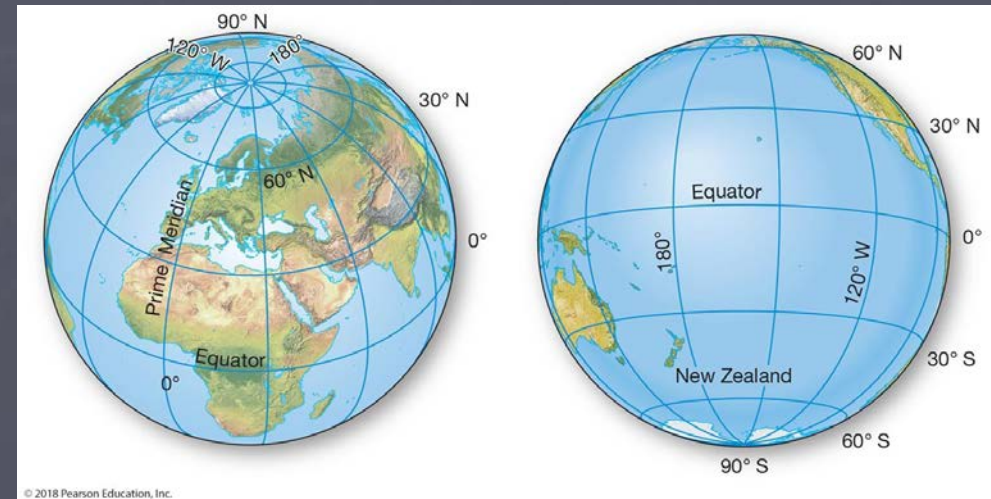


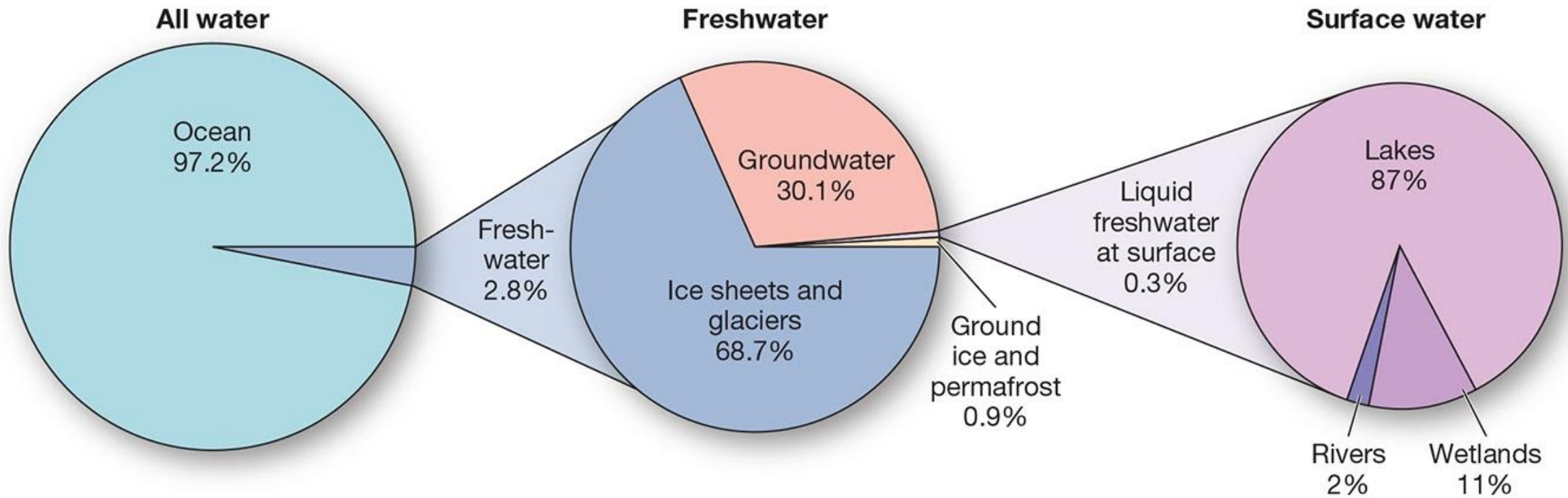
# The Hydrosphere

The background of the slide is a dark blue color. On the left side, there is a faint, light-colored map of the United States. A compass rose is overlaid on the map, with the letters 'N', 'S', 'E', and 'W' indicating the cardinal directions. The map shows the outlines of the states and some major geographical features like the Great Lakes and the Mississippi River.

