

Colorado River Basin Climate from Instrumental Records: Climate Change Yet?

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The flow of the Colorado River exhibits more variability than any other major river system in the United States. This variability is expressed in year-to-year fluctuations, as well as in the form of regimes and episodes. Though much attention is focused on the river and its water during its lengthy desert traverse, most of the flow originates in the central and even northern portions of the Rocky Mountains and their westward extension toward the eastern Great Basin. The supply is thus largely governed by climatic conditions in those areas, and in the winter months. The demand occurs downstream, and is greater in the summer months.

Climate influences both the supply and the demand for Colorado River water, but in different ways. Observational climate records extend from the mid to late 1800s, and become more common by late in the century. Basin-wide temperature and precipitation have been interpolated to fine-scale monthly grids from 1895 to present. This record shows multi-year fluctuations of the type seen in lengthy tree-ring records. The basin is currently experiencing drought of a magnitude typically seen about once or twice a century. Temperatures have risen steadily for the past 30 years, more than any other part of the country when expressed in standard deviations. The last 7-8 years (approximately coinciding with the drought) have been even warmer. The current drought is about 1 degree C warmer than the last major drought in the 1950s and thus is not fully comparable. There have been several recent instances where spring conditions (warmer and drier) hastened and reduced the melt season.

Most climate projections call for continually increasing temperatures for the next few decades, and for near constant (middle Rockies) or modest decreases in precipitation (closer to the Mexican border). Some projections are indicating that precipitation and the soil moisture replenishment rate should have already started a gradual decline a quarter century ago. Observations have not clearly shown this. A major question hangs over the current drought: Is this a typical drought of the type seen over the past 1000 years, or a new type of drought that may be a harbinger of a more chronic condition for the region?

With population continuing to increase, there is scarcely a bigger issue facing the Southwest.