Global Warming Impacts on Arid Lands in Western United States

U.S.D.A. Assessment

The final U.S. Department of Agriculture report released in May 2008 finds climate change is creating severe threats to population centers and important natural habitats in the arid lands of the Western United states, one of the nation's fastest growing regions. The full report is available online at http://www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm

"The extent of these changes will… depend on changes in precipitation and fire. Increased drought frequency will likely cause major changes in vegetation cover. Losses of vegetative cover coupled with increases in precipitation intensity and climate-induced reductions in soil aggregate stability will dramatically increase potential erosion rates. Transport of eroded sediment to streams coupled with changes in the timing and magnitude of minimum and maximum flows will affect water quality, riparian vegetation, and aquatic fauna. Wind erosion will have continental-scale impacts on downwind ecosystems, air quality, and human populations."[1]

The five major U.S. arid land areas are the Great Basin, located primarily in Utah and Nevada; the Colorado Plateau of Utah, Colorado, Arizona and New Mexico; the Mojave Desert of California, Nevada, Utah and Arizona; the Sonoran Desert of California, Arizona and northern Mexico; and the Chihuahuan Desert of New Mexico, Texas, Arizona and northern Mexico. These areas include major population centers such as Las Vegas, Phoenix, Tucson, Salt Lake City and El Paso.

The report estimates that in the next 30 years, CO_2 concentrations will increase about 60 ppm, from today's 380 ppm to about 440 ppm. While temperatures nationwide are expected rise by an average of 2.2 degrees Fahrenheit, increases in arid regions are projected to be substantially higher. The report estimates increases in the Great Basin will reach —9 to 18 degrees Fahrenheit. This finding is backed up by a 2007 study by the National Research Council of the National Academies, which says that the Colorado River Basin, which includes Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, California and Mexico, is already the nation's fastest-warming region.[2]

Potential impacts on arid lands include:

- **Extreme Weather:** Increased drought, severe rainstorms, and erosion from wind and water, which will help spark desertification across the West's arid lands. *"Extreme climate events such as drought may act as triggers to push arid*

[1] U.S. Dept. of Agriculture, "The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity;" final report, May 2008, p. 96, http://www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm
[2] National Research Council of the National Academies, "Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability," p. 83.

ecosystems experiencing chronic disturbances, such as grazing, past desertification 'tipping points.'"[3]

- **Disappearing Desert Icons:** Major losses of signature desert species, such as saguaro cactus and Joshua trees. *"Climate change will create physical conditions conducive to wildfire, and the proliferation of exotic grasses will provide fuel, thus causing fire frequencies to increase in a self-reinforcing fashion… the probability of loss of iconic, charismatic mega flora such as saguaro cacti and Joshua trees will be greatly increased."*[4]

- **Dwindling Rivers:** Rivers and streams will be damaged by a combination of lower water flows, higher water temperatures, silting from erosion and non-native plant invasions. *"Riparian ecosystems will likely contract, and in the remainder, aquatic ecosystems will be less tolerant of stress. The combination of increased droughts and floods, land use and land cover change, and human water demand will amplify these impacts and promote sedimentation."*[5]

[3] U.S. Dept. of Agriculture, "The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity;" final report, May 2008, p. 99, www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm
[4] U.S. Dept. of Agriculture, "The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity;" final report, May 2008, pp. 119, www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm
[5] U.S. Dept. of Agriculture, "The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity;" final report, May 2008, p. 120, www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm