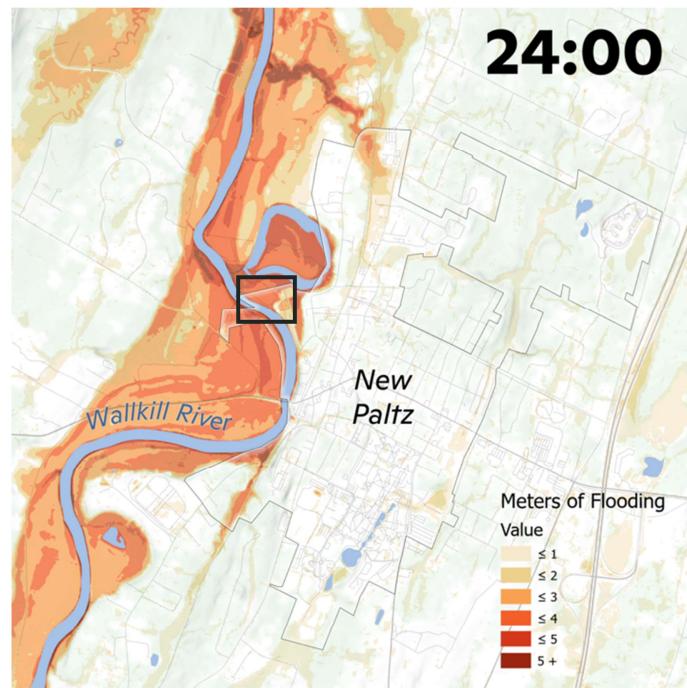
	Present	2041-2060	2071-2090
1-in-100 Year	957	1,071 (+12%)	1,282 (+34%)



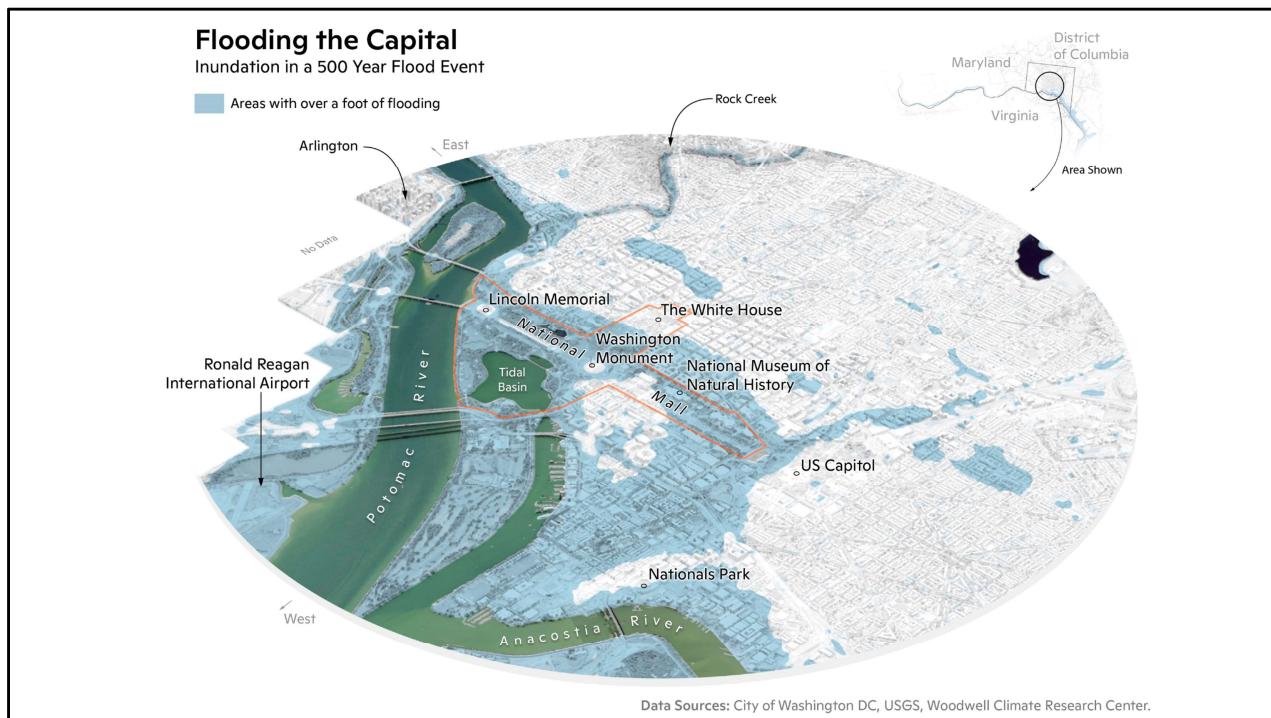
During the 24 hours of rain there will be significant flooding. Especially near the river.

