



# Climate Change and the Colorado River: Future Allotment Plans for Arizona



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## Future Scenario For the Colorado River

- Climate change will have great impacts on future water allotments for Arizona by possibly reducing the amount of water from the Colorado River
- There are three different possibilities: a wet scenario, a normal scenario, and a dry scenario
- Each of these are possibilities, allowing city managers to adjust their future water plans to each scenario
- Wet Scenario: 20.3 million acre feet
- Normal Scenario: 15.3 million acre feet
- Dry Scenario: 11.75 million acre feet
- Took the percent that Arizona currently gets from the Colorado River and used that to determine the amount Arizona would have for each scenario

## Methods

- Model used to determine dry and wet amounts:
  - Three future climate ensembles based on business as usual emission scenarios
  - One 50 year climate control scenario
- Used a VIC hydrology model (Variable Infiltration Capacity) which is a macroscale hydrologic model
- Normal scenario is based off the average stream flow of the Colorado River and is used as the control variable in order to compare the wet and dry scenario

Table A: Data Helping to Understand the Dry Scenario

	2010-2039	2040-2069	2070-2099
Temperature Change	1.0 C	1.7 C	2.4 C
Precipitation Change	-3%	-6%	-3%
Snow Water Equivalent (SWE)	24%	29%	30%
Runoff Reductions	14%	18%	17%
Chance of Level 1 Shortage	92%	89%	100%
Chance of Level 2 Shortage	77%	54%	75%
Spill Probability	7%	7%	2%
Reduction of water from Glen Canyon to the Lower Basin	0.27 MAF/yr	0.54 MAF/yr	0.61 MAF/yr
Reduction of water to Mexico	0.11 MAF/yr	0.19 MAF/yr	0.31 MAF/yr

Chart A is describing the different factors in order to determine the dry scenario of 11.5 maf/yr

Chart A: Future Water Allotment For Arizona

Dry Scenario: 11.75 maf/yr Normal Scenario: 15.3 maf/yr Wet Scenario: 20.3 maf/yr

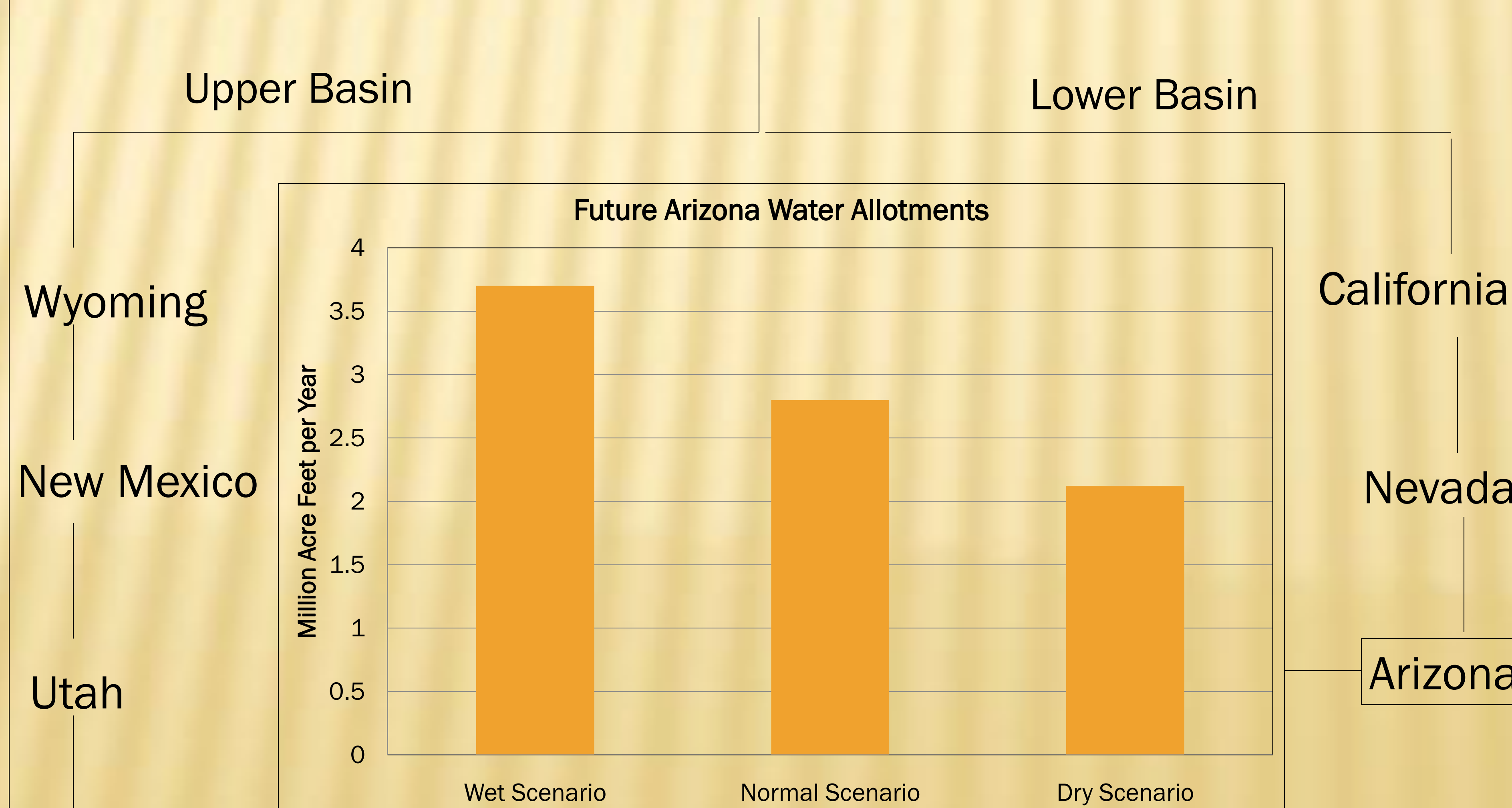


Chart A shows the water allotments for Arizona and where it is represented in the Seven Basin States

## Current Amounts Used in Cities

- Scottsdale currently uses around 249 gallons per person per day with a population of about 243,500 people
- Phoenix currently uses around 120 gallons per person per day with a population of about 1.4 million people
- Glendale currently uses around 123 gallons per person per day with a population of about 225,000 people

## Conservation Strategy

- Future GPCD will be limited to between 128 gallons and 105 gallons

Two Possible Strategies:

- Capping the amount of water used in a residential home based on the daily amounts. In order to enforce, monthly water meters would be used to determine this amount
- Residents would pre-pay for water amounts prior to the month. Once the amount was consumed in this time period, they would be forced to pay extra for using more than their amount allocated to them.

## References

Gober, P. (2010). Water planning under climatic uncertainty in Phoenix: Why we need a new paradigm. *Annals of the Association of American Geographers*, 100(2), 356-372.

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