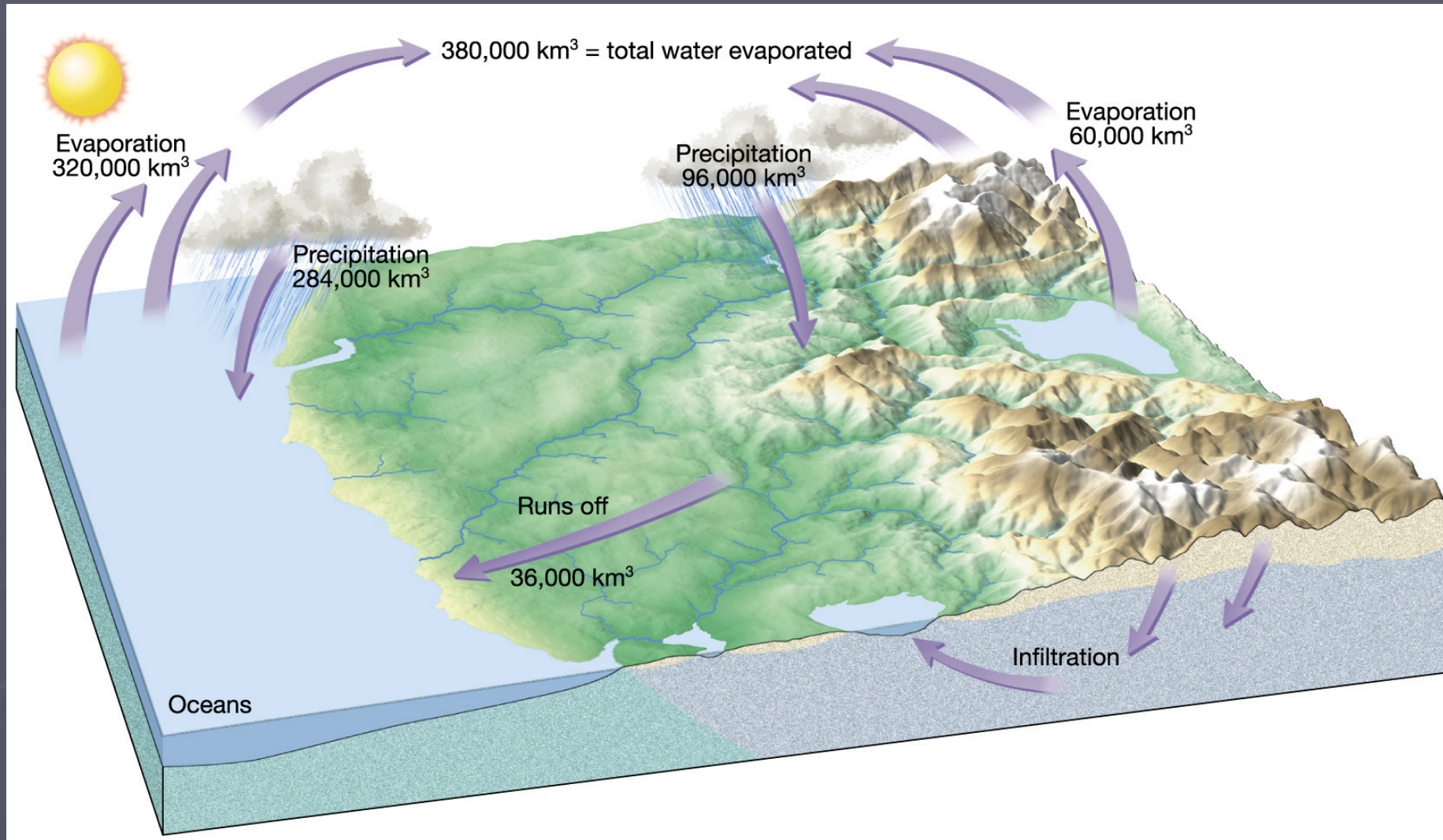
# Earth: The Blue Marble



# Breakdown of Earth's Water

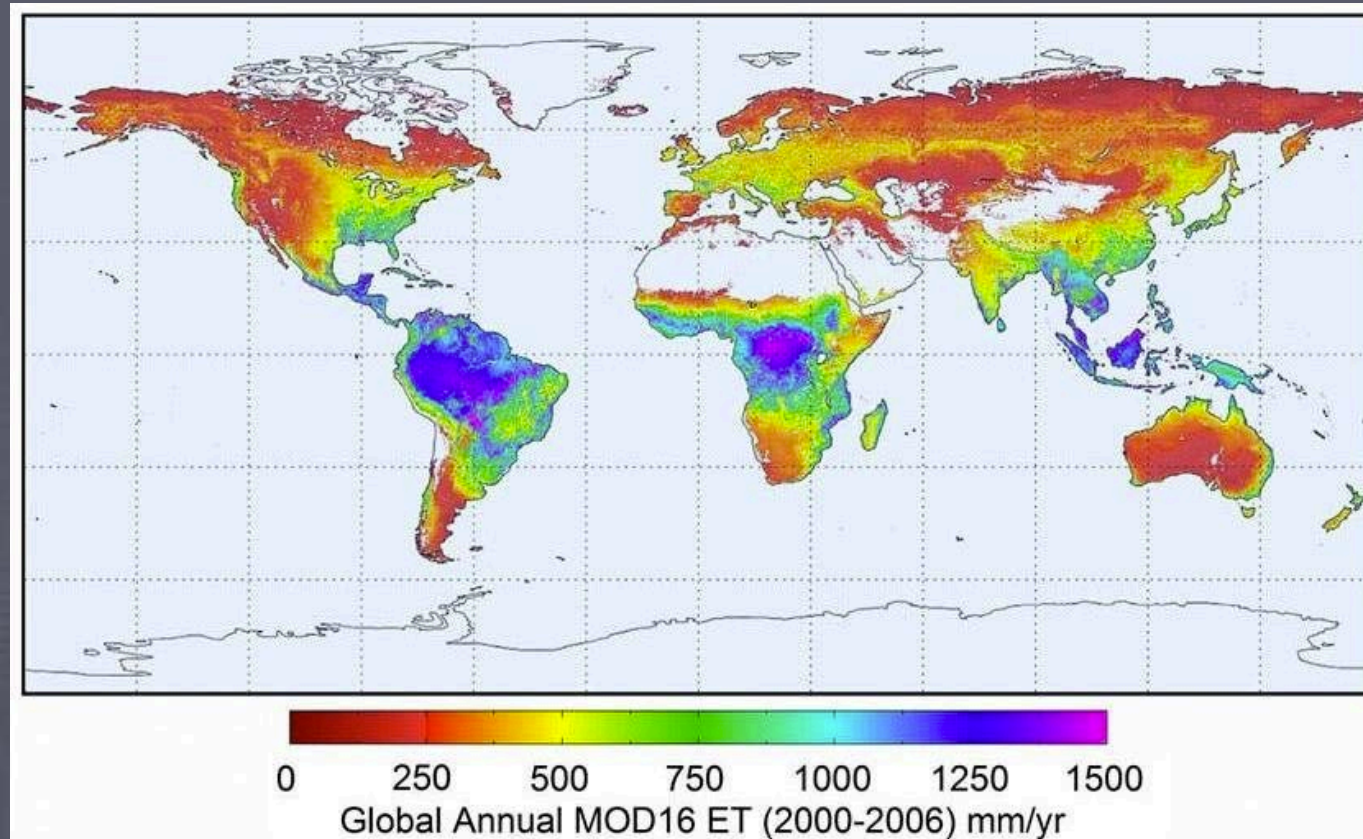


# The Hydrological Cycle

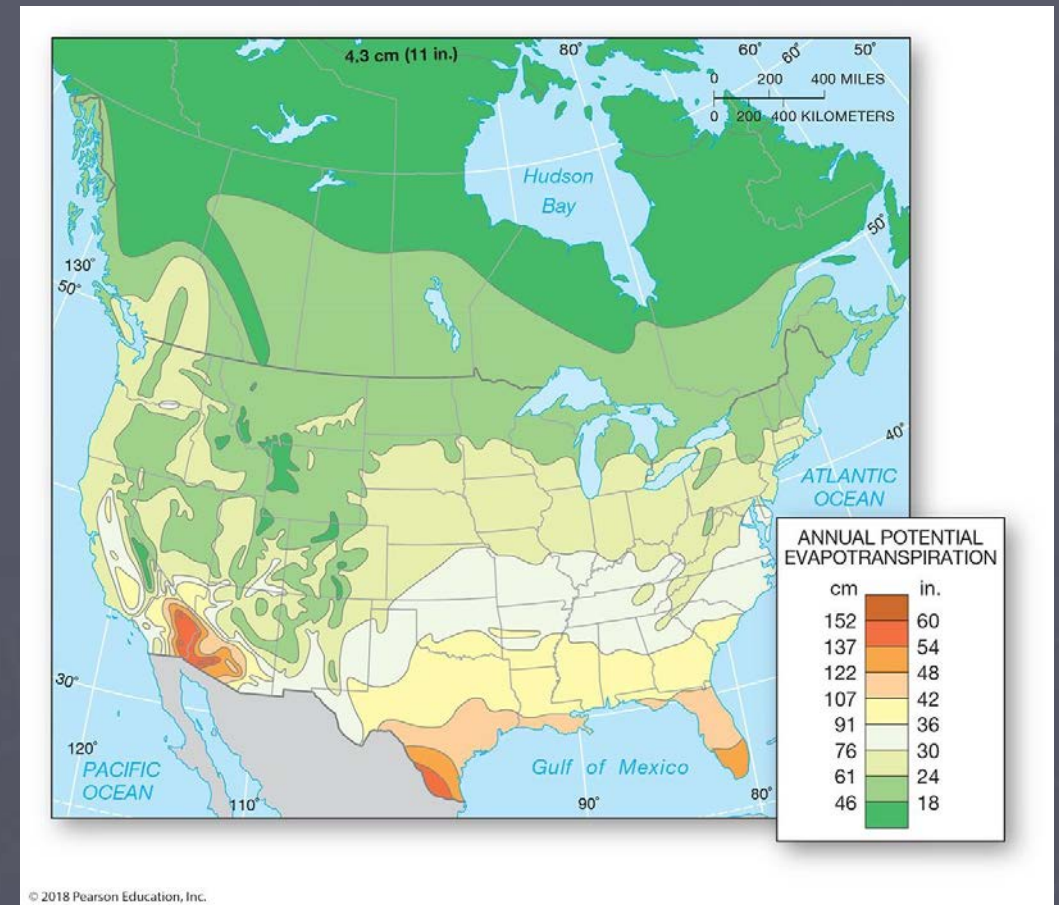
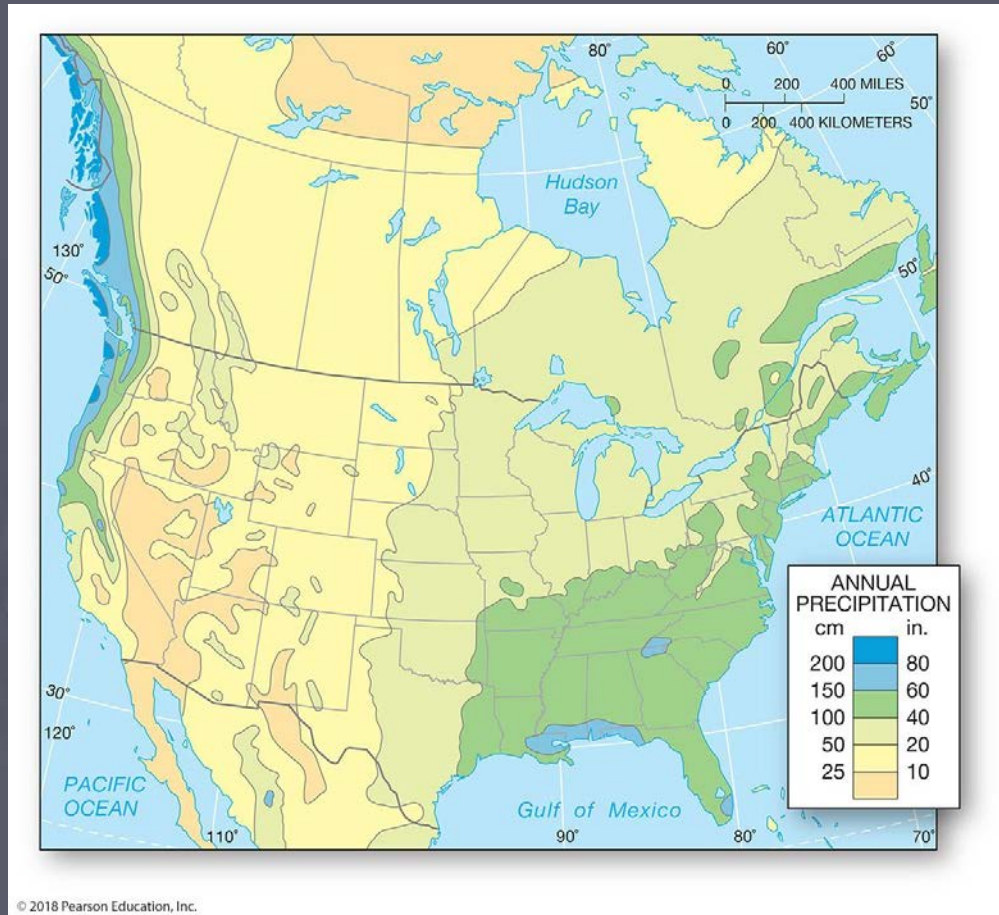


# The Water Budget: Evapotranspiration

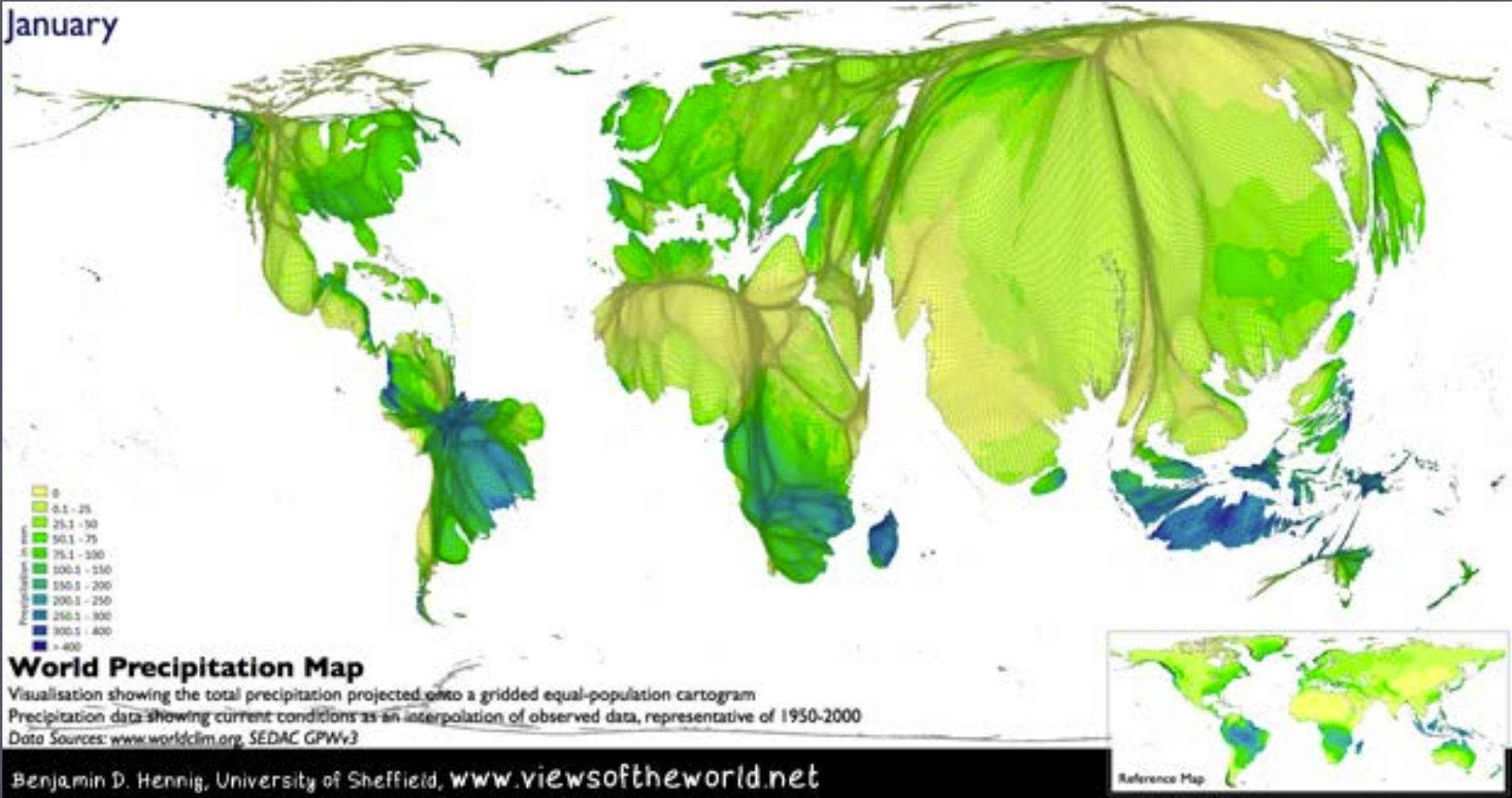
- **Evapotranspiration** = Evaporation (water evaporating from soils and water + transpiration (water evaporating from plants))



