

Climate Change in Rhode Island: What's Happening Now & What You Can Do

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*By the URI Climate Change Collaborative
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Climate is the overall trend of weather patterns – hot in the summer and cold in the winter. Over decades, centuries, and millennia, the Earth's climate shows natural changes. However, it is the large and unnatural change underway today that we familiarly refer to as climate change. The evidence is so overwhelming that the scientific community is in consensus that the climate is indeed changing. Climate change is affecting temperatures, the length and timing of seasons, the amount of rain and snow that falls annually, sea level, and ocean chemistry. Many of these changes have negative consequences for people and the environment, and individuals and communities should work to reduce their risks from today's climate hazards and tomorrow's effects of climate change. The table below shows current climate trends in Rhode Island and what these trends mean.

Change	Current Trend in RI	What this Means
Air Temperature	Increased 1.7°F from 1905 to 2006.	Longer, hotter summers increasing drought potential and human health effects.
Water Temperature	Increased 3.6°F since the 1960s in Narragansett Bay.	Change in species composition and dynamics. Decline of some fish species while other southern species increase. Potential for more harmful algal blooms, invasive species.
Precipitation	Rain and snow increased 0.12 inches per year over the past century (1 foot).	More rainfall, in more intense storms, means increased risk of flooding. Less snow in winter.
Storms	Hurricane intensity in the western North Atlantic Ocean has increased.	Increased erosion and damages to roads, bridges, buildings; interruption of business.
Sea Level Rise	Sea level in Newport increased 8 inches since 1930.	Loss of waterfront property, public access.

Source: R.I. Ocean Special Area Management Plan

What can we expect by the end of the century?

In general, the world is getting warmer, the oceans are getting warmer and more acidic, storms are getting more intense, and sea levels are rising at an accelerated rate. However, these trends can vary by region.

In New England, temperatures are expected to increase by a few degrees by the end of the century. While summers may be 3°F to 7°F warmer, winters will likely be 5°F to 8°F warmer. Likewise, we will continue to see a shift in the seasons. Summer weather potentially will persist longer and with more days over 100°F. Winters will be warmer with more rain and less snow. Wet days will be wetter but droughts will be more frequent.

The average annual temperature of Narragansett Bay has warmed approximately 3.6°F (with winters even greater) since the 1960s, and the Bay is expected to continue warming throughout the century. Rates of sea level rise have been increasing as well. By 2100, the R.I. Coastal Resources Management Council is planning for 3 to 5 feet of sea level rise.

What can you do?

If nothing is done to reduce the emissions that largely contribute to climate change, today's projections will likely turn out to be too conservative and the Earth as we know it may be drastically different for our grandchildren. While we allocate our resources to other issues today, we will find that climate change exacerbates today's concerns in the next decade.

To *mitigate* climate change means to reduce greenhouse gas emissions, which will slow warming of our atmosphere. Mitigation is essential to reduce the severity of climate change. However, if humans stopped emitting all greenhouse gases today, the atmosphere would still need time to "digest" all the extra carbon dioxide that is there right now. With some degree of climate change already occurring, and with more changes inevitably to come, *adaptation* is needed to reduce risk from climate changes to which we are already committed. Individuals can adapt to climate change by educating themselves about climate change and potential impacts, and taking steps to protect themselves and their property from changing conditions. Communities can adapt by encouraging leaders in government and business to take climate change into account in action plans.

What does a changing climate mean?

A changing climate will, and already has, affected most people, businesses, and the natural environment in Rhode Island. Below are some key implications to various aspects of Rhode Island's culture, economy, and environment.



With accelerated sea level rise, higher spring tide elevations of today will likely be similar to daily high tides of the future. Narragansett (upper) and Wickford (lower) are seen in September 2010.

COASTAL RECREATION AND COMMERCE

Key to our citizens and guests alike, we will need to be aware of the opportunities and challenges that come with climate change. Longer, warmer summers and milder winters will extend the beach, boating, and fishing season for most people. However, increased intensity of storms or hurricanes may force boaters to dock their boats during storms or cancel trips. Fish species from the south are already moving north to Rhode Island waters, and species native to Rhode Island may migrate north toward cooler waters. With increased water temperatures, Narragansett Bay is already seeing shifts, with reductions in bottom fish (such as flounder) and increases in squid and pelagic fish (such as scup), which inhabit the water column. There may be a decline in commercially valuable species, such as lobster, and an increase in less valuable species as a result of these shifts. Shellfish are particularly vulnerable to increasing ocean acidity, and rising water temperatures may degrade sensitive habitat, such as eelgrass, making it more difficult for juvenile fish to survive to market size.

