Regional Highlights from

Global Climate Change Impacts in the United States

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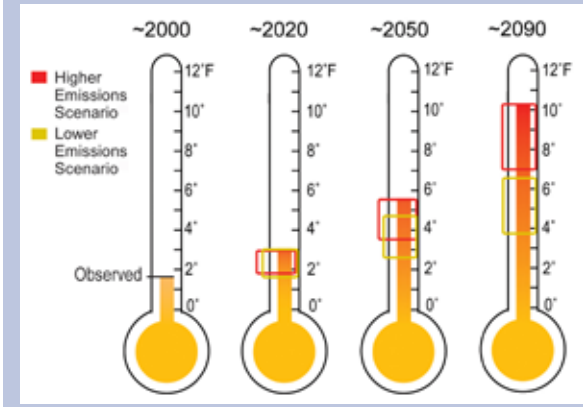
Southwest

Recent warming in the Southwest has been among the most rapid in the nation. This is driving declines in spring snowpack and Colorado River flow. Projections of future climate change indicate continued strong warming in the region, with much larger increases under higher emissions scenarios compared to lower. Projected summertime temperature increases are greater than the annual average increases in parts of the region and are likely to be exacerbated by expanding urban heat island effects. Further water cycle changes are projected, which, combined with increasing temperatures, signal a serious water supply challenge in the decades and centuries ahead. The prospect of future droughts becoming more severe due to warming is a significant concern, especially because the Southwest continues to lead the nation in population growth.

Observed and Projected Temperature Rise



Southwest temperature has already increased ~1.5°F compared to a 1960-1979 baseline. By late this century, average annual temperature is projected to rise ~4°F to 10°F above the baseline. The brackets on the thermometers represent the likely range of model projections, though lower or higher outcomes are possible.

A note on the emissions scenarios

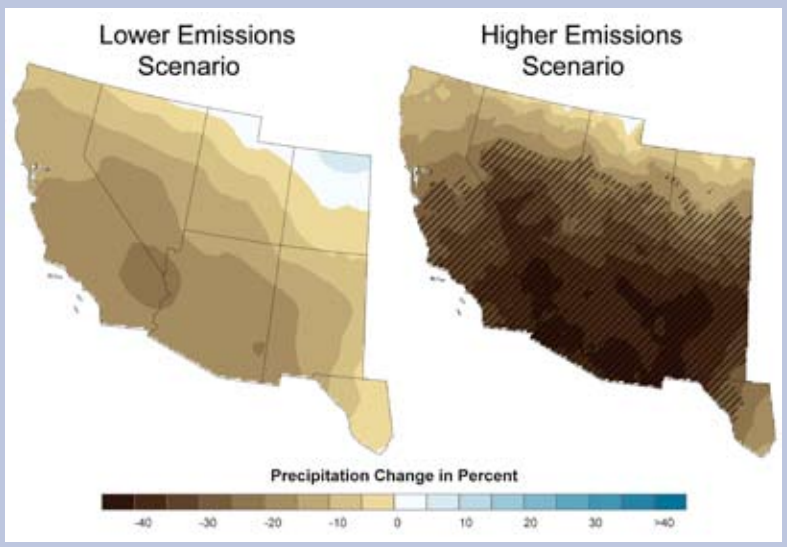
None of the emissions scenarios used in this report include any policies specifically designed to address climate change. All, including the lower emissions scenario, lead to increases in heat-trapping gas emissions for at least the next few decades, though at different rates.

Key Issues

Water supplies will become increasingly scarce, calling for trade-offs among competing uses, and potentially leading to conflict.

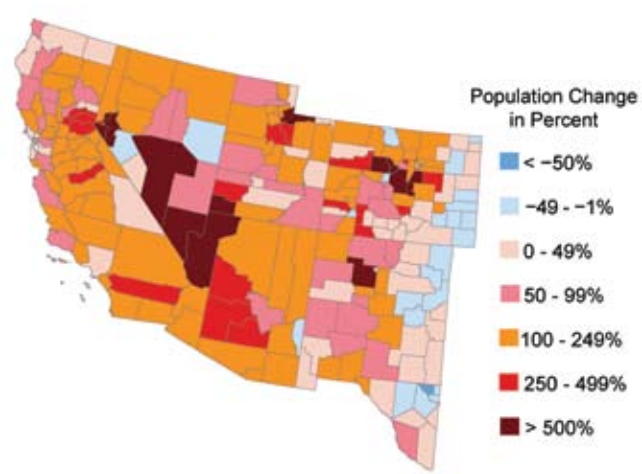
Water is vital to agriculture, hydroelectric power production, the growing human population, and ecosystems. Water supplies in some areas are already becoming limited. Large reductions in spring precipitation are projected for the Southwest. Continued temperature increases combined with river flow reductions and rapid population growth will increase competition for water supplies.

Projected Change in Spring Precipitation, 2080-2099



Percentage change in March-April-May precipitation for 2080-2099 compared to 1961-1979 for a lower emissions scenario (left) and a higher emissions scenario (right). Confidence in the projected changes is highest in the hatched areas.

Change in Southwest Population
from 1970 to 2008



The map above of percentage changes in county population between 1970 and 2008 shows that the Southwest has experienced very rapid growth in recent decades (indicated in orange, red, and maroon). This rapid population growth, coupled with continued temperature increases and river flow reductions, will increase competition for water supplies.

Increasing temperature, drought, wildfire, and invasive species will accelerate transformation of the landscape.

Impacts of climate change on the landscape of the Southwest are likely to be substantial, threatening biological diversity, protected areas, and ranching and agricultural lands. Temperature increases have made the current drought in the region more severe than the natural droughts of the last several centuries. Record-setting wildfires are resulting from the rising temperatures and related reductions in spring snowpack and soil moisture.

Increased frequency and altered timing of flooding will increase risks to people, ecosystems, and infrastructure.

Rapid landscape transformation due to vegetation die-off, wildfire, and loss of wetlands along rivers reduces flood-buffering capacity. Decreased snow cover on the lower slopes of high mountains and the increased fraction of winter precipitation falling as rain and therefore running off more rapidly also increases flood risk.

Unique tourism and recreation opportunities are likely to suffer.

Rising temperatures will adversely affect winter activities such as downhill and cross-country skiing, snowshoeing, and snowmobiling. Later snow and less snow coverage are projected for ski resort areas, particularly those in the southern part of the region. Decreases from 40 to almost 90 percent are likely in end-of-season snowpack under high emissions scenarios in counties with major ski resorts from New Mexico to California.

Cities and agriculture face increasing risks from a changing climate.

With more intense, longer-lasting heat waves projected to occur over this century, demands for air conditioning are expected to deplete electricity supplies, increasing risks of brownouts and blackouts. Much of the region's agriculture will experience detrimental impacts in a warmer future, particularly specialty crops in California such as apricots, almonds, artichokes, figs, kiwis, olives, and walnuts. These and other such crops require a minimum number of hours below a chilling temperature threshold in the winter to set fruit for the following year.

The full report, including references for the material above, can be found online at:
www.globalchange.gov/usimpacts

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