# Average Precipitation & Potential Evapotranspiration

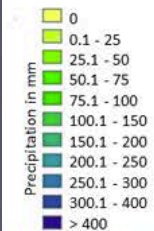
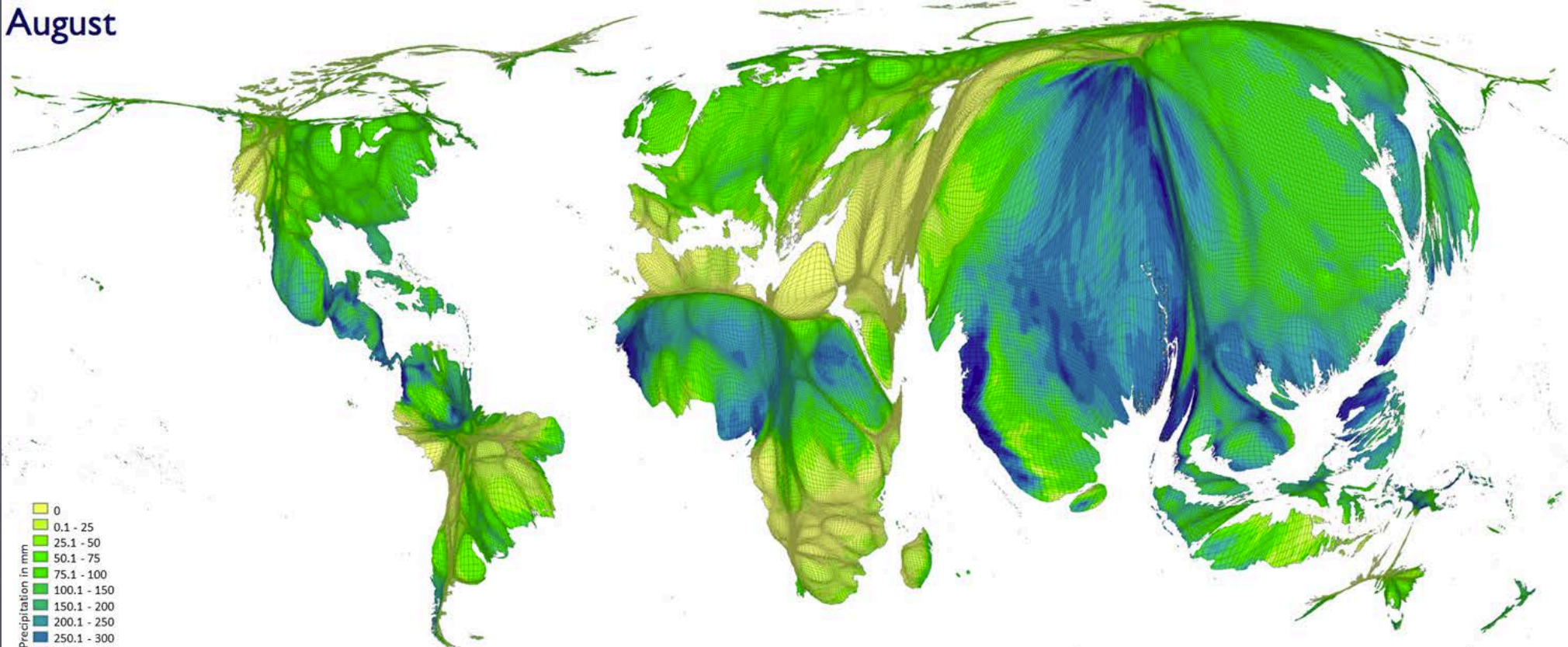


# Global Precipitation as Connected to Population



# Global Precipitation as Connected to Population

August



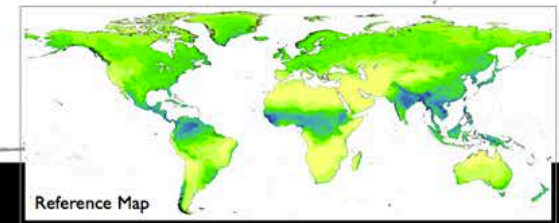
## World Precipitation Map

Visualisation showing the total precipitation projected onto a gridded equal-population cartogram

Precipitation data showing current conditions as an interpolation of observed data, representative of 1950-2000

Data Sources: [www.worldclim.org](http://www.worldclim.org), SEDAC GPWv3

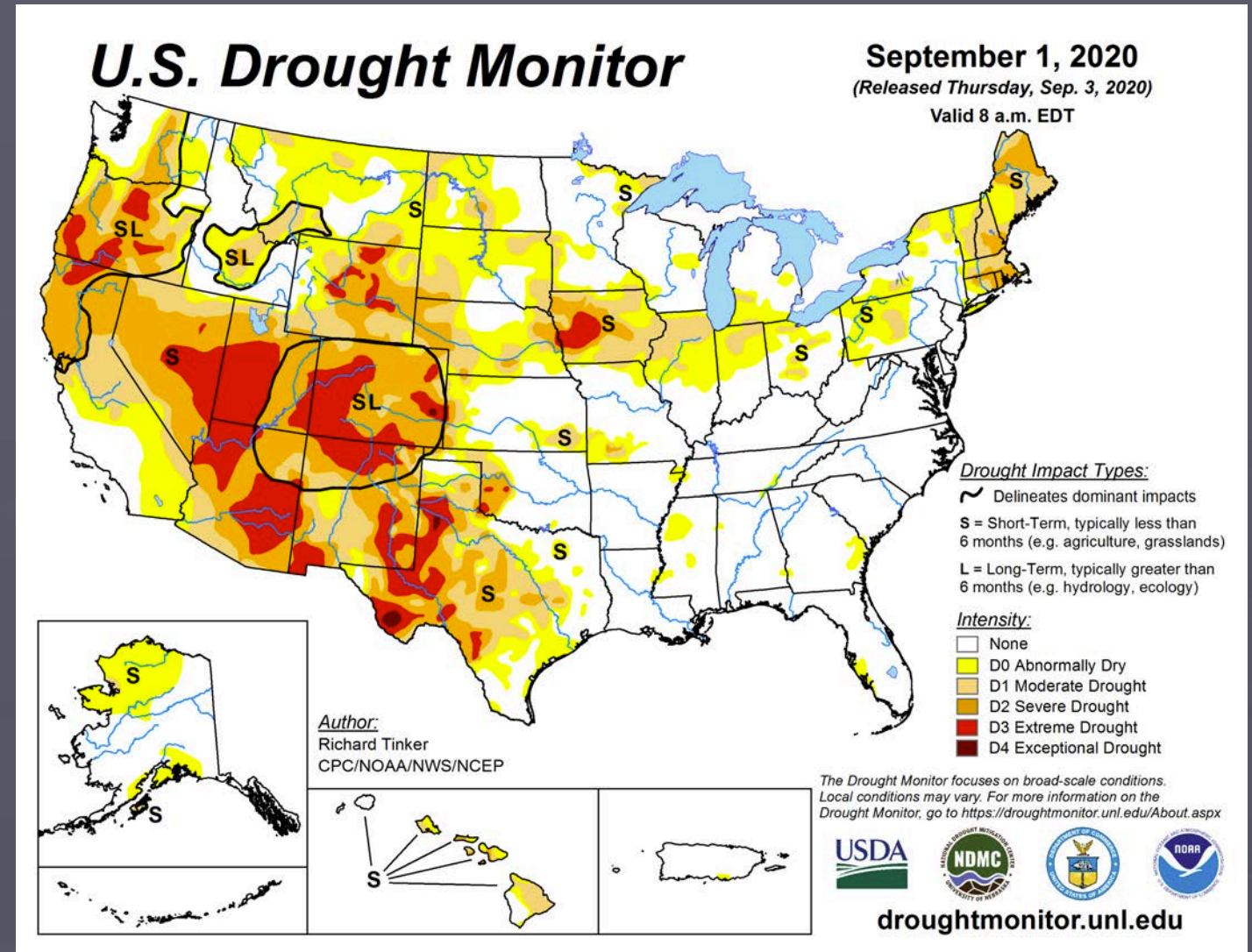
Map created by Benjamin D Hennig, University of Sheffield  
[www.viewsoftheworld.net](http://www.viewsoftheworld.net)