24:00

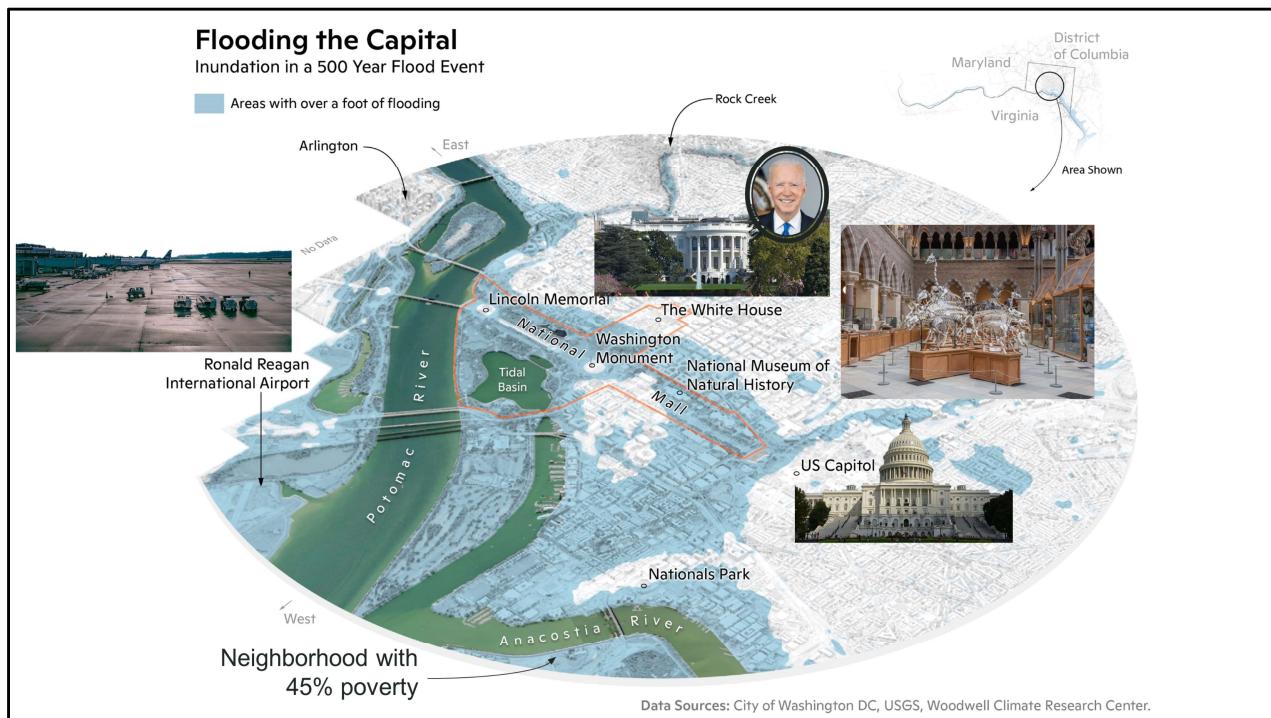
What are the impacts?



This is important for the people because in this part there is a community garden and a water treatment plant where goes from dirty water to clean water



This is a map of Washington DC in the United States. We can see the places that have more than 30 cm of flooding; they are in blue.



And, first we can see the White House is ok. The Capital is ok. It is possible that they would have less than 30 cm, maybe only 10 cm, but this map does not show places with only a little flooding.

But the airport and the Natural History Museum are going to be in trouble. What are the economic and cultural impacts if these locations are destroyed?

Flooding the Capital

Inundation in a 500 Year Flood Event

Areas with over a foot of flooding



Data Sources: City of Washington DC, USGS, Woodwell Climate Research Center.

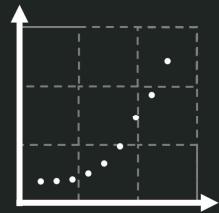
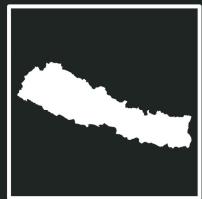
How do you prioritize?

How do you prioritize?

