Climate Changes and Impacts in Columbus, Ohio

GLISA
A NOAA RISA TEAM

Rising Temperatures

Average Temperature

2.3°F
1951-2012

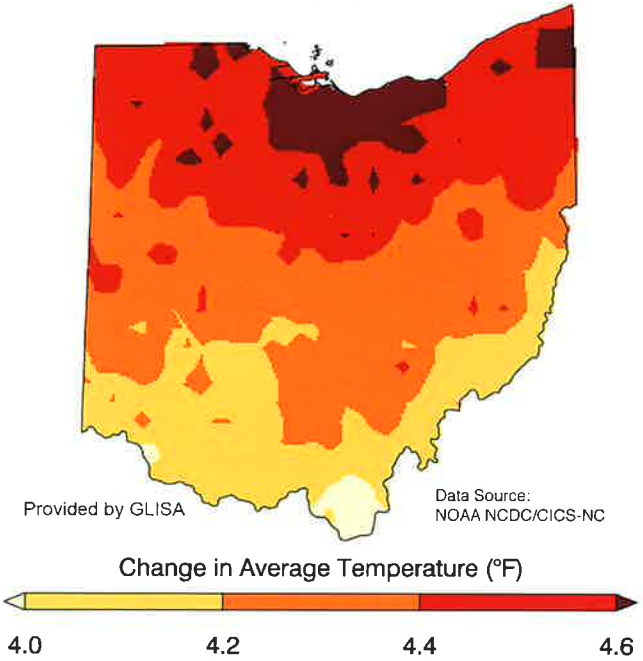
Average temperatures warmed by 2.3°F from 1951 through 2012, faster than the national and global rates. Models project this trend will continue, with temperatures rising approximately 3-5°F by mid-century.

Growing Season

26 Days
1951-2012

The length of the freeze-free season (growing season) increased by 25.5 days from 1951 through 2012, and is expected to lengthen by an additional 1-2 months throughout the coming century.

Projected Change in Average Temperature
Period: 2041-2070 | Higher Emissions: A2



Average temperatures are projected to increase by 3 to 5°F by the middle of the 21st century, depending on the rate of future greenhouse gas emissions. Shown above are mid-century projections for 2041-2070 that assume greenhouse gas emissions will continue to rise as they have in the recent past (the A2 Scenario).

What Rising Temperatures Mean for Columbus:

Dangerously Hot Days: Rising temperatures increase the potential for extremely hot days. By mid-century, Columbus could see an additional 3 to 7 weeks per year of high temperatures exceeding 90°F, and an additional 1 to 2 weeks exceeding 95°F.

Air Quality: Air quality deteriorates with warmer temperatures, increasing the risk of serious public health consequences. A greater incidence of asthma attacks and other respiratory conditions is anticipated.

Agriculture: Through mid-century, some crop types may flourish in a warmer climate. Beyond mid-century, those benefits will likely be negated by heat stress, more frequent droughts, and a greater risk from pests.

Natural Resources: Rising temperatures will alter the habitats of fish and wildlife, forcing plants and animals to migrate or adapt. Those unable to migrate with the pace of climate change will lose their advantage over other species, reducing ecosystem diversity.

Increasing Precipitation

Total Precipitation

19.8%
1951-2012

Total precipitation increased by 19.8% from 1951 through 2012, similar to changes observed in other major Ohio cities. Fall precipitation increased dramatically, by 43.5% (3.2 inches).