# Drought

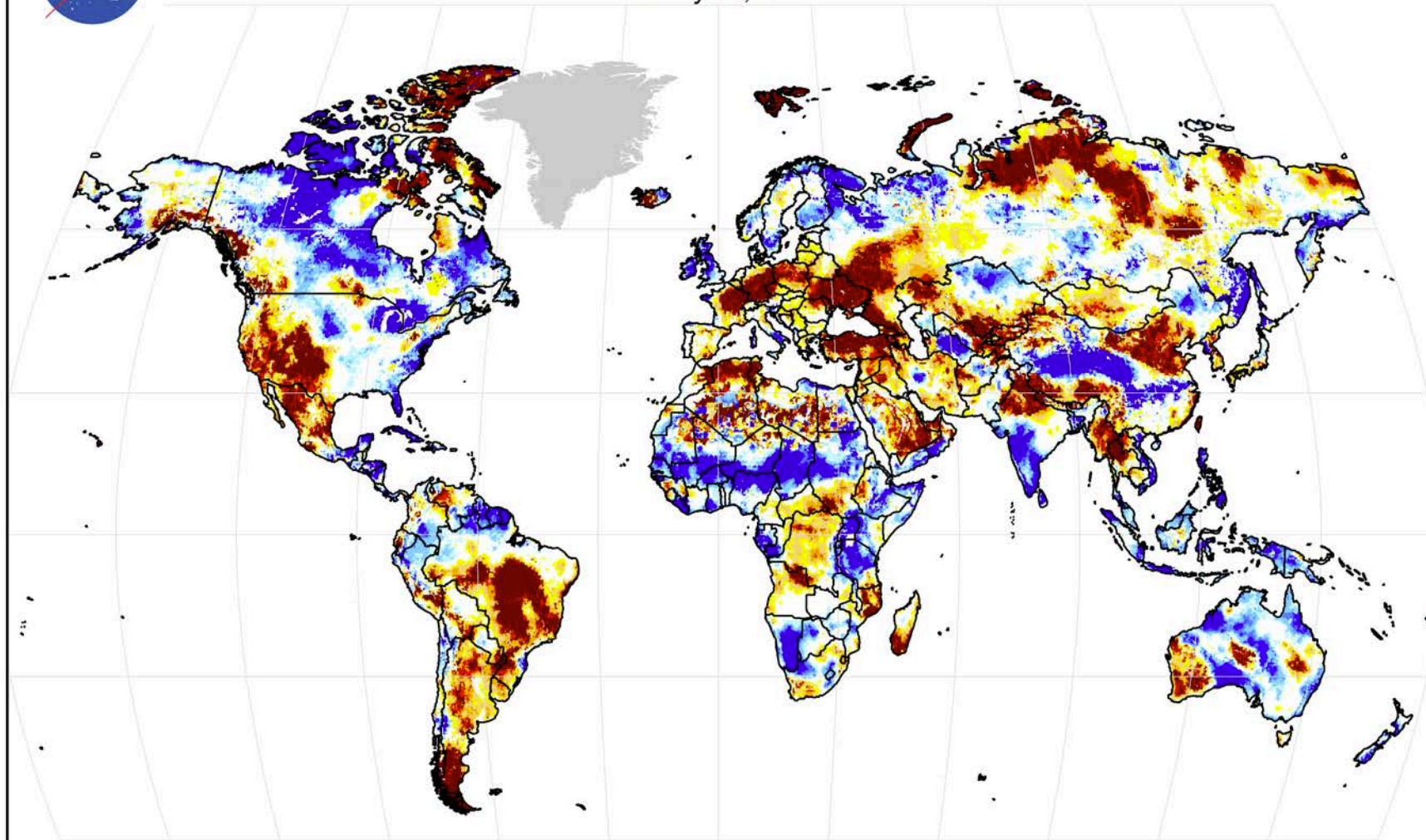
- Long periods of time in which Potential Evapotranspiration exceeds Actual Evapotranspiration without recharge from precipitation





# GRACE-Based Shallow Groundwater Drought Indicator

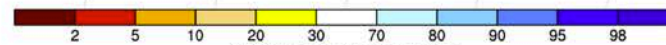
January 18, 2021



Wetness percentiles are relative to the period 1948-2012

Cell Resolution 0.25 degrees

Projection of this document is Times (World)



