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Water Research, Assessment
and Networking Ecosystem

Climate Change Impacts

Presented by: Dr. Tracy M. Quan

What are the potential impacts of climate change on water resources?



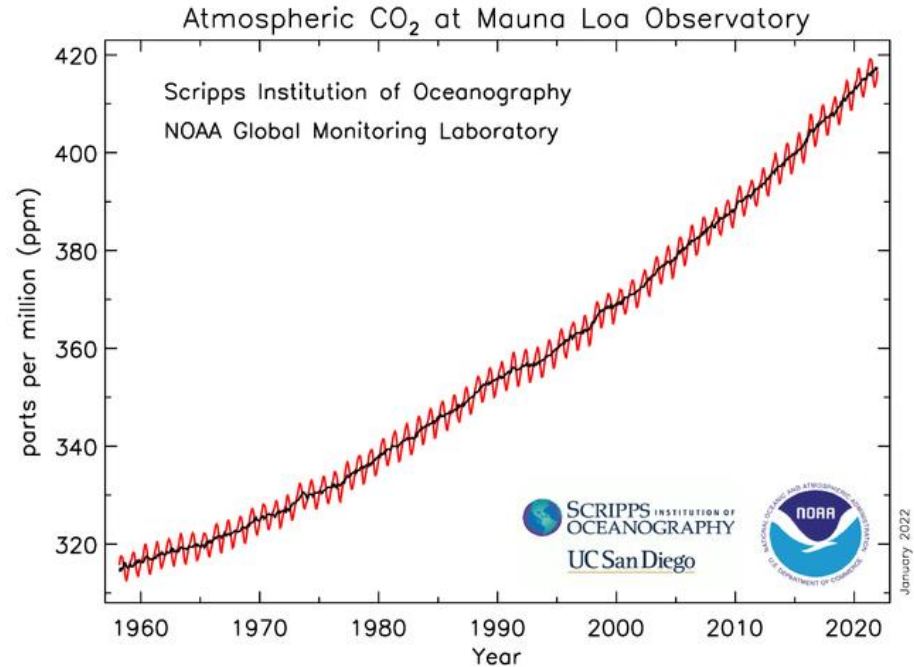
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Outline

- Predicted climate change risks
 - Sea level rise
 - Increased drought
 - Increase in extreme weather
- Impacts



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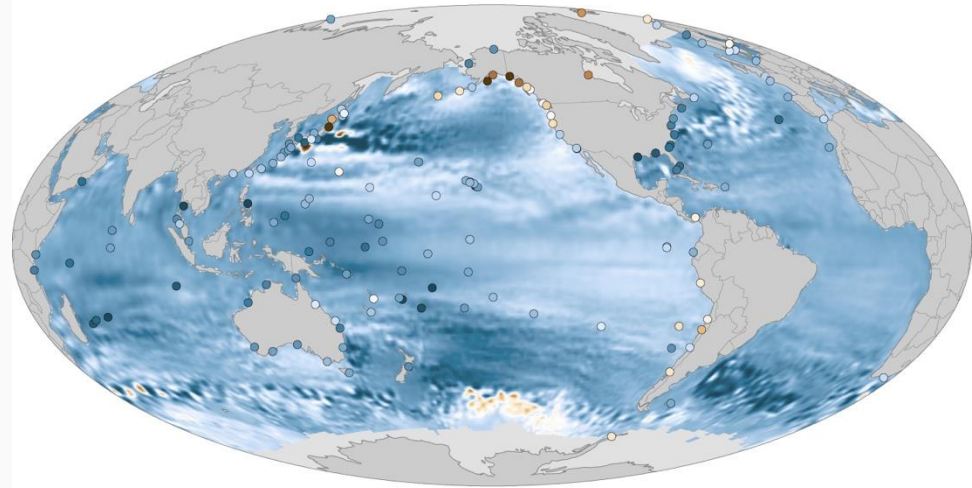
Sea Level Rise

- 40% of the US population lives in coastal areas
- Sea level is rising at ~3.2 mm (0.13 in) per year
- Impacts include
 - Storm surges farther inland
 - Nuisance flooding
 - Flooding upriver
 - Saltwater infiltration

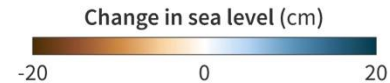


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SEA LEVEL CHANGE (1993-2020)