Amsterdam Sea Level Rise + 2050 Flood

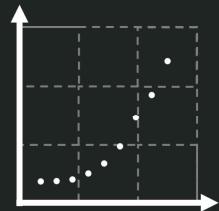
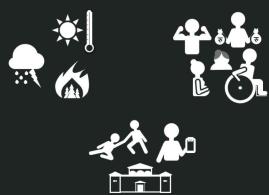


These two maps show the importance of getting accurate data for flood modeling. Here we look at future flooding in the Netherlands according to a private company and Woodwell. The Woodwell model includes flooding defenses. The difference between the two maps is huge. It shows leaders that their infrastructure is expected to help with flooding.

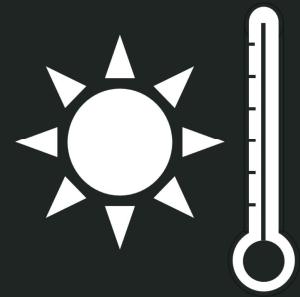


Questions?

Questions on reading risk maps?

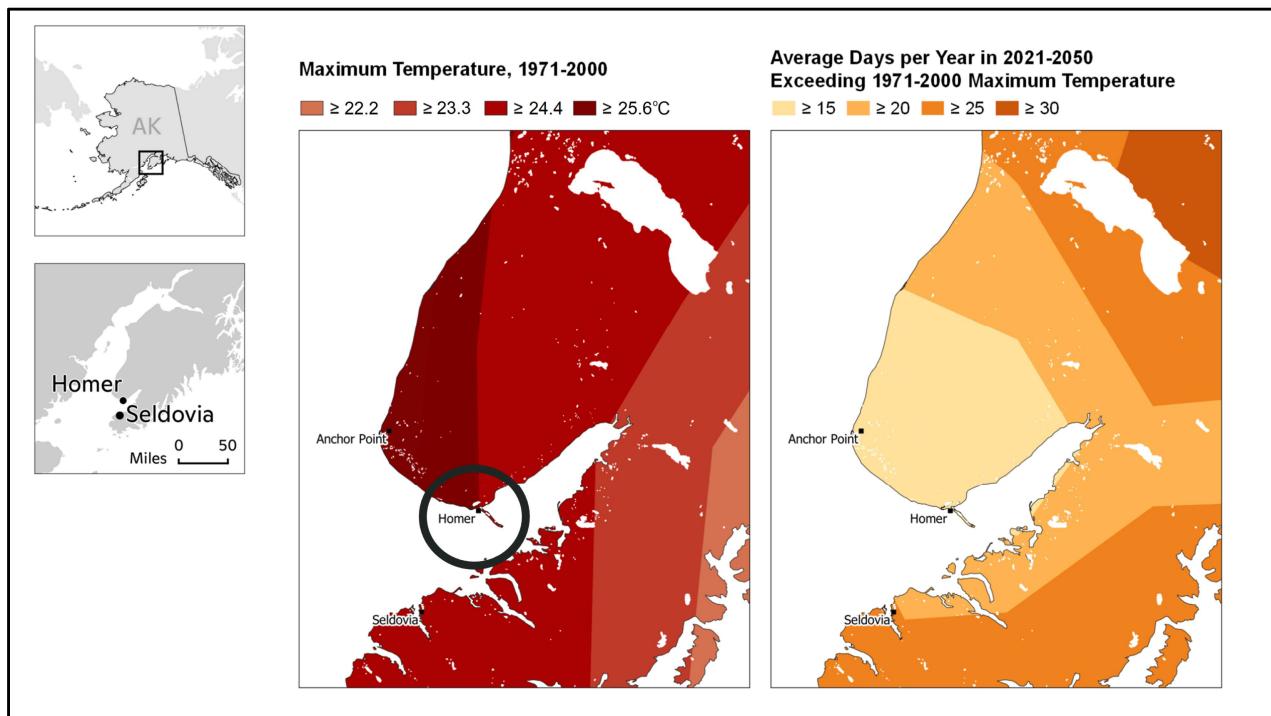


Appendix- Extra maps



Heat

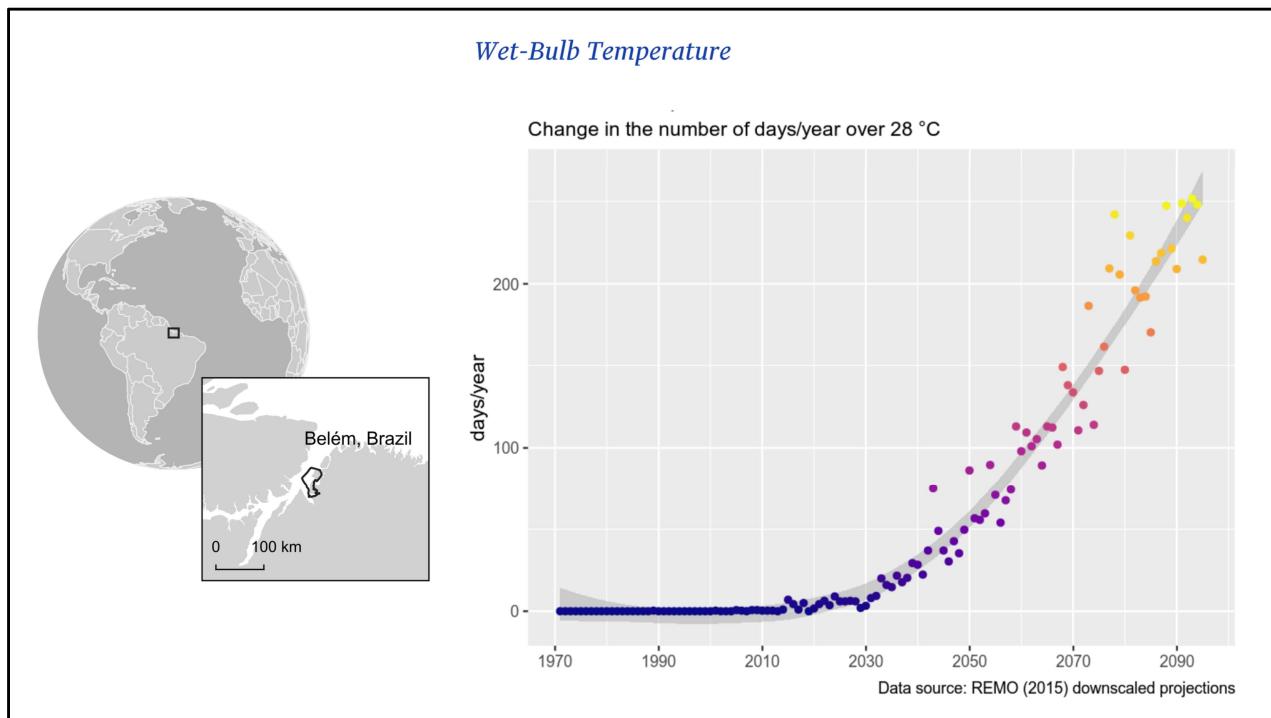
First, heat.



Sometimes when you look at a map you want to know about a specific point.