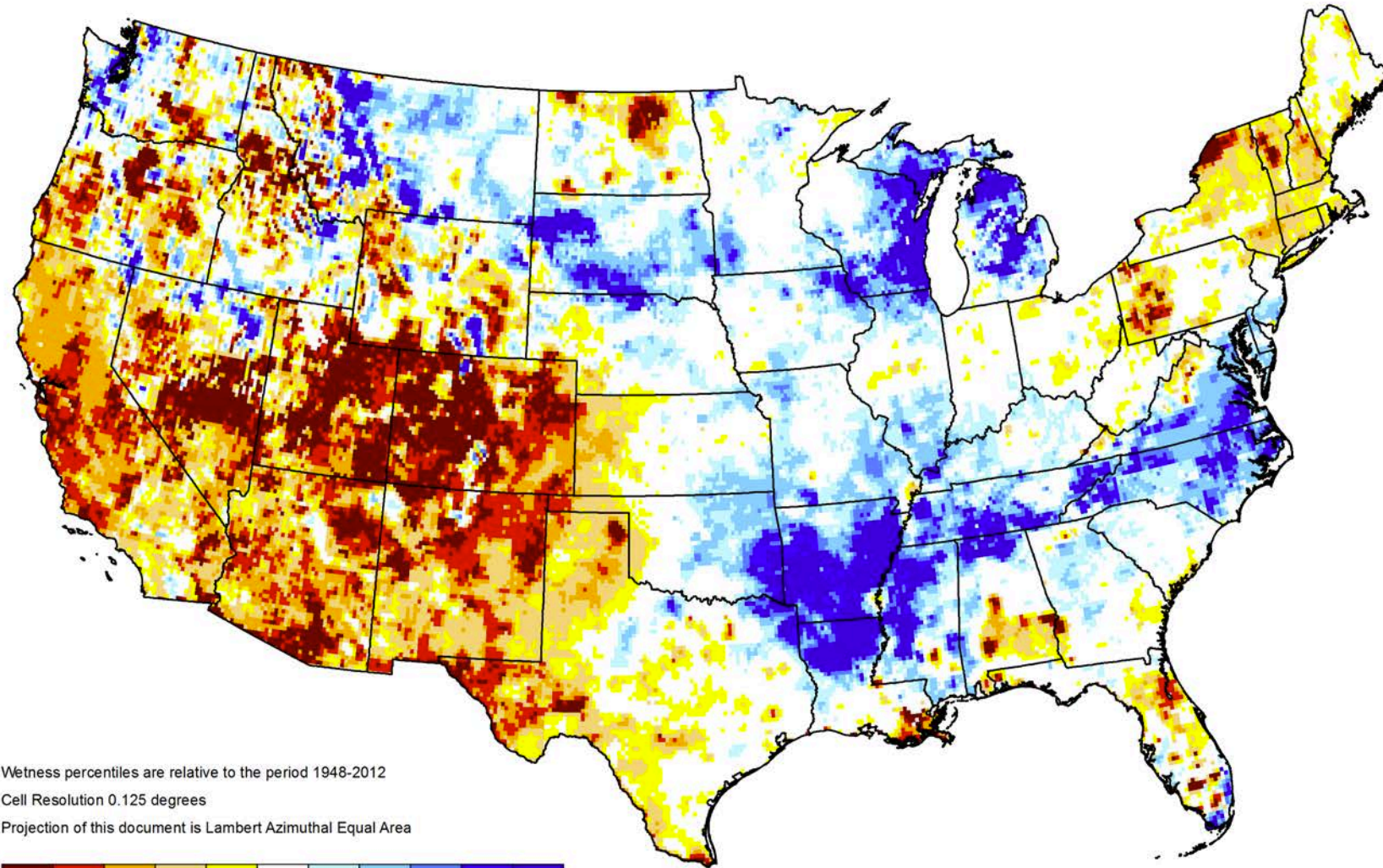
Wetness Percentile

<https://nasagrace.unl.edu>

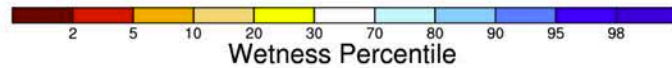


# GRACE-Based Shallow Groundwater Drought Indicator

January 18, 2021

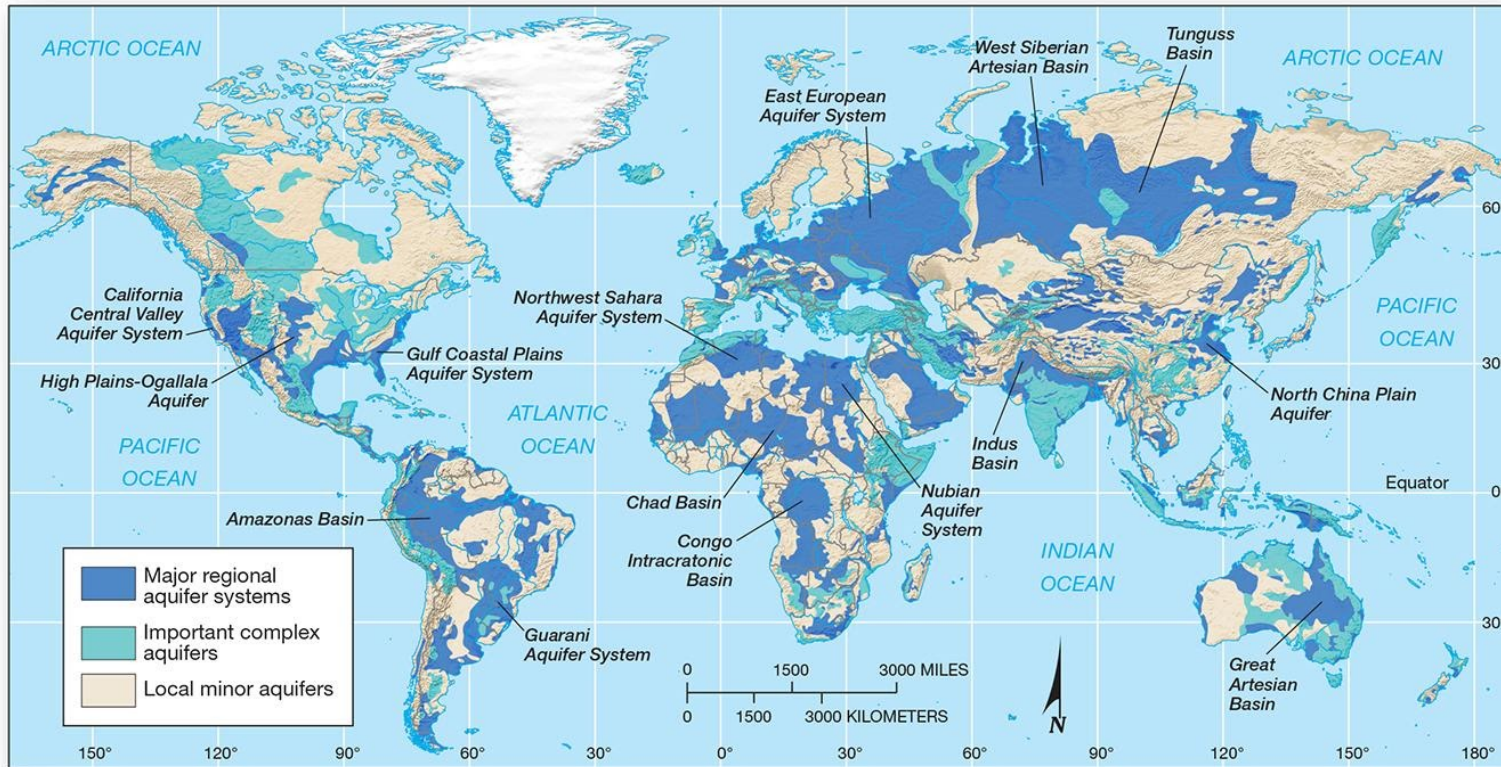


Wetness percentiles are relative to the period 1948-2012  
Cell Resolution 0.125 degrees  
Projection of this document is Lambert Azimuthal Equal Area