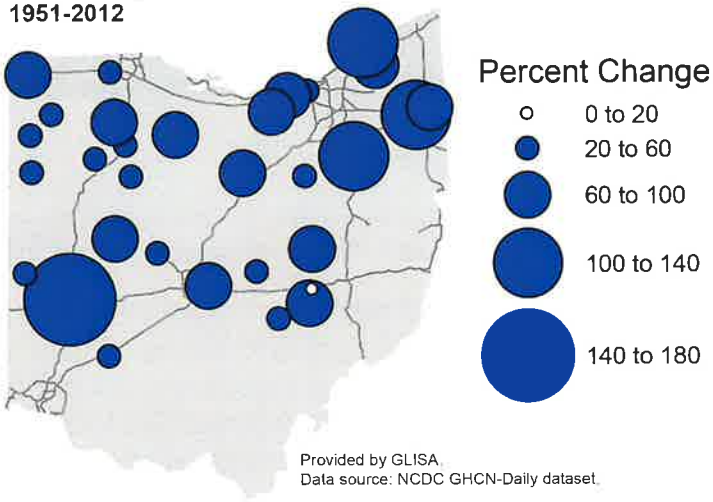
Heavy Precipitation

32%
1951-2012

Between the 1951-1980 and 1981-2010 periods, the number of very heavy precipitation events increased by 32%.

The number of days per year that saw more than 1.25" of precipitation increased by 78% from 1951-2012.

Percent Change in the Number of Days Exceeding 1.25" of Precipitation per Year
1951-2012



Provided by GLISA
Data source: NCDC GHCN-Daily dataset

Nuisance flooding and other impacts begin to occur more frequently with daily precipitation totals over 1.25 inches.

Shown above is the percent change in the number of days per year exceeding 1.25" of precipitation recorded at high-quality weather observation stations from 1951-2012. All stations have observed an increase. Long-term, contiguous climate records are limited in much of southern Ohio.

What Increasing Precipitation Means for Columbus:

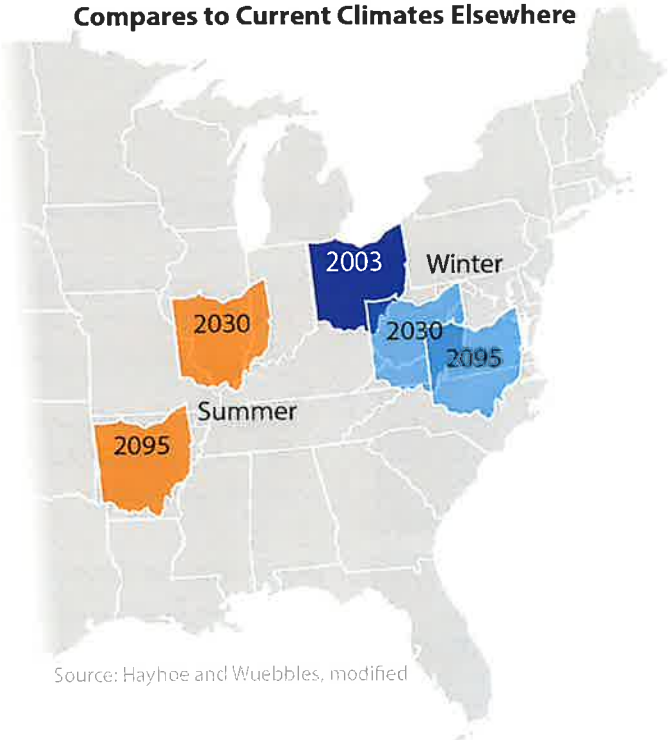
Greater Flood Risk: Ohio has seen large increases in heavy storms that can lead to flooding. Models project those trends will continue, increasing flood damage risks to infrastructure and public health.

Changing Seasonal Precipitation: As temperatures warm and precipitation increases, the form and timing of precipitation will likely change. The number of days dry enough to plant crops in the spring may be reduced, and the potential for rain on semi-frozen ground may increase.

Reduced Water Quality: With stronger storms come flashier flows, more runoff, and greater chances of sewer overflows that can contaminate water supplies.

Summer Water Availability: Many models project summer precipitation will decline even as precipitation increases during other seasons. This raises the potential for summer droughts and seasonal water shortages, particularly for agricultural and industrial use.

How the Future Climate of Ohio Compares to Current Climates Elsewhere



Source: Hayhoe and Wuebbles, modified

Based on temperature, humidity, and precipitation, future summers in Ohio might resemble those in Arkansas, and winters may become similar to those in Virginia.

Recommended Climate Adaptations for Columbus

Extreme Heat

- N1 — Establish a larger, better coordinated, more responsive network of cooling centers and draft clear guidelines for network members.
- N2 — Implement educational campaign, health advisories, and best practices for time spent outdoors in extreme heat.
- A1 — Internalize climate resilience practices in city planning to reduce the urban heat island.
- A2 — Provide programs to distribute fans, air conditioners, and water to vulnerable populations.