Here on the right, it is very clear that there are more than 2 weeks when the average day in the future is hotter than the maximum temperature.

And this is the maximum temperature in the past. So, for Homer it is either 24.4°C or more or 25.6°C or more. So, the map is important to see the whole area because we see it is very similar. If it is more than 25.6°F it probably not much more. It is probably not 27°F or 28°F . It is probably more or less 25.6°F .



Sometimes we don't use maps, we use charts. These are the number of days more than 28° C wet-bulb. Wet-bulb temperature is not normal temperature. Wet-bulb temperature is normal temperature and humidity.

At 28° C wet-bulb, people who work outside or old people can start to get sick if they are not careful.

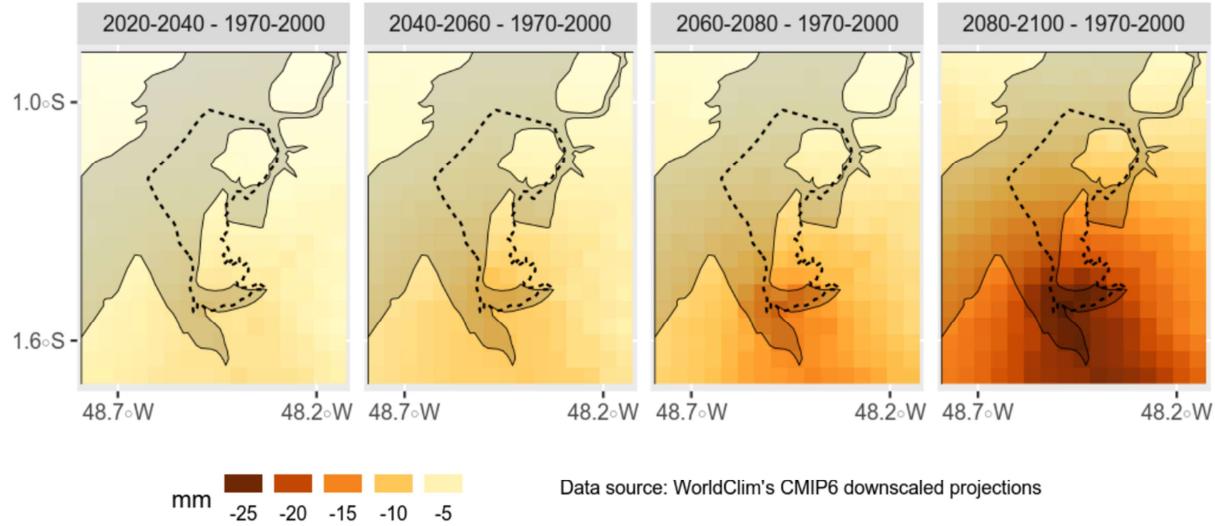
We can see that in the future the change in the number of days is very fast.