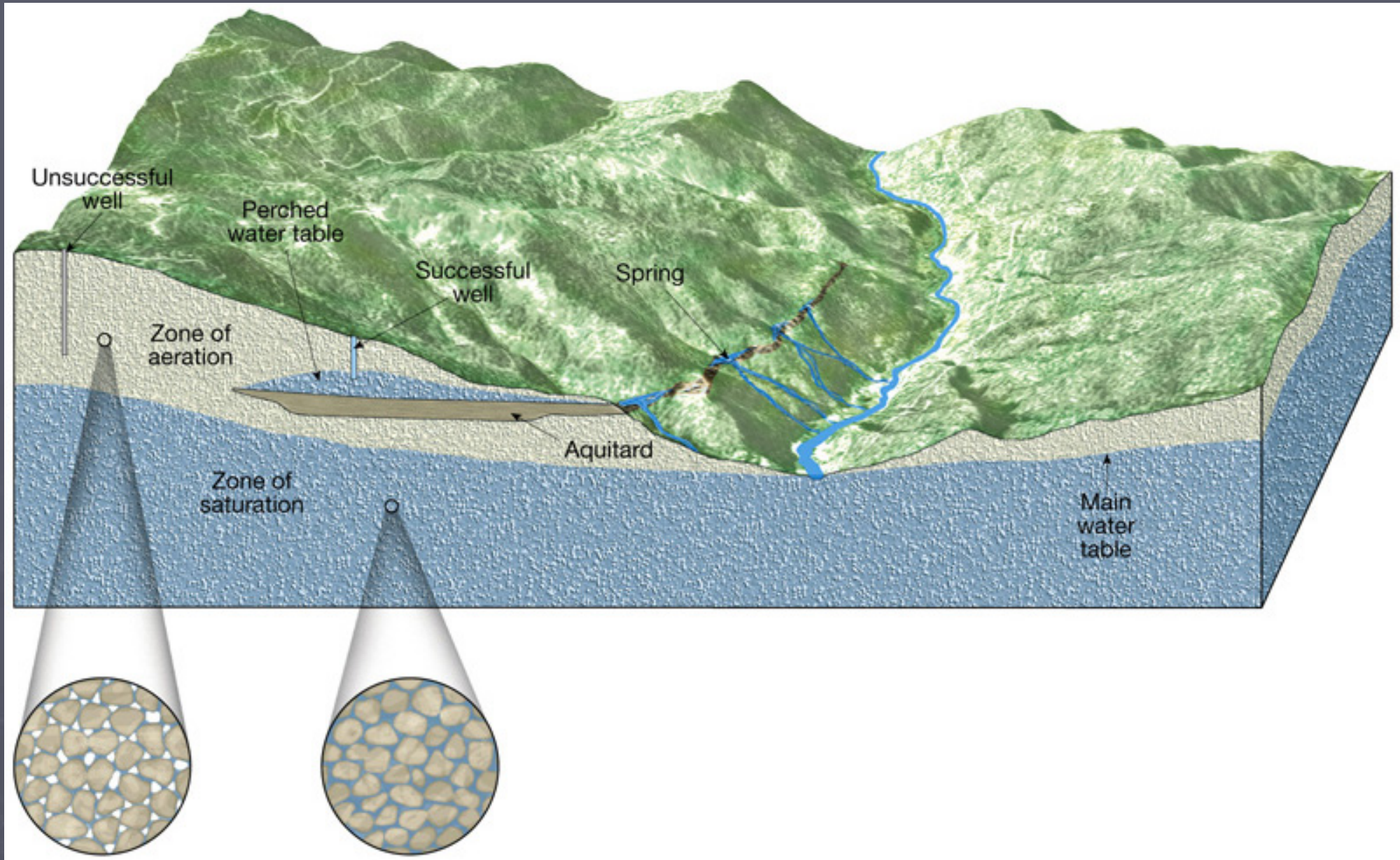


<https://nasagrace.unl.edu>

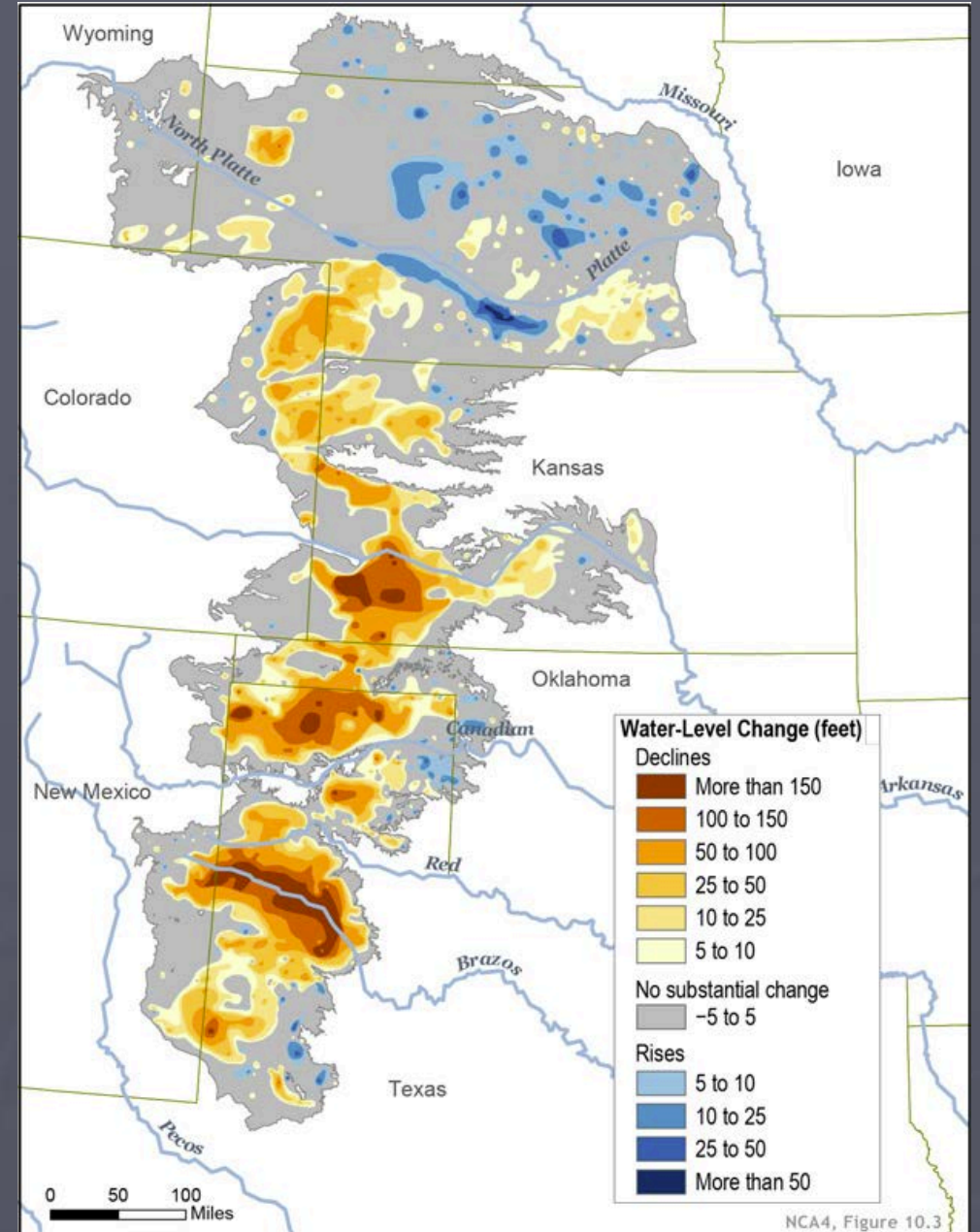
# Groundwater



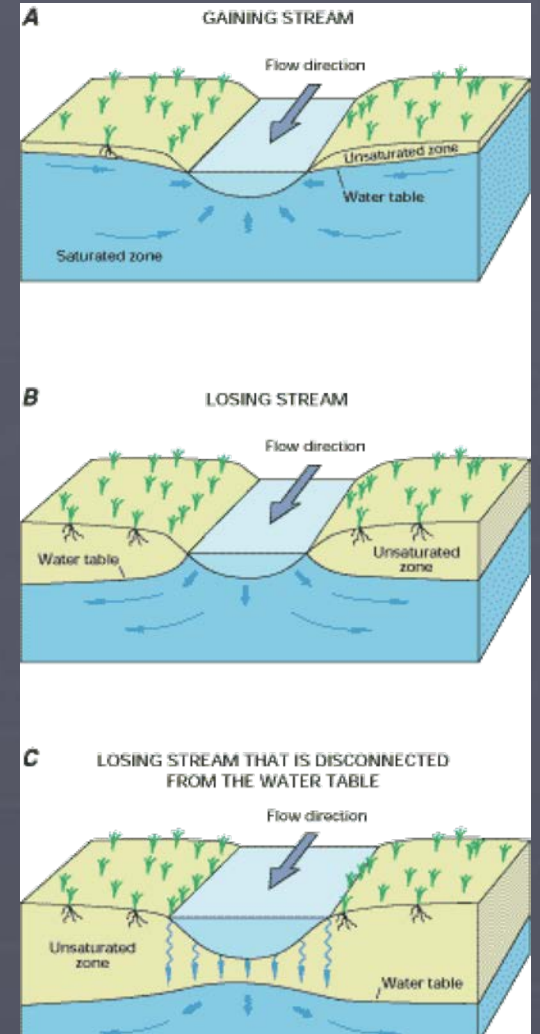
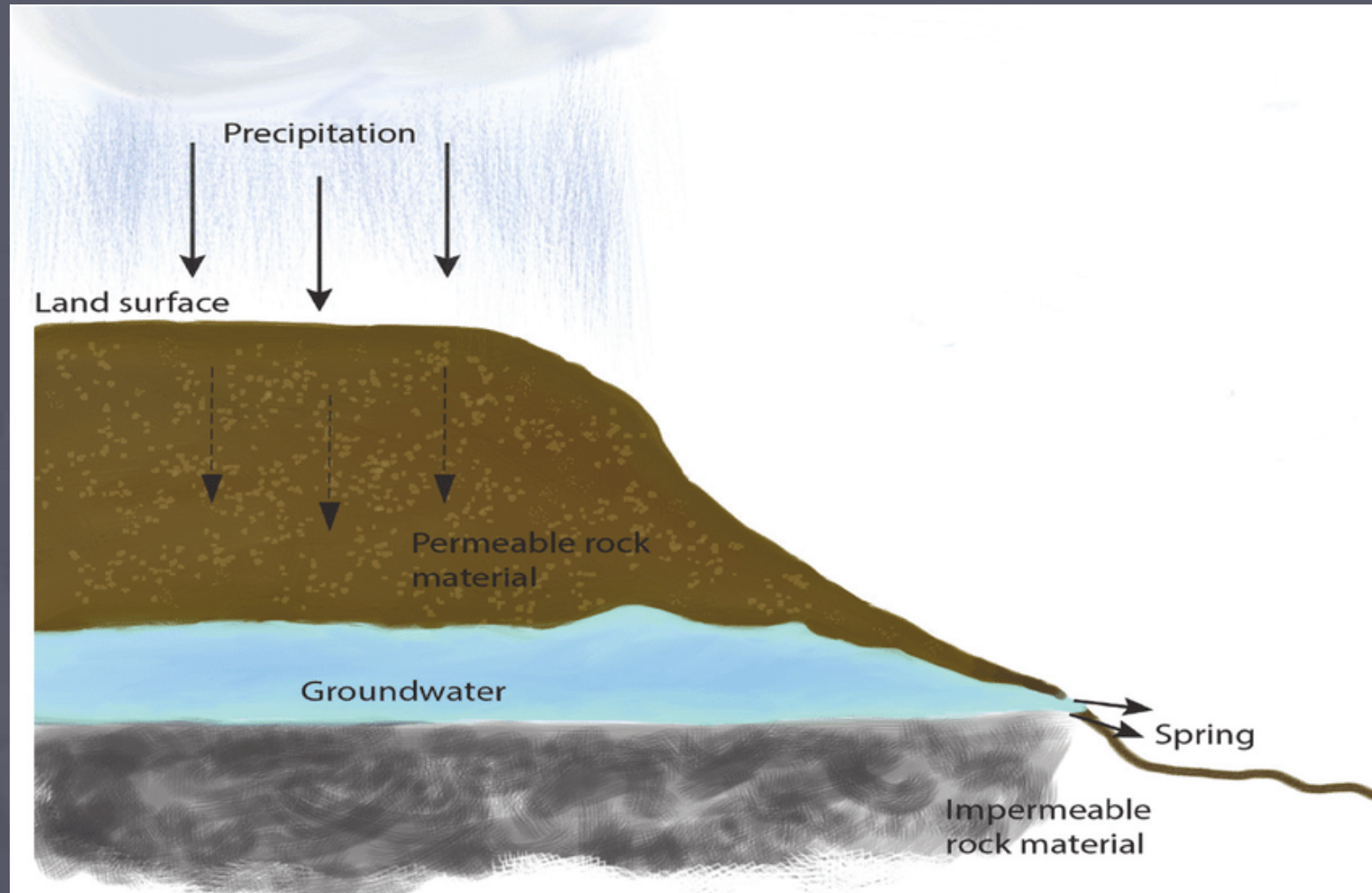
- Groundwater dependent upon surface water to recharge
- Source of Clean drinking water
  - Too deep and it Brines
- Less affected by short-term droughts



# Ogallala Aquifer



# Groundwater's effects on Springs & Streamflow



# Lakes and the Water Supply

- Freshwater Lakes makeup the largest percentage of accessible fresh water
  - .009% of all water is in freshwater lakes
  - .008% is in saline or saltwater lakes
- Lakes either spring fed, seepage fed, or stream fed

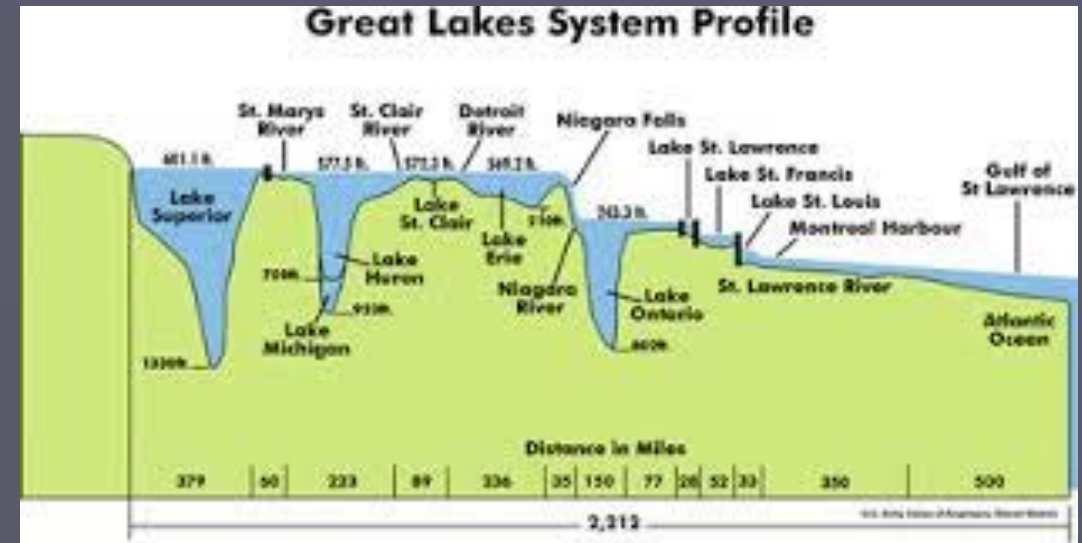
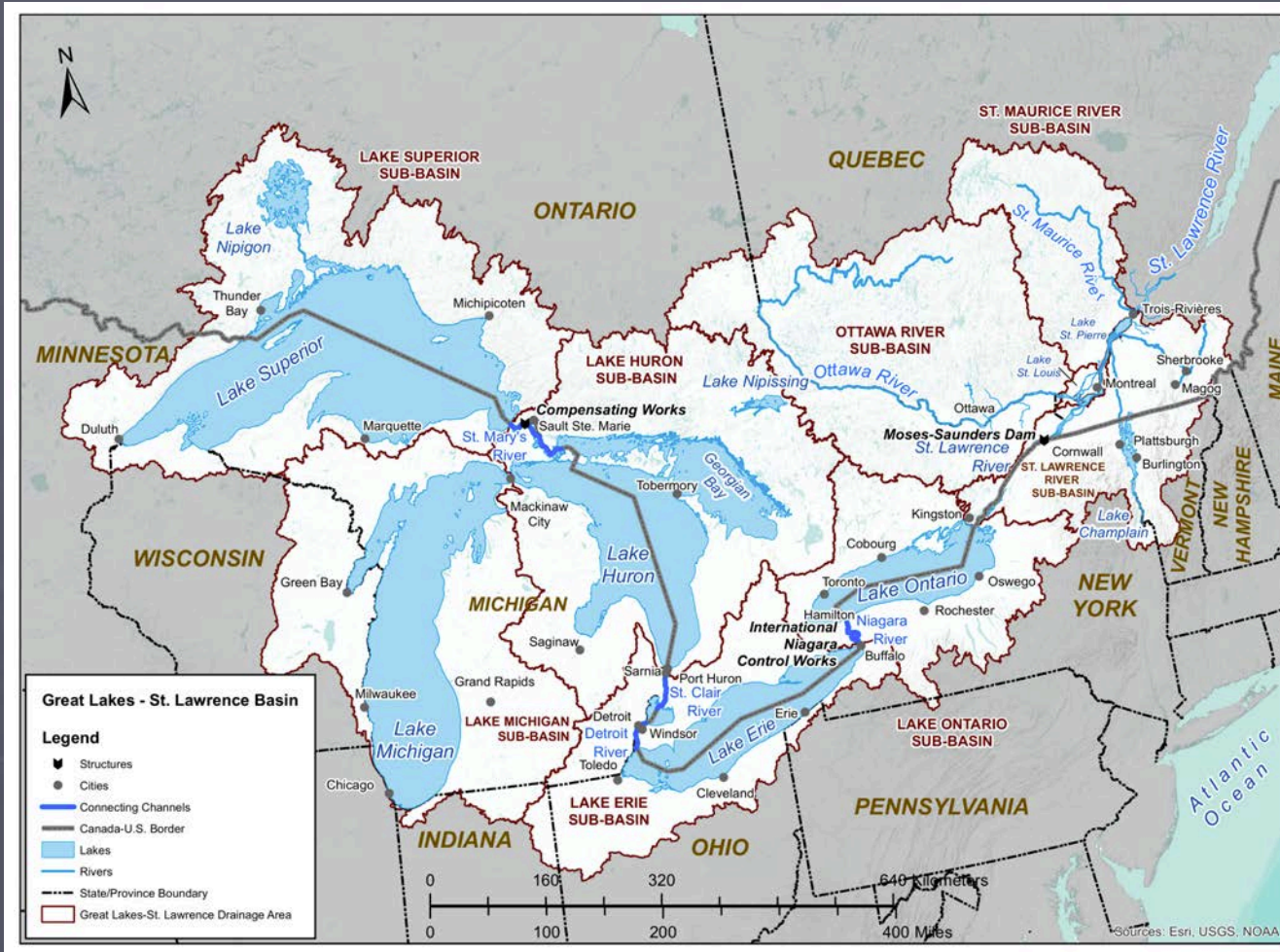




