



Climate Change and Ecosystems



Highlights from the New York State Climate Impacts Assessment

New York State is home to a diverse array of ecosystems. These include coastal shorelines and wetlands, forests, mountaintop alpine habitat, lakes and rivers, and heavily populated urban areas. Ecosystems are dynamic networks of organisms that interact with one another—so impacts to one species can also affect many others. Climate-related changes to ecosystems have the potential to affect quality of life for all New Yorkers. The state's communities and economies depend on healthy, functioning ecosystems. For example, ecosystems provide food, water, and lumber; they prevent flooding and support the formation of soil; and they offer recreational opportunities and other cultural services.

Climate Change Impacts on New York State's Ecosystems

Climate plays a large role in the distribution and function of ecosystems. It also influences the ranges where species can live and their seasonal patterns. Climate hazards facing New York State's ecosystems include:

Rising temperatures. For example:

- Warming temperatures mean the growing season is becoming longer across the state, and winter conditions are becoming milder, with fewer days of frost and snow cover. These trends are expected to continue in the future. These changes can alter the timing of biological activities such as the flowering of plants, the arrival of migrating birds and fish, and when leaves drop in the fall.
- Rivers, lakes, and coastal waters in or near New York State have become warmer over the past few decades. As this warming trend continues, species adapted to cold water will seek more favorable habitat in colder waters. Rising water temperatures also reduce the level of oxygen in the water, causing stress for coldwater species that require sufficient levels of dissolved oxygen in water to survive.
- Climate change is worsening the state's problem with invasive species by creating conditions that make it easier for these non-native species to survive and spread. For example, a drop in the number of freezing days is allowing new pests, such as insects that feed on trees, to survive winter. Invasive species can cause economic or environmental harm or threaten human health.



The Ausable River in the Adirondack mountains is well known for trout fishing; however, rising water temperatures threaten populations of these temperature-sensitive fish.

Increasing heavy precipitation and extreme events. Intense storms, droughts, and heat waves are becoming more frequent as the climate changes. These extreme events disturb ecosystems, damaging soil, vegetation, and wildlife populations. For example, during one extreme storm event, a small wetland adjacent to a river or stream



can be eroded or buried completely. A sudden flow of water, nutrients, sediment, or toxins into a wetland from an intense storm can threaten wildlife and wildlife habitat, as well as cause harmful increases in algae growth.

Sea level rise. The state's coasts are experiencing faster rates of sea level rise than the global average. Sea level rise will have major impacts on species habitats and populations, from shellfish and grasses to birds and mammals. Coastal wetlands and marshes are especially at risk from rising sea levels.

Adaptation and Resilience Strategies

A range of adaptation and resilience strategies can help protect the state's ecosystems and the services they provide. For example:

- Ecosystem management strategies that focus on the impacts of extreme events can help preserve ecosystem services. For example, improved floodplain management can help protect areas at risk from flooding and manage stormwater runoff that impairs water quality when it flows into water bodies.
- Adaptation strategies focused on maintaining coldwater habitats will benefit temperature-stressed species, such as brook trout. Examples of these strategies include maintaining hydrologic connections to coldwater areas where species can seek refuge, improving shade cover, and management practices like dam releases of cold bottom water to lower water temperatures.
- Advances in infrastructure, such as improved sewage management and green infrastructure that uses plant and natural features, can help address the impacts of sea level rise. For example, some types of green infrastructure can help create a buffer against storm surges.
- Creating wildlife corridors, such as bridges and underpasses, improves habitat connectivity by allowing species to move safely around highways and shift their ranges in response to changing climate conditions.
- Developing tools for anticipating and detecting the arrival of new invasive species can help address the threat of invasives. So can raising awareness about invasive species and increasing education, outreach, and community engagement.

Ecosystems that are already stressed by human activities are more vulnerable to projected climate impacts. For example, land use changes that result in habitat loss or fragmentation can prevent species from migrating to new locations. For this reason, there is a clear benefit to prioritizing adaptation strategies that can address both human and climate stressors at the same time.

Learn More

Explore the New York State Climate Impacts Assessment at <https://nysclimateimpacts.org>.

Climate Equity and Justice

Several factors—such as location, access to resources, and historical marginalization—can place regions, communities, groups, and individuals at greater risk of harm from climate change impacts on ecosystems. For example, rural communities often have natural resource-dependent economies and have limited financial resources to cope with, respond to, and adapt to climate change. Many Indigenous communities harvest materials from nature for cultural activities (such as basket making) and health care needs (such as herbal medicines). This direct relationship with ecosystems increases vulnerability to ecosystem impacts.

Urban communities experience more intense impacts from extreme heat due to the heat island effect. While some communities benefit from the regulating service of tree cover, parks and green spaces are unevenly distributed in cities. Low-income communities with less access to green spaces face stronger impacts.