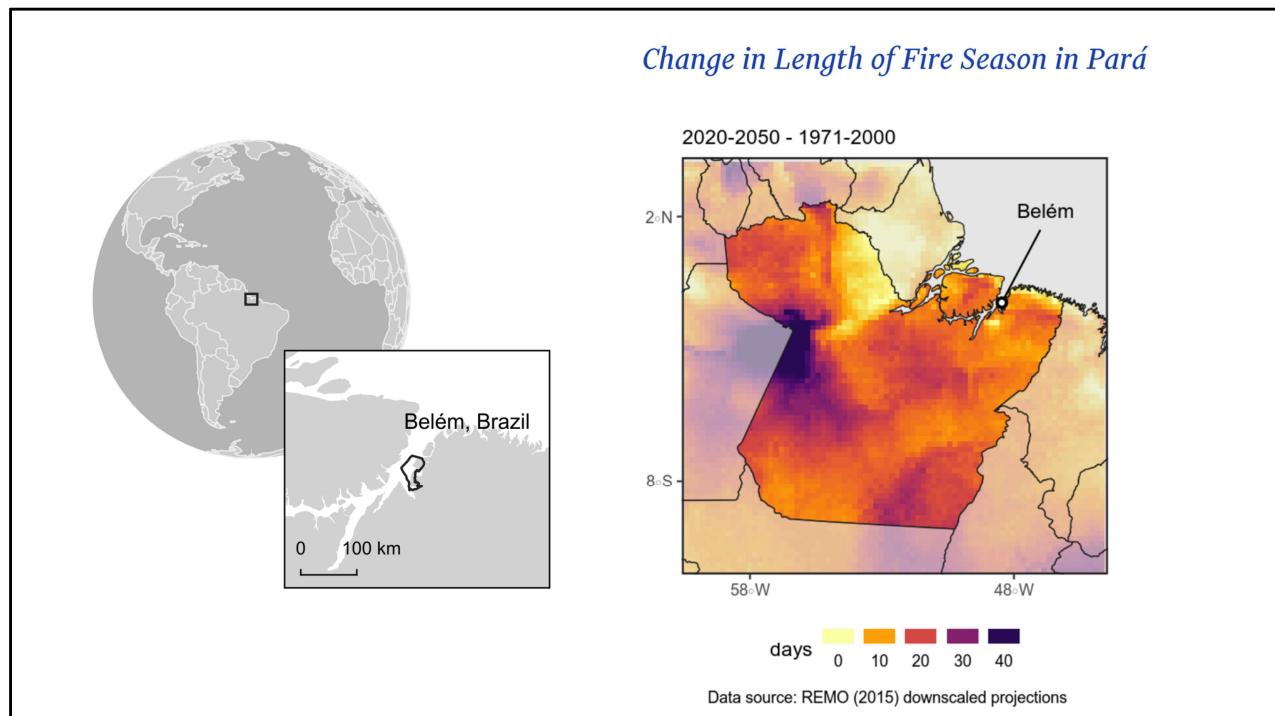
Drought & Fire

Drought and Fire

Change in Precipitation of Driest Month



This is a map of Belém, a city in Brazil. And this is precipitation, or rain, in the driest month. The driest months are going to be more, and more, and more dry. This time of year is going to be more, and more, and more difficult.



This is the change in the length of the fire season.

This is the city of Belém, inside the state of Pará. States are similar to the provinces in Nepal.

In the map you not only see Pará, you can see the other states, but they are lighter.

We look at a larger area for fire because smoke travels far. A fire can be 100's of kilometers and there is a problem with the air.

Who will have problems when there is smoke?

It is important to speak about the people in Belem who are going to have problems.