Colorado River Basin Climate: What Lies Ahead?

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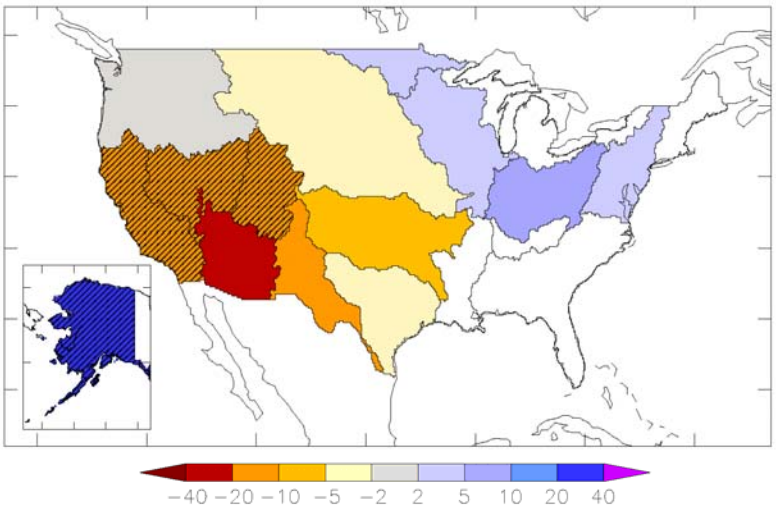
The first paper on the impacts of climate change on the Colorado River basin was written almost thirty years ago by Charles Stockton and William Boggess (1979). They found that under both warmer and drier and warmer and wetter conditions the Colorado River could lose approximately 30% of its historical flow. Since that time there have been six other studies on the impacts of climate change on the river, including three in the last three years. These studies have used a variety of methods to generate future climates, the future runoff from those climate projections, and the likely impacts of that changed runoff on water storage and deliveries from the basin. An analysis of the mean change in runoff from each study would suggest that under a warmer climate, Colorado River flow could drop by anywhere from 10% to 40% in the next 50 to 100 years. However, the range of potential outcomes from these studies also includes potential flow increases under scenarios that have increased annual, or winter, precipitation (Christensen and Lettenmaier, 2006).

Recently, there have also been other more generic studies on the impacts of climate change on the region. In 2005, a USGS scientist studied runoff from thirty-five runs from twelve general circulation models and found that 90% of the models had reduced runoff from the Upper Basin of approximately 20-30% (Milly et al.). Earlier this year another modeling study suggested that the American Southwest was on the verge of an imminent transition to a more arid climate (Seager et al. 2007). A regional analysis of the American Southwest by the 2007 Intergovernmental Panel on Climate Change suggests that annual mean precipitation is likely to decrease (Christensen et al. 2007). Common to many of the recent studies is the suggestion that Hadley cells will expand along with poleward movement of the mid-latitude westerlies and storm tracks.

Model-Projected Changes in Annual Runoff, 2041-2060

Percentage change relative to 1900-1970 baseline. Any color indicates that >66% of models agree on sign of change; diagonal hatching indicates >90% agreement.



(After Milly, P.C.D., K.A. Dunne, A.V. Vecchia, Global pattern of trends in streamflow and water availability in a changing climate, *Nature*, **438**, 347-350, 2005.)

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