# Case Study: Caspian Sea

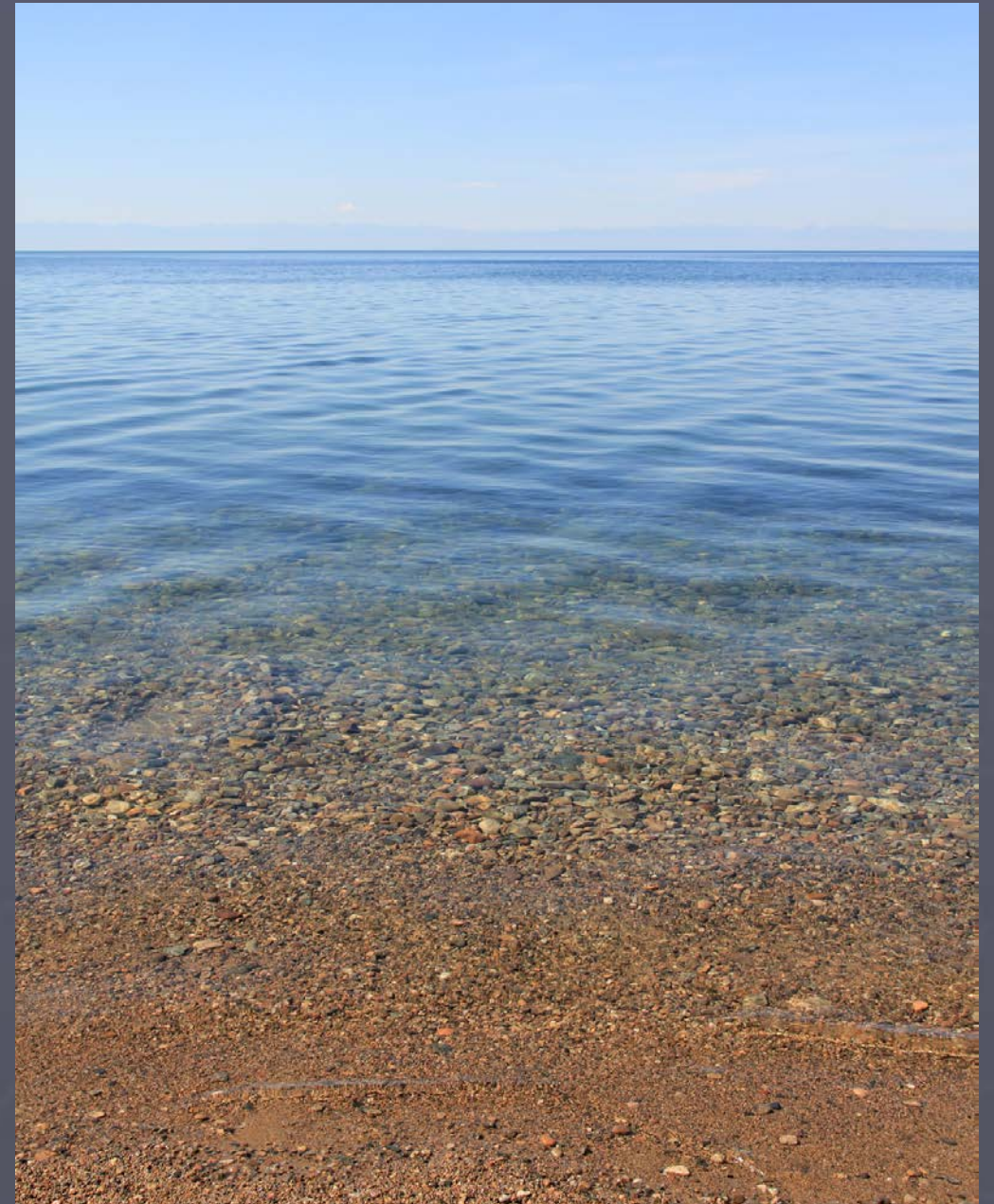
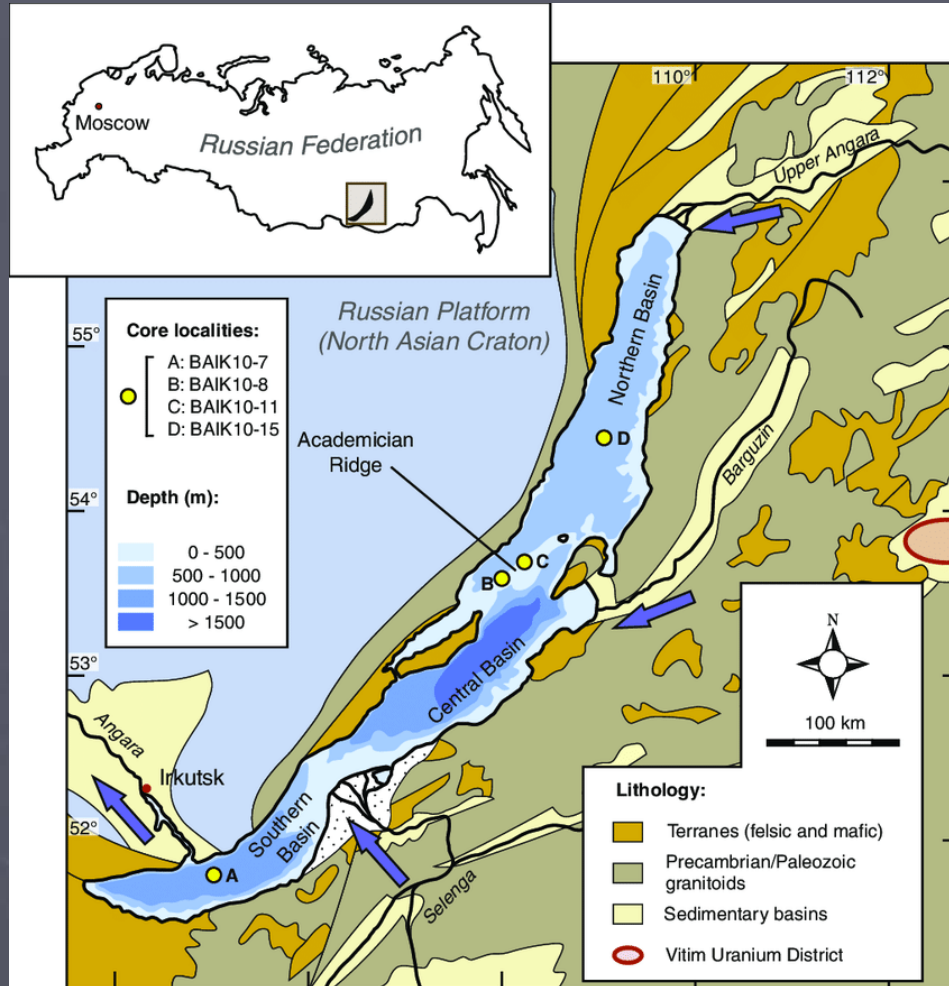


