

Land Cover and Land-Use Change

Artist: Kelly Curl

Key Message 6.1

The Goods and Services Provided by Land Systems Are Threatened by Climate Change

Climate change has increased regional intensity and frequency of extreme rain, droughts, temperature highs, fires, and urban floods (*high confidence*), posing increased risks for roads and other infrastructure, agricultural production, forests, biodiversity, carbon sinks, and human health (*high confidence*). Climate-driven increases in wildfire extent and intensity are threatening the ability of some western forests to provide valued goods and services (*high confidence*). Climate change has disrupted the ways that people interact with the landscape for spiritual practices, recreation, and subsistence (*high confidence*).

Key Message 6.2

Changes in Climate and Land Use Affect Land-System Resilience

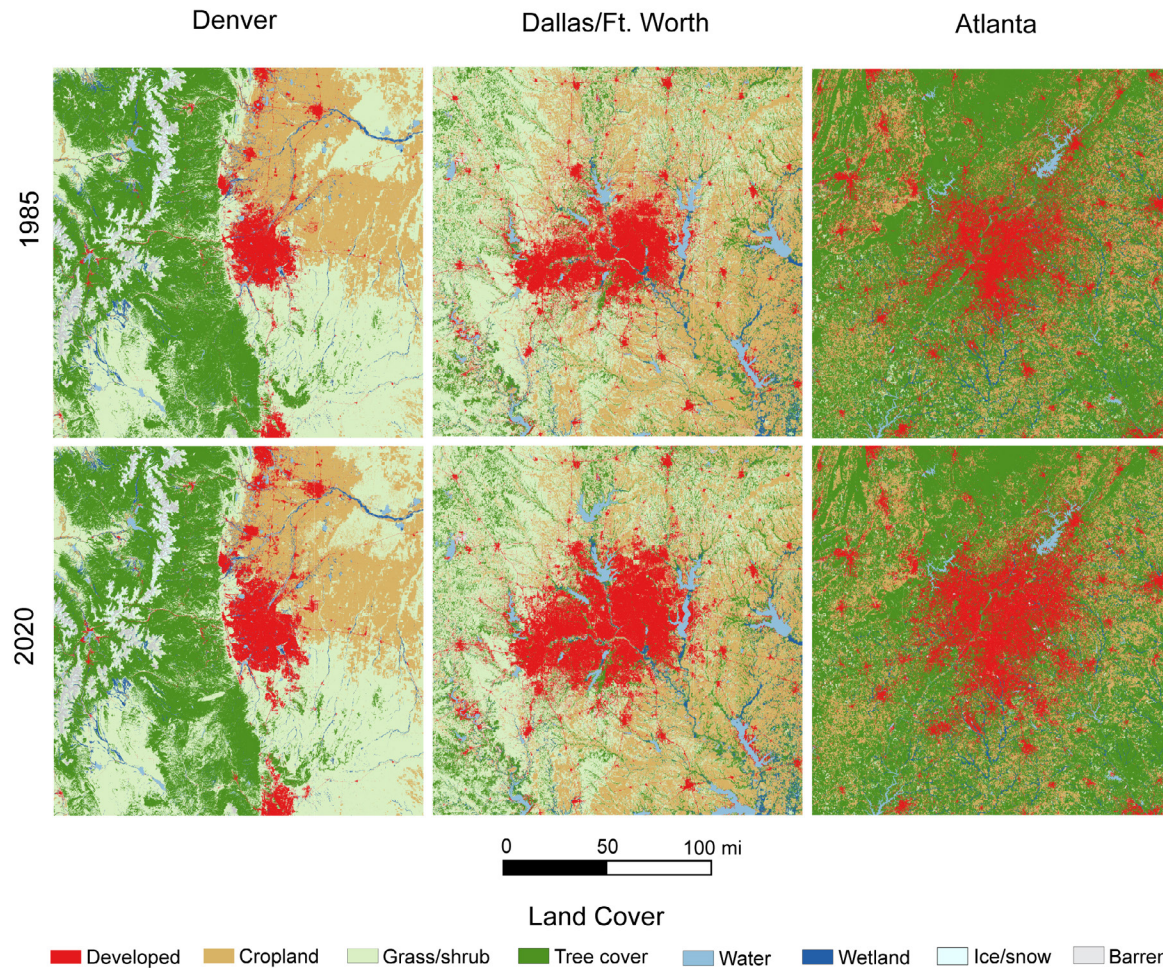
Changes in climate and land use affect the resilience of land ecosystems and thus the fate of the services they provide (*high confidence*); for example, increasing drought reduces the ability of forests to store carbon. Climate and land-use change interact, and these interactions present challenges as well as opportunities for maintaining ecosystem resilience (*high confidence*).

Key Message 6.3

Mitigation and Adaptation Priorities Will Increasingly Constrain Future Land-Use Options

The future of land use in the United States will depend on how energy and agricultural technology evolves, how the climate changes, and the degree to which we prioritize climate mitigation and adaptation in land-use decisions (*high confidence*). US cropland area had been declining but has rebounded somewhat over the last 1–2 decades (*high confidence*). Future cropland needs will depend on uncertain factors such as agricultural technology improvements, dietary shifts, and climate change impacts (*medium confidence*). Decarbonization will require a continued expansion of solar and wind energy generation and transmission infrastructure (*very likely, high confidence*) and may involve large land-use changes toward land-based mitigation measures, including reforestation, other natural climate solutions, and bioenergy crops (*low confidence*).

Expansion of Developed Land Cover



Increased development decreases natural and managed land cover.

Figure 6.3. Continuing expansion of development into vegetated land changes the array of climate-related risks to land system goods and services (KM 6.1), land system resilience (KM 6.2), and future land-use options (KM 6.3). Land-cover changes from 1985 to 2020 are shown for three urban areas: Denver, Dallas/Fort Worth, and Atlanta. Figure credit: Oak Ridge National Laboratory and USGS.

Recommended Citation

Thornton, P.E., B.C. Reed, G.Z. Xian, L. Chini, A.E. East, J.L. Field, C.M. Hoover, B. Poulter, S.C. Reed, G. Wang, and Z. Zhu, 2023: Ch. 6. Land cover and land-use change. In: *Fifth National Climate Assessment*. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023.CH6>