Impacts of Climate Change: Regional Drought Increase

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CPSG101 Science & Global Change First Year Colloquium II
April 16, 2019

What is a drought?

A significant period where an area is abnormally dry

Droughts affect both ecosystems and agriculture. If left unchecked, droughts can cause disasters like the one shown in this image

What causes droughts?

- Interruption of normal weather patterns
- El Niño/La Niña
- Global warming/climate change has increased its frequency and intensity

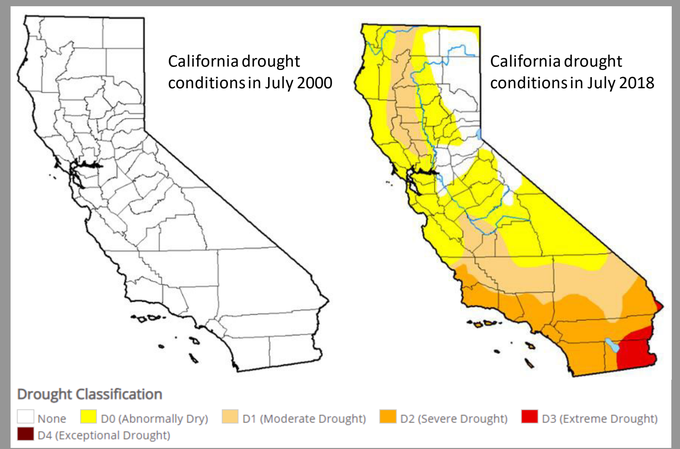
4 Types of Drought

Meteorological	A decrease of precipitation in a certain area
Hydrological	A period where bodies of water consistently have a low volume
Agricultural	A lack of precipitation that hinders agricultural growth
Socioeconomic	When there is less water than what the demand for water requires

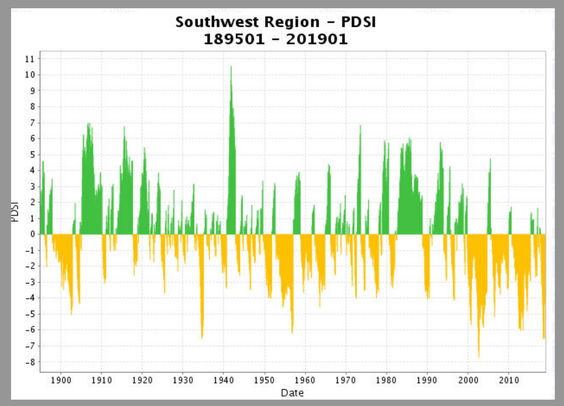
Drought Severity

- Palmer drought severity index (PDSI) - utilizes monthly precipitation and temperature data, and water holding capacity of soils
- Standardized precipitation index(SPI) - utilizes historical precipitation records

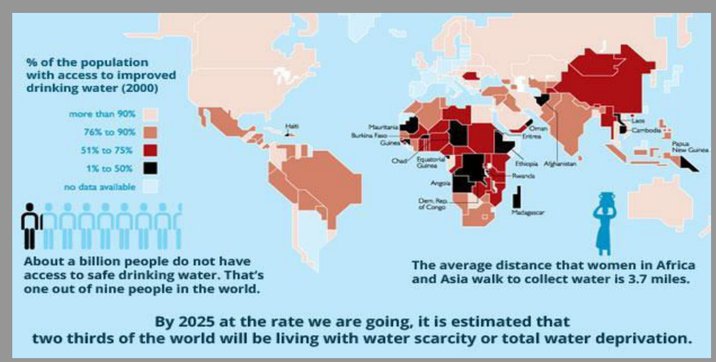
Category		PDSI	SPI	Effects
D0	Abnormally Dry	-1.0 - -1.9	-0.5 - -0.7	•Lingering water deficiency •Slowed agriculture growth
D1	Moderately Dry	-2.0 - -2.9	-0.8 - -1.2	•Damage to agriculture •Bodies of water's water level lowered •Imminent water shortage
D2	Severe Drought	-3.0 - -3.9	-1.3 - -1.5	•Agriculture losses •Water shortage
D3	Extreme Drought	-4.0- -4.9	-1.6 - -1.9	•Significant agriculture losses •Widespread water shortage
D4	Exceptional Drought	Below -5.0	Below -2.0	•Widespread and significant agriculture losses •Major shortages in water causing emergency