# Case Study: Great Lakes



Lake Superior as seen from Two Harbors, Minnesota

# Case Study: Lake Baikal



Lake Baikal as seen from Listvyanka, Russia

# Issues with Water Supply: Overuse

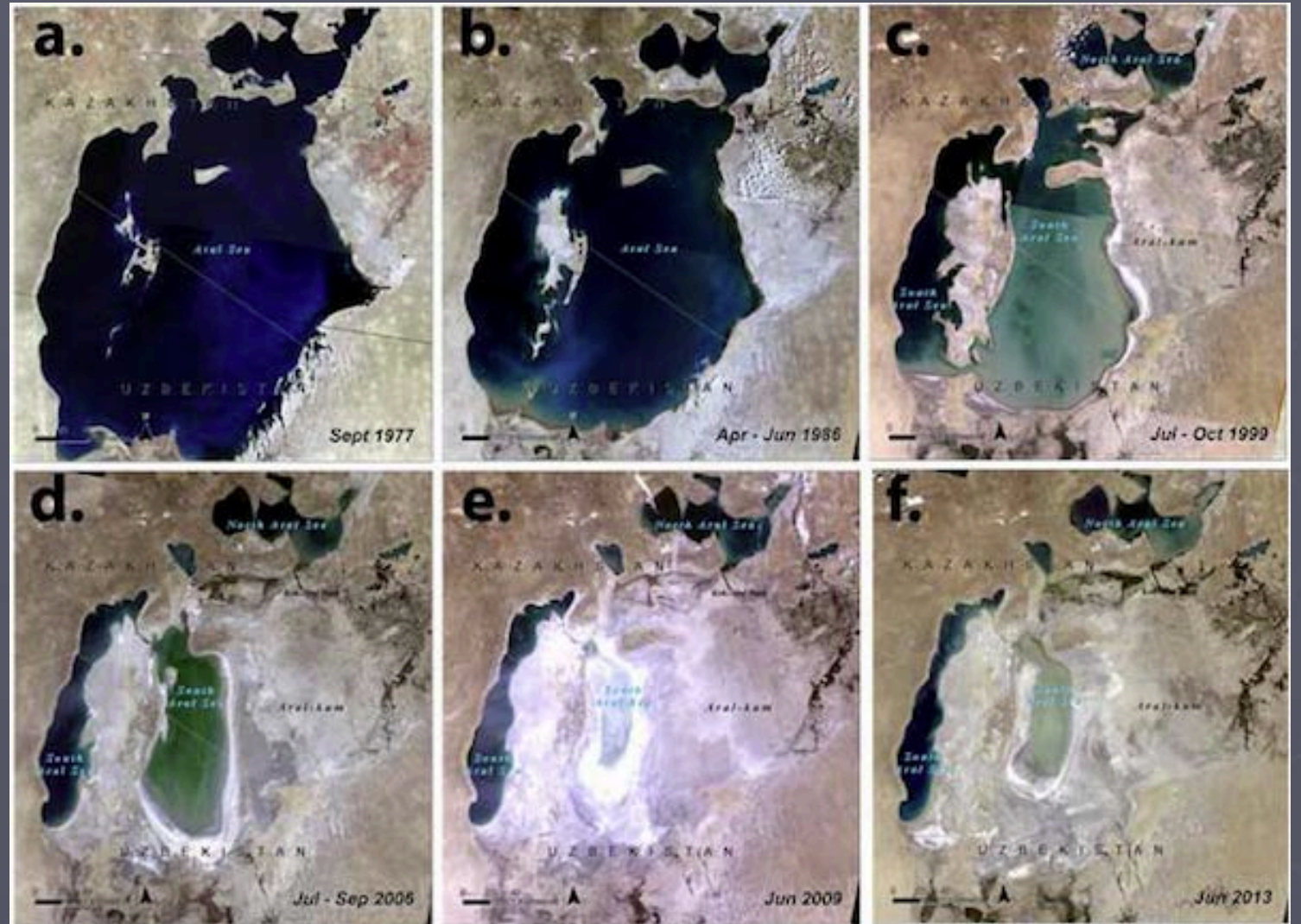
**WATER ONLY**  
**1 DAY A WEEK**  
NOV 1 - FEB 28

 SLASH your water use and SAVE money



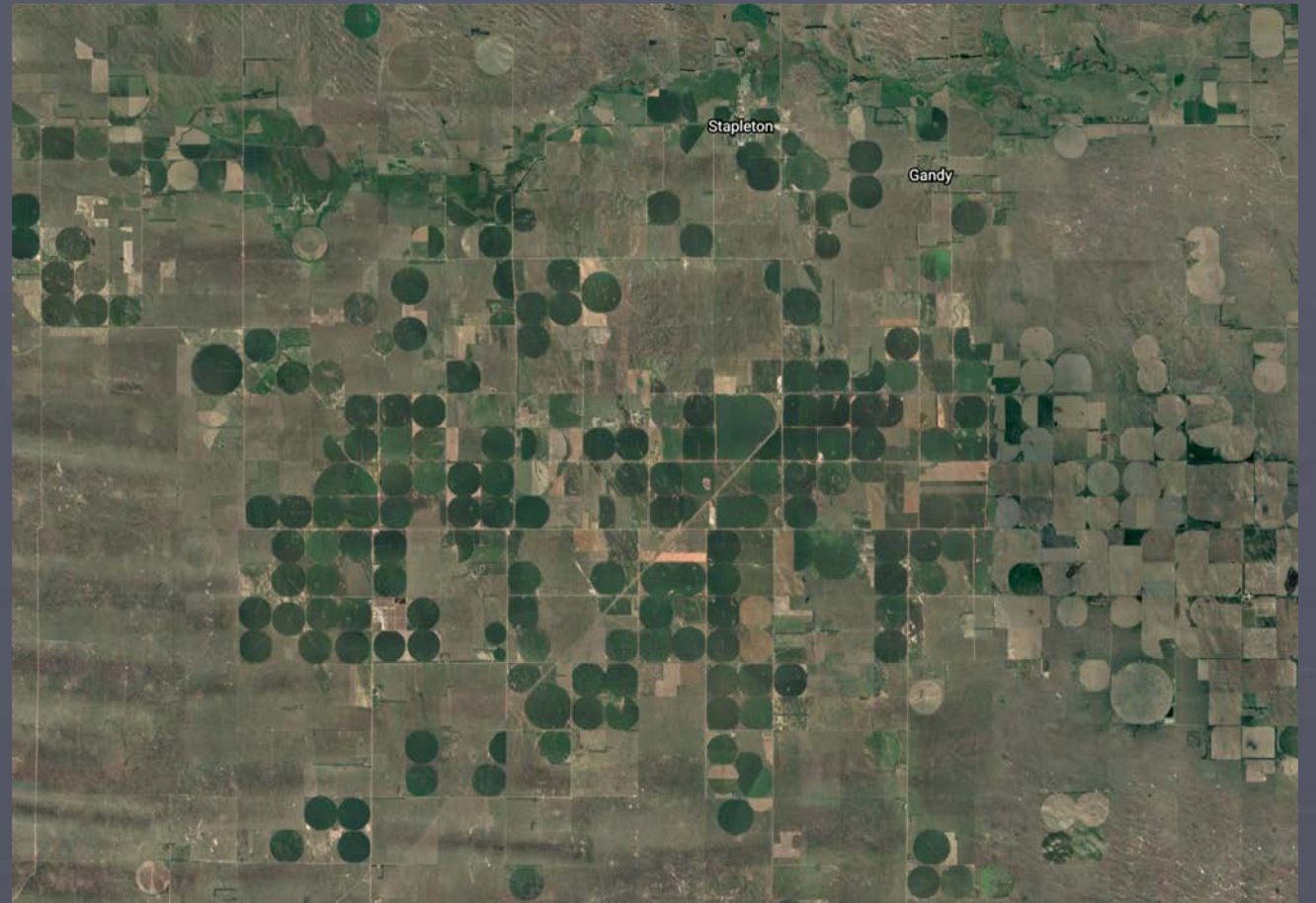
Aerial View of Suburban Las Vegas, Nevada

# Case Study: The Aral Sea

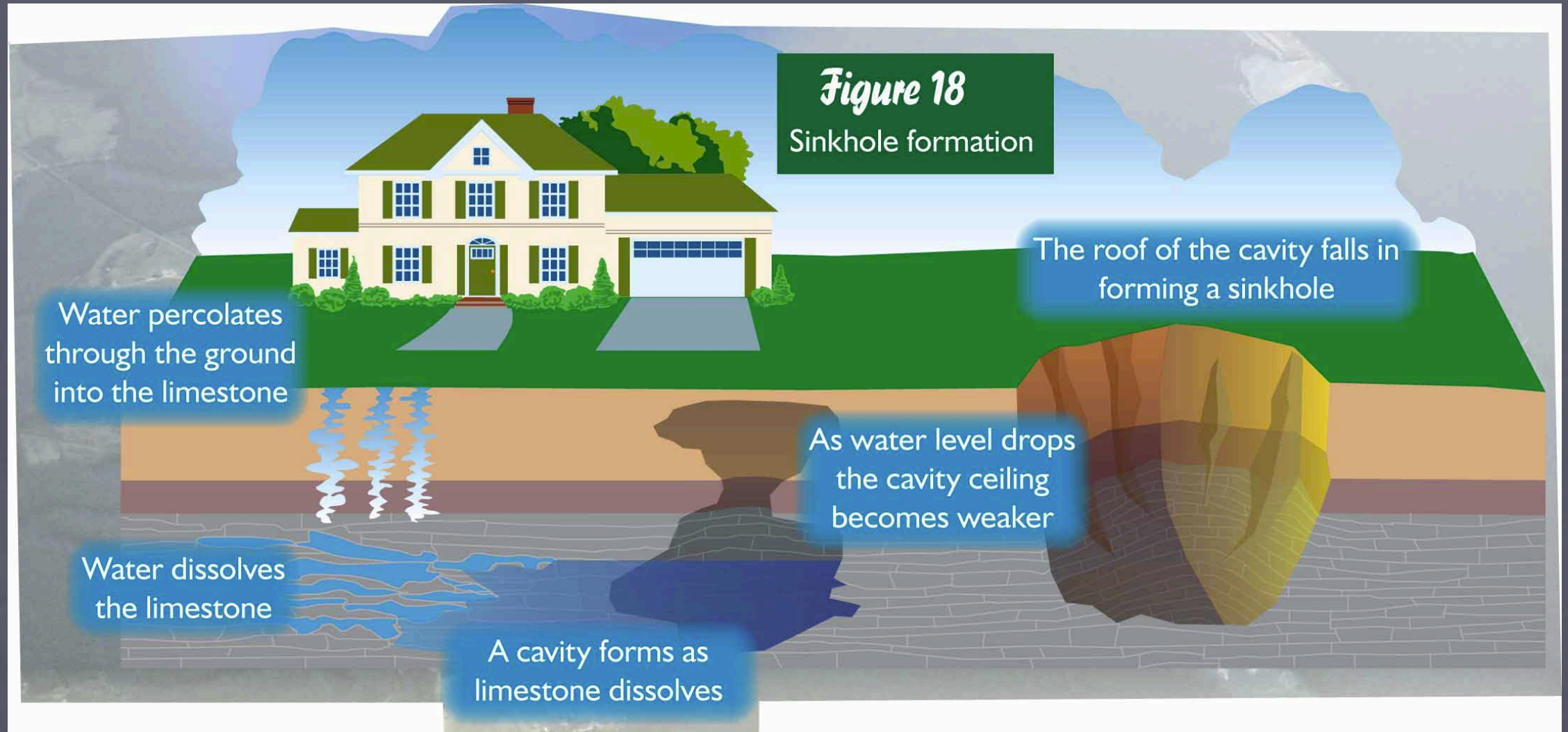


# Dependence on Ground Water

Satellite Image from Stapleton,  
Nebraska



# Issues of Groundwater: Sinkholes



# Sinkhole in Omaha, Nebraska (2014)





# Issues of Groundwater: Contamination