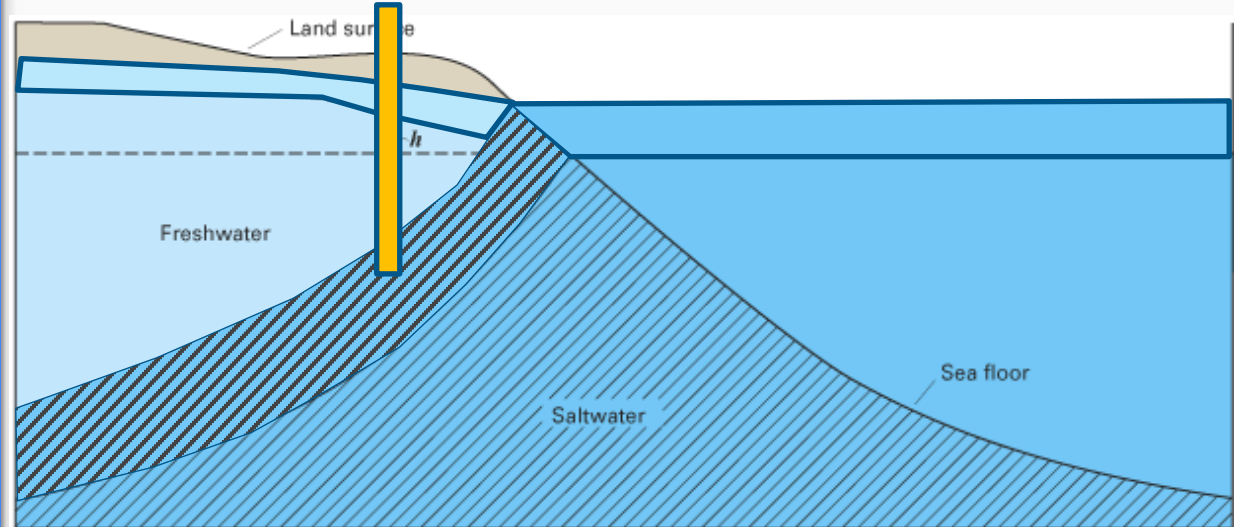
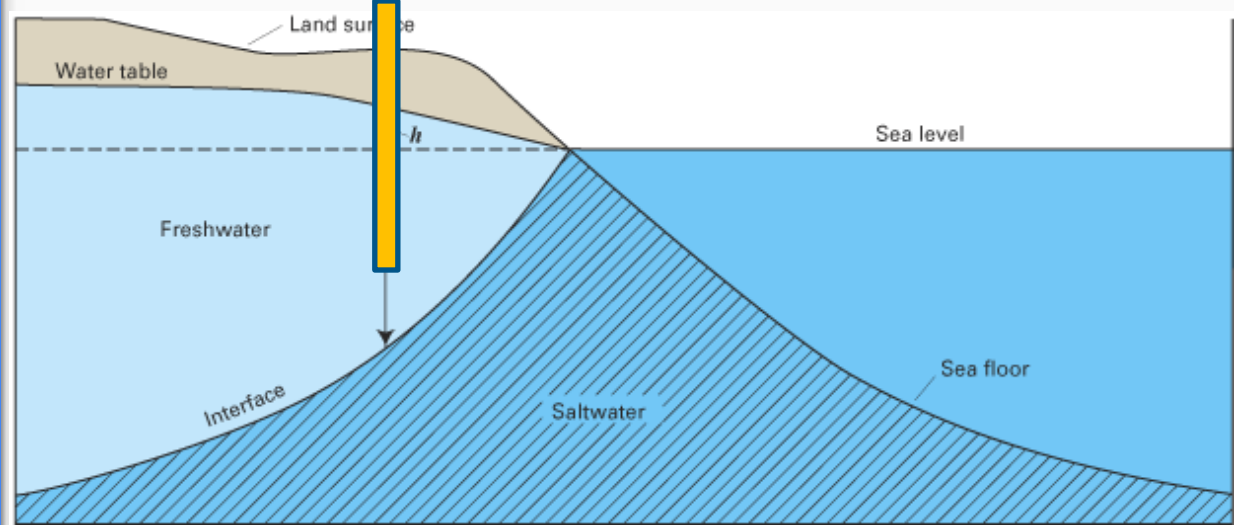
1993-2020



NOAA Climate.gov
Data: UHSLC

Saltwater Infiltration

Higher sea levels can impact freshwater reservoirs, particularly groundwater



Drought

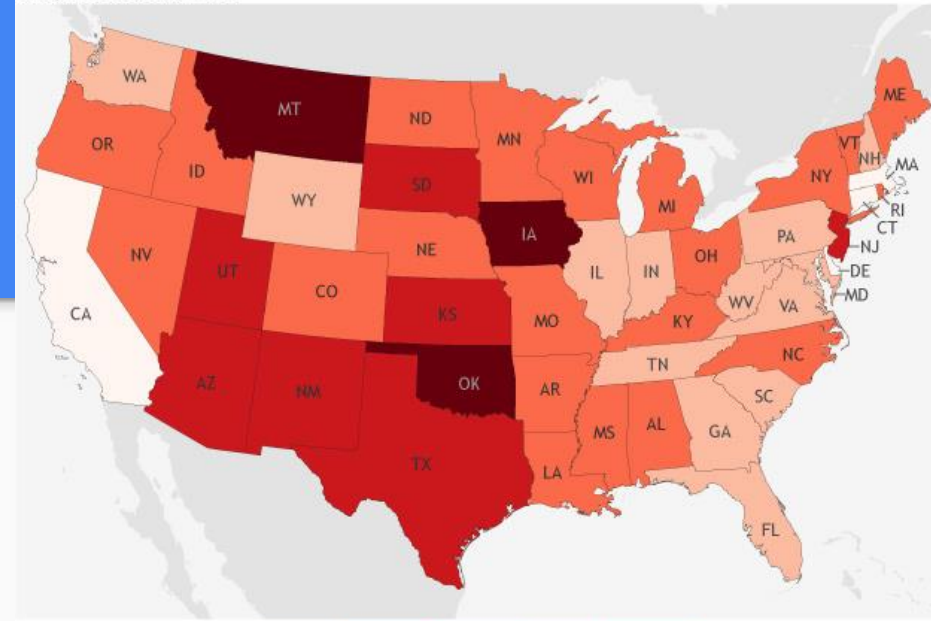
- Warmer temperatures, changes in atmospheric circulation, decreasing snowpack can lead to increased number and intensity of droughts.
- According to a NOAA-funded study, Oklahoma is particularly drought vulnerable