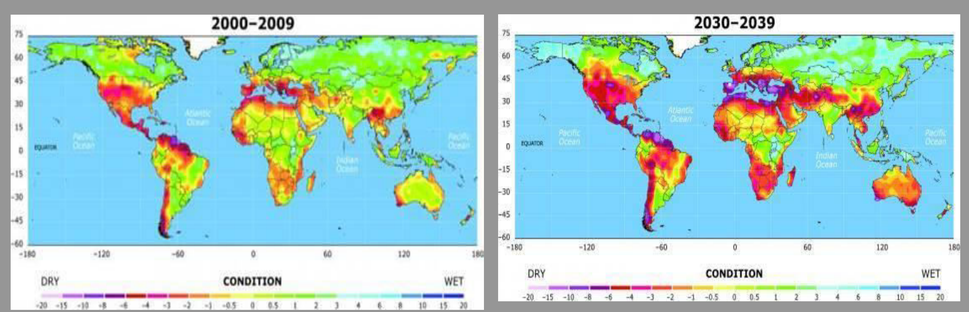
Data from the US Drought Monitor (affiliated with NOAA), a map that shows the prevalence of drought in California in July 2018, compared to just 18 years prior (11)



This data from the National Climatic Data Center shows how since 1900, the PDSI for the southwestern US has become more frequently negative, and more negative overall (7)



One of droughts impacts is lessening precipitation, and generally more dry conditions, which can affect the availability of safe drinking water (5)



Data from Wiley Interdisciplinary Review [2]. These maps compare the Palmer Drought Severity Index from 2009-2019 to the forecasted index from 2030-2039.

Bibliography:

1. Anonymous. "Drought Classification". *United States Drought Monitor*. Accessed 27 3 2019
2. "Anonymous". October 19,2010. "Future droughts will be shockers, study says". NBC news. March 27
3. Anonymous. How does Drought Affect Our Lives?. *National Drought Mitigation Center (Univ. of Nebraska)*. Accessed 26 March 2019.
4. Anonymous. The Facts About Climate Change and Drought *The Climate Reality Project*. Accessed 26 March 2019
5. Anonymous. What makes clean water so important?. *Blue Planet Network*. Accessed 26 March 2019
6. Anonymous. Country-by-country overview. *Drought Disasters (UNICEF)*. Accessed 26 March 2019
7. Baldwin, Rich. Divisional Data Select. NCDC.
8. Dai, A. and Zhao, T. 2017. Uncertainties in historical changes and future projections of drought. Part I: estimates of historical drought changes. Climatic Change **144:** 519-533. doi:10.1007/s10584-016-1705-2
9. Essa, A. Namibia battles worst drought in decades. *Al Jazeera*. Accessed 26 March 2019
10. Funk, C., Hoell, A., and Stone, D. 2014. Examining The Contribution Of The Observed Global Warming Trend To The California Droughts Of 2012/13 And 2013/14. Bulletin of the American Meteorological Society S11-S15.
11. Hadwin, T., Magendrathajan, M., Pascual, R., Lopez, M., Rippey, B., and Brusberg, M. U.S. Drought Monitor
12. Kogan, F., Adamenko T., and Guo, W. 2013. Global and regional drought dynamics in the climate warming era. Taylor and Francis Remote Sensing Letters **4:** 364-372. doi:10.1080/2150704X.2012.736033
13. Wolchover, N. 28 9 2018. "What is a Drought?". *Live Science*. Accessed 27 3 2019
14. Rodgers, A. 18 8 2013. "Drought". *National Geographic*. Accessed 27 3 2019
15. Zhang, Q., Han, L., Jia, J., Song, L., and Wang, J. 2016. Management of drought risk under global warming. Theoretical and Applied Climatology **125:** 187-196. doi:10.1007/s00704-015-1503-1
16. Abiodun, Babatunde J., and Ulrich Diasso. Aug. 2018 "Future Impacts of Global Warming and Reforestation on Drought Patterns over West Africa". Theoretical & Applied Climatology, **133**: 647–662. doi:10.1007/s00704-017-2209-3.
1. Burke, Eleanor J. and Simon J.Brown 4 October 2010 "*Regional drought over the UK and changes in the future*". Journal of Hydrology **394***:471-485. doi: 10.1016/j.jhydrol.2010.10.003*