Air Quality & Energy

- N3 — Modernize electric grid for greater resilience and more efficient energy distribution.
- N4 — Implement educational campaign on idling reduction.
- A3 — Implement educational campaign on energy audits and renewable energy to reduce emissions for residential and business users.
- A4 — Increase number of air quality monitoring stations to provide baseline data and public educational opportunities.
- A5 — Use data and best practices to adapt transportation modes and inform economics of transportation.

Flooding

- N5 — Design and implement an educational campaign that leads to reduced impacts of stormwater and basement sewage backups, promotes use of green infrastructure, and accurately conveys risks to and responsibilities of property owners.
- N6 — Review city regulations, technical documents, departmental processes and plans, property owner programs, enforcement mechanisms, and monitoring efforts to ensure that current practices reduce localized flooding and basement/sewage backups.
- N7 — Develop an emergency plan that can be implemented during a flood to ensure adequate transportation and logistics for critical resources.
- N8 — Identify and assess risk associated with older flood control and stormwater infrastructure, and use data gathered to reduce risk by developing property owner education, informing the city's capital projects, and establishing property owner requirements.
- A6 — Advocate for state and federal government to implement policies that reduce erosion and runoff and promote infiltration.

Water Quality

- N9 — Implement the City of Columbus Watershed Management Plan and work with regional partners to implement the Sustaining Scioto Adaptive Management Plan.
- N10 — Understand the types, likelihood, and severity of events that could adversely impact the quality of drinking water sources.
- N11 — Continue upgrades to sewer system and sewage treatment infrastructure to reduce sewage contamination of waterways.
- N12 — Design an educational campaign for individuals and businesses on proper use of tap water during an emergency.
- A7 — Improve data collection to anticipate and respond to harmful algal blooms (HABs).
- A8 — Continue upgrades to water and sewage treatment infrastructure to reduce harmful alagal bloom (HAB) toxins in drinking water.

Water Use

- N13 Implement educational campaign on reducing water use.
- A9 Develop event-based water use criteria.
- A10 Update building code to require more efficient water use.
- A11 Improve irrigation through changes in infrastructure and practices that more efficiently use water.
- A12 Improve efficiency of water use in city fountains, pools, splash pads, and ponds.

Ecosystems

- N14 Promote sustainable landscaping practices for residential, commercial, and industrial properties.
- A13 Develop guidelines for city property on application of fertilizers, herbicides, pesticides, and animal waste.
- A14 Collaborate with landscaping and fertilizer companies to improve services and use of products.
- A15 Implement educational campaign for landowners to promote responsible use of fertilizers, herbicides, and pesticides.
- A16 Collaborate with organizations, agencies, and private landowners to identify and create additional green space, urban tree canopy, and urban farms.

Emergency Preparedness

- N15 Use geographic information systems (GIS) to map fixed critical assets and vulnerable populations susceptible to environmental hazards.
- N16 Evaluate city preparedness and response during and after environmental hazard emergencies.
- A17 Track and communicate costs associated with preparing for and responding to environmental hazards.
- A18 Establish contingency contracts so that sufficient resources are available in case of environmental hazard emergencies.
- A19 Develop new app or integrate with existing app for environmental hazard alerts.
- A20 Implement educational campaign to inform the public about insurance and other shared risk programs available for environmental hazards.

Vulnerable Populations

- N17 Identify representative advocacy organizations for diverse and vulnerable populations.
- N18 Facilitate cross-cultural dialogue, offer training for service providers, and share best practices.
- N19 Ensure diverse modes of communication during environmental hazard emergencies to reach diverse and vulnerable populations.
- N20 Implement educational campaign on environmental hazard preparedness to reach diverse and vulnerable populations.
- N21 Coordinate closely with the Ohio public-private partnership to manage food and water access for vulnerable populations during environmental hazard emergencies.
- N21 Require disclosure of known property problems for sale or rental of property.
- A22 Require or incentivize that monthly utility costs for rental properties be reported to potential tenants.