



**Western Forestry Leadership Coalition
Issue Brief, June 4, 2008**

**Summary of the USDA Report:
*The Effects of Climate Change on Agriculture, Land Resources, Water
Resources, and Biodiversity in the United States***

Report Overview

The U.S. Climate Change Science Program (CCSP) recently released the Synthesis and Assessment Product 4.3 (SAP 4.3): *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*. This report provides an assessment of the effects of climate change on U.S. agriculture, land resources, water resources, and biodiversity. It is one of a series of 21 Synthesis and Assessment Products being produced by the CCSP. The CCSP integrates the federal research efforts of 13 agencies on climate and global change.

The report was written by 38 authors from universities, national laboratories, non-governmental organizations, and federal service. The report underwent expert peer review by 14 scientists through a Federal Advisory Committee formed by the USDA. This 193-page assessment is based on extensive review of over 1,000 relevant scientific publications.

The synthesis discusses the ability to identify and monitor the stresses that influence ecosystems, evaluates the relative importance of these stresses and how they are likely to change in the future. The report identifies resource condition changes that are currently being observed and examines whether these changes can be attributed in whole or in part to climate change. The report includes predictions of potential climate-related impacts over the next 25 to 50 years.

Report Summary

There is robust science consensus that human-induced climate change is occurring. Climate change is currently impacting ecosystems in significant ways within the country and these impacts are likely to accelerate in the future, and in some cases dramatically. The development and assessment of mitigation and adaptation strategies are severely complicated by the complex interactions among change agents such as climate, land alteration, and invasive species.

Increases in disturbances such as forest fires, insect outbreaks, severe storms and drought increases demands on resources pushing ecosystems to altered states adding the potential for system failures. There may be near-term productivity increases in some agricultural and forest systems, but in the long-term these systems are likely to experience overall decreases in productivity that could result in economic and ecosystem service losses, and the need for new and perhaps potentially significant changes in management regimes.

Key Findings

- Grain and oilseed crops will mature more rapidly, but increasing temperatures will increase the risk of crop failures, particularly if precipitation decreases or becomes more variable.
- Higher temperatures will negatively affect livestock. Warmer winters will reduce mortality but this will be offset by greater mortality in hotter summers. Hotter temperatures will also result in reduced productivity of livestock and dairy animals.
- Forests in the interior West, the Southwest, and Alaska are already being affected by climate change with increases in the size and frequency of forest fires, insect outbreaks and tree mortality. These changes are expected to continue.

- Much of the United States has experienced higher precipitation and streamflow due to decreased drought severity and duration over the 20th century. The West and Southwest, however, are notable exceptions, with increased drought conditions in these regions.
- Weeds grow more rapidly under elevated atmospheric CO₂. Under projections reported in the assessment, weeds migrate northward and are less sensitive to herbicide applications.
- There is a trend toward reduced mountain snowpack and earlier spring snowmelt runoff in the Western United States.
- Horticultural crops (such as tomato, onion, and fruit) are more sensitive to climate change than grains and oilseed crops.
- Young forests on fertile soils will achieve higher productivity from elevated atmospheric CO₂ concentrations. Nitrogen deposition and warmer temperatures will increase productivity in other types of forests where water is available.
- Invasion by exotic grass species into arid lands will result from climate change, causing an increased fire frequency.
- The growing season has increased by 10 to 14 days over the last 19 years across the temperate latitudes. Species' distributions have also shifted.
- The rapid rates of warming in the Arctic observed in recent decades, and projected for at least the next century, are dramatically reducing the snow and ice covers that provide denning and foraging habitat for polar bears.

Link to USDA report: <http://www.climatescience.gov/Library/sap/sap4-3/final-report/sap4-3-final-all.pdf>

Upcoming SAP reports of interest:

Preliminary review of adaptation options for climate-sensitive ecosystems and resources;
Synthesis and Assessment Product Report 4.4 Release date: mid June 2008

This report will address management options for adapting to climate variability for various types of USDA administered lands (eg. Forest Service, National Parks) in the U.S. and identify characteristics of ecosystems and adaptation responses that promote successful implementation and meet resource managers' needs.

Thresholds of Change in Ecosystems; Synthesis and Assessment Product 4.2

Release date: September 2008

This report will address potential abrupt state changes or regime shifts in ecosystems in response to climate change as well as provide a framework for discussion of these shifts.

For More Information:

Diane Denenberg
Communications Director
Western Forestry Leadership Coalition
303-445-4365
diane.denenberg@colostate.edu

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http://www.wflccenter.org/infomaterials/issue_briefs.php