What you can do

- Secure your boat before a storm hits, and have a hurricane preparedness plan
- Consider "soft" solutions or living shorelines instead of hardened structures to stabilize the shoreline
- Maintain/protect natural coastal features, such as dunes and bluffs, which absorb wave impacts

What your community can do

- Protect native fish habitat
- Upgrade/maintain beach facilities to accommodate erosion and increased use
- Maintain boat ramps and docks to accommodate sea level rise



Flooding in Rhode Island in 2005 (left) and 2010 (below).



COASTAL ENVIRONMENT

Rhode Island has made significant strides in conservation and management of its natural resources, but they will still be impacted by accelerated climate change. Most beaches will narrow due to sea level rise and erosion from more severe storms. In Narragansett Bay, jellyfish are becoming more abundant as the shifting of temperature affects the species dynamics of the Bay. Increasing water temperature is also a factor in the frequency of harmful algal blooms and the spread of invasive species and marine diseases. Heightened rainfall and runoff may increase nutrients and other pollution flowing into the sea. This can compromise water quality and lead to beach and shellfish bed closures. Wetlands may be “squeezed” out between the rising tide and a developed shore, as sea level rises.

What you can do

- Grow a variety of native plants to promote healthy habitats
- Maintain wider setbacks from coastal features when building near the shore
- Maintain chemical free landscapes on your property to reduce nutrient runoff

What your community can do

- Have an effective stormwater management plan that considers changing rainfall patterns
- Protect coastal wetlands and open space which absorbs flood waters
- Plant sea grasses and cord grasses to stabilize shorelines and create habitat

INFRASTRUCTURE

Bridges and roads will be more susceptible to damage because of more severe storms and heavy rainfall. However, less snow could be beneficial. Sea level rise and storminess may threaten coastal infrastructure, while increased flooding could affect inland infrastructure. The floods of 2010 severely impacted sewage treatment plants in Warwick and West Warwick, with financial, environmental, and social implications. Ocean acidification may increase the deterioration of marine infrastructure.

What you can do

- Protect your property from flood waters (elevate utilities, buy a portable pump)
- Regrade landscape and keep your gutters clean to prevent property flooding
- Evaluate your need for flood insurance

What your community can do

- Review the capital facilities improvement plan in light of climate change
- Enforce coastal development setbacks to accommodate shoreline retreat and protect property
- Encourage Low Impact Development to reduce storm runoff

COMMUNITY WELL-BEING

Increased storminess, sea level rise, and erosion will impact private and public property, facilities, and infrastructure with increased risk of flooding and other damages, as well as the loss of waterfront land (and tax revenue) and infrastructure. These impacts may result in higher insurance premiums (or potential loss of insurance) and higher taxes and fees. Changing coastal waters and wetland areas may affect community zoning and permitting.

What you can do

- Encourage community leaders to prepare for current and future risks associated with a changing climate
- Join a local civic group that is involved in community stewardship or sustainability issues

What your community can do

- Become a storm-resilient community and participate in the Community Rating System
- Update and implement actions in the Hazard Mitigation Plan
- Include sea level rise and energy efficiency in capital improvement projects



Increasing sea levels and more intense storms will impact our shores. This rocky barricade, or revetment, was scattered by an intense storm that caused sea water to overtop the rocks.

HEALTH AND AGRICULTURE

Warmer air temperatures may extend the growing season for some plants but may also affect bud setting and harm crops such as apples and maple trees (syrup) that prefer colder weather. Along with the potential for more frequent drought, changing rainfall patterns will also disrupt agriculture, causing mold problems in crops such as tomatoes, peppers, and squash. In terms of health, hotter summers indicate more heat waves, threatening in particular the elderly, city dwellers, and people who do not have a respite from the heat. Warmer temperatures may also prolong the life of ticks and mosquitoes, increasing associated risks of disease.

What you can do

- Know your flood evacuation route
- Consider natural ventilation, light-colored walls, and small shuttered windows to keep buildings cool
- Support locally grown foods and community-supported agriculture

What your community can do

- Maintain the natural and beneficial functions of floodplains
- Increase access to human health services and cooling centers
- Establish more trees and gardens on public lands



Land conservation can preserve historic agricultural land and provide local produce, while minimizing impacts of additional residential development. Photo courtesy South Kingstown Land Trust, 2008.

FOR MORE INFORMATION and links to other local sites on climate change, visit Rhode Island Sea Grant's page on climate change and hazards: seagrants.gso.uri.edu/coast/a_hazard_theme.html.

