

# Climate Change and Changes to Ecosystems and Agriculture

**B**efore the City of Chicago existed, the area was covered by forest, savanna, grassland, and wetland **ecosystems**. These ecosystems still remain in the area, although they have been changed by housing, industry and agriculture. New ecosystems have also been developed in farms and gardens throughout the area.

Today, changes in temperature and precipitation are altering plant growing conditions and modifying animal habitats. As the climate continues to change, some plant and animal species could move out of the region, and new species could move in. Some native species may become extinct if they cannot successfully adapt to a changed climate or migrate to more suitable habitats.

## Climate Change and Chicago Ecosystems

As the climate changes, researchers expect the following changes to native ecosystems:

### The type of plants growing in the Chicago area could change.

**Figure 1** shows “plant hardiness zones,” or zones where different species of plants can grow. As the climate warms, Chicago’s zone would change. If humans switch to alternative fuels and conserve energy (a “lower” emissions scenario), Chicago’s zone would become equivalent to southern Illinois mid-century and Missouri by the end of the century. If humans

continue to depend on fossil fuels (a “higher” emissions scenario), Chicago’s zone would become equivalent to western Kentucky by mid-century, and to northern Alabama by the end of the century.

**ecosystem:** a connected system of plants, animals, and their habitats in an area

**Impacts of this change:** Some plant species in the Chicago region would migrate north and/or decrease in number. For example, there could be fewer numbers of white oak, maples, and northern red oak. Some evergreen species may disappear altogether. Also, plant species from the south

could begin to grow in the region. Gardeners and homeowners may need to replace current trees and bushes with new species that are less vulnerable to disease and/or better suited to the new climate.

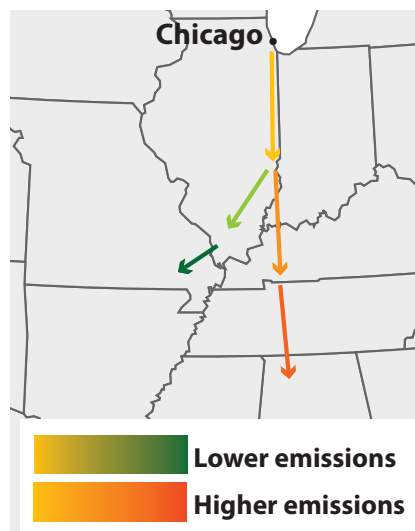
**Types of birds, insects, fish, and mammals living in the Chicago region could change.** As the climate and types of plants in the region change, so would the animals living there. Under both scenarios, many native species are projected to decrease in number, while other southern species increase. Changes in species would dramatically alter the Chicago region’s character. Also, changes in species could disrupt the balance of local ecosystems.

### Impacts of this change:

Researchers estimate that from 46 (under lower emissions) to 51 species (under higher emissions) would lose at least half their suitable habitat in the Chicago region by the end of the century.

Birds, fish, mammals, and other animals may be able to adapt to changes in climate by migrating if a green pathway is available out of their current protected area. However, protected sites for plant and animal species at risk are not currently linked to such migration pathways. As a result, migration pathways must be created for plants and species that need to migrate if they are to survive a changing climate.

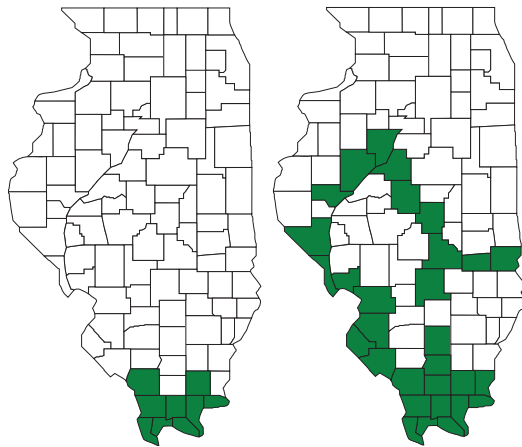
**Damage caused by plant and animal pests could increase.** Plants stressed by climate change are more



**Figure 1** Under lower emissions, Chicago’s plant hardiness zone would “migrate” along the path of the yellow arrow (30 years), the light green arrow (50 years), and then the dark green arrow (100 years). Under the higher emissions scenario, Chicago’s zone would “migrate” along the path of the yellow arrow (30 years), the orange arrow (50 years), and the dark orange arrow (100 years).

vulnerable to insect or disease attacks. Current insect pests are likely to reproduce faster and cause more damage in a warmer climate. New pests may also move into the Chicago region because they could survive the winter. Invasive plants and weeds would grow and spread more quickly under a warmer climate and higher CO<sub>2</sub> levels.

**Impacts of this change:** Weeds such as the spotted knapweed—a roadside weed that crowds out native plants—and Canada thistle—a fierce competitor for



**Figure 2** These maps show the spread of kudzu across Illinois from 1971 (left) to 2006 (right). Illinois' cold winters have stymied this invasive weed, but warming temperatures should allow it to threaten additional conservation and farmland across the state.

water and nutrients in gardens and natural areas—may become more aggressive. Kudzu, an invasive weed nearly impossible to eradicate, may spread into the

### Protecting Our Agriculture

Illinois farmers can adapt in a number of ways to the changing climate. Some options include:

- adjusting planting and harvesting dates
- planting more heat-tolerant varieties
- switching to warmer season crops (e.g., melons)
- investing more capital in irrigation, crop storage, or livestock facilities
- growing crops that benefit from increased CO<sub>2</sub>

### Protecting Our Ecosystems

What can we do to protect our ecosystems?

Reducing our emissions of heat-trapping gases will reduce the extent of climate change. In addition, we can protect ecosystems by making wise management and land use choices. Climate changes will particularly affect vulnerable or threatened species in the region. We need new or more intensive strategies of forest and park management and greater efforts to conserve vulnerable species, including creation of migration pathways.

region from the south (**Figure 2**). The Japanese beetle may cause greater damage to soybean crops. The gypsy moth, a major forest pest that harms or destroys trees, is already beginning to move into the Chicago area. These and other pests would impact gardening and farming in the Chicago area.

### Climate Change and Agriculture

Researchers expect the following changes in the agriculture industry in northern Illinois:

**Soybean production could decrease.** For every 1°C rise in temperature there is about a 17% drop in crop yield. By 2100, soybean crop yield could drop by 30% (under lower emissions) to 50% (under higher emissions).

**Increases in pests and disease may damage farm crops.** Pests and diseases would be favored in a warmer climate. Also, insects and weeds from the south, such as kudzu, may spread north into the area.

**Increases in spring flooding and hot summers may damage farm crops in the Chicago area.**

Researchers expect more rainfall in the spring, raising flood risk. Little change in summer rain combined with higher evaporation increases drought risk.

**Longer growing seasons and higher CO<sub>2</sub> levels may increase crop productivity.** These positive changes, however, may not be enough to overcome the negative effects of a warmer climate.



## Climate Change and Chicago: Projections and Potential Impacts

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