Drought in the Colorado River Basin
The Colorado River supports the livelihood of roughly 40 million people:

- Denver, CO
- Phoenix, AZ
- Los Angeles, CA

Providing 17 million acre-feet of domestic water every year for municipal, industrial, and agricultural use:

- Irrigation of ~6 million acres
- Hydropower
- Habitat and recreation
- 22 tribes
Colorado Basin “Law of the River”

- 1922 Colorado River Basin Compact
- 1928 Lower Basin Boulder Canyon Project
- 1944 Treaty with Mexico
- 1948 Upper Basin Compact
- 1968 Central Arizona Project
- 2019 Drought Contingency Plan
Water Allocation

Lower Basin Allocations
- California = 59%
- Arizona = 37%
- Nevada = 4%

Upper Basin Allocations
- Colorado = 52%
- Utah = 23%
- Wyoming = 14%
- New Mexico = 11%

Mexico = 1.5 million af/yr
Severe Drought

- Temperatures greatly increased across the southwest from 1901 to 2016
- Unprecedented 2000-2014 drought
- Climate change
- Higher temperatures
- Decreased flow
- Global climate model projections

Difference between the 1986-2016 average temperatures and 1901-1960 average temperatures
Reservoir Reduction

- Reduced streamflow
- Lake Powell and Lake Mead
- Upper Colorado River Basin
- Temperatures
- UCRB annual temperature
- UCRB annual precipitation
Temperature v. Precipitation

Temperature sensitivity
- Studied only for temperature increases

Precipitation elasticity
- Studied for both increases and decreases

There are large differences in certainty of future changes in the two variables
- Temperature will surely rise
- Precipitation may increase or decrease
Flow Response

- Temperature sensitivities imply much greater temperature-induced losses.
- An average sensitivity of -6.5%/°C warming was reported.
- Recent warming of 0.9°C has likely already reduced river flows from -2.7% to -9%.
- Climate model outputs:
  - RCP 8.5 & RCP 4.5
Precipitation and Megadrought

- More precipitation can reduce flow loss, but there is a lack of increase to date
- Megadroughts have occurred in the past
- The risk of a multidecadal megadrought in the Southwest is over 90% this century
- Changes in precipitation would need to be huge and would still only reduce megadrought risk below 50%
Takeaway

- There is high confidence that temperatures will continue to rise.
- There is also high confidence river flows will continue to decline as a result, ranging from -11% to -55% by the end of the century.
- There is low confidence that precipitation will increase enough to offset the temperature-driven declines in streamflow.
- The risk of megadrought is already significant but increases substantially with continued global warming.
- Anomalously low runoff is likely to occur even if there is an increase in precipitation.
Questions / Raising Awareness

● Were you aware of this situation, if so, to what extent?
● How do you feel about the Colorado River being managed by agreements derived from the twentieth century?
● Besides lowering emissions, what policies can be enacted to help maintain streamflow (converse water) and influence water policy?
● Do you feel like using less water is enough to help?
● Any other policies that you think will help mitigate streamflow loss?

Encourage your family and friends to take action, explore the outdoors and try new adventures like rafting and fishing!
References


Kahoot Sources