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State rankings of drought vulnerability and its drivers

Drought Vulnerability Index



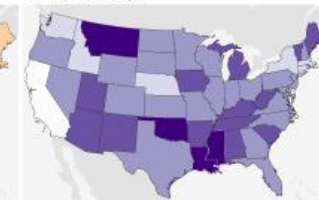
sensitivity



exposure



ability to adapt

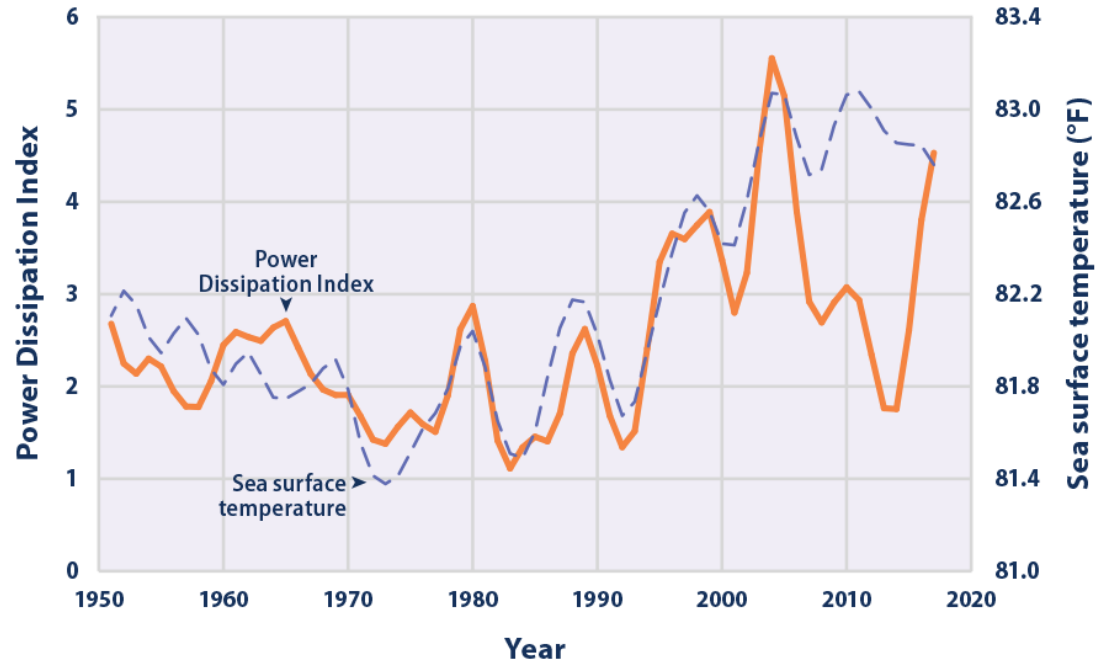


NOAA Climate.gov
Data: Engström et al., 2020

Extreme Weather

- Higher sea surface temperatures and higher water vapor levels may increase the number and intensity of hurricanes and tropical storms
- While some parts of the globe experience drought, others will have more intense monsoon-driven rainfall

North Atlantic Tropical Cyclone Activity According to the Power Dissipation Index, 1949–2019



Data source: Emanuel, K.A. 2021 update to data originally published in: Emanuel, K.A. 2007. Environmental factors affecting tropical cyclone power dissipation. *J. Climate* 20(22):5497–5509.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.



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We can predict the effects of climate change. We do not know the exact sequence of events.

Earth's climate is a complex system. While we can use science to forecast what issues might occur, the severity and timing are still uncertain.



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**It is probable that the
impact of climate
change will be felt
globally, but not equally**



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Acknowledgements

Contact us:

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NSF grant ICER-2119861

Cas.okstate.edu/wrane/index.html

Additional Information:

- [Sea Level Rise and the Fate of Coastal Cities](#): Climate Central/Google Earth
- [US Drought Vulnerability Rankings](#): NOAA Climate.gov
- [The Growing Groundwater Crisis](#): R. Cho, Columbia Climate School
- [Sea Level Rise Viewer](#): NOAA



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