The Rhode Island Department of Health (RIDOH) Climate Change Program is part of a national cohort of state and local health programs funded through the Centers for Disease Control and Prevention’s (CDC) Building Resilience Against Climate Effects (BRACE) framework, which allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change.

**WHO WE ARE**

Our mission is to prepare for the human health effects related to climate change to create a healthy, sustainable, and resilient future for all Rhode Islanders.

**THE RHODE ISLAND DEPARTMENT OF HEALTH CLIMATE CHANGE PROGRAM**

**WHAT WE DO**

Develop a unified climate and health adaptation strategy for Rhode Island based on the best available science and the national BRACE program standards.

Convene experts and collect resources to better understand potential climate changes in Rhode Island and to predict and monitor health effects.

Develop programs to mitigate the public health impacts of climate change.

Identify the populations most vulnerable to climate change.

**HOW WE WORK**

**EDUCATE**

the public to raise awareness about the connection between climate change and health.

**WORK**

with community partners/agencies to develop a unified and equitable adaptation plan.

**ADVOCATE**

for policy and behavioral changes that reduce/prevent emissions of greenhouse gases.

**FOCUS**

on holistic solutions, community cohesiveness, and equity.

**COORDINATE**

with local, state, and regional partners to leverage efforts to reduce negative health outcomes.

**OFFER**

a variety of programs to mitigate public health impacts among vulnerable populations.

**CLIMATE CHANGE IMPACTS ON HEALTH**

- Asthma, allergies, and other respiratory illness from increasing allergens/air pollution
- More mosquito-borne and tick-borne illnesses related to changes in ecology
- Injuries and fatalities due to severe/extreme weather and flooding
- Increased levels of water-borne diseases and harmful algal blooms
- Impacts on food supply and access to clean water due to extreme weather and droughts
- Increased levels of anxiety, post-traumatic stress disorder (PTSD), and other long-term mental health effects
- Rising temperatures could increase heat-related illness and death

**KEY CLIMATE CHALLENGES FOR RHODE ISLAND**

- Rhode Island's average temperature has increased about three degrees since 1900.
- The rest of the continental United States has had an average temperature increase of about 1.5 degrees.
- Rhode Island has seen a 76% increase in the number of heavy downpours since 1950 and has had the nation's largest increase of extreme precipitation events since the 1950s.
- Heavy rainstorms are more frequent.
- Severe storms cause more floods that damage homes, businesses, and utilities.
- Warmer weather could increase the risk of insect-borne diseases.
- Ticks that transmit Lyme disease and other diseases are active when temperatures are higher than 45 degrees.
- From 1930 to 2000, sea level at the Newport tide gauge increased an average of one inch per decade for a total of nearly 10 inches. Since 2000, the sea level rise has increased one inch every five to six years.
- Spring is arriving earlier and bringing more precipitation, and summers are hotter and drier.
- From 1930 to 2000, sea level at the Newport tide gauge increased an average of one inch per decade for a total of nearly 10 inches. Since 2000, the sea level rise has increased one inch every five to six years.
**KEY CLIMATE CHALLENGES FOR RHODE ISLAND**

- **Educate**
  - Educate the public to raise awareness about the connection between climate change and health.

- **Work**
  - Work with community partners/agencies to develop a unified and equitable adaptation plan.

- **Advocate**
  - Advocate for policy and behavioral changes that reduce/prevent emissions of greenhouse gases.

- **Coordinate**
  - Coordinate with local, state, and regional partners to leverage efforts to reduce negative health outcomes.

- **Focus**
  - Focus on holistic solutions, community cohesiveness, and equity.

- **Offer**
  - Offer a variety of programs to mitigate public health impacts among vulnerable populations.

**WHAT WE DO**

For more information on the Rhode Island Department of Health Climate Change Program, visit [http://www.health.ri.gov/climatechange](http://www.health.ri.gov/climatechange)

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**CLIMATE CHANGE IMPACTS ON HEALTH**

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- **More mosquito-borne and tick-borne illnesses related to changes in ecology**
- **Injuries and fatalities due to severe/extreme weather and flooding**
- **Increased levels of water-borne diseases and harmful algal blooms**
- **Impacts on food supply and access to clean water due to extreme weather and droughts**
- **Increased levels of anxiety, post-traumatic stress disorder (PTSD), and other long-term mental health effects**
- **Rising temperatures could increase heat-related illness and death**

**From 1930 to 2000, sea level at the Newport tide gauge increased an average of one inch per decade for a total of nearly 10 inches. Since 2000, the sea level rise has increased one inch every five to six years.**

**What we've seen:**

- Rhode Island's average temperature has increased about three degrees since 1900. The rest of the continental United States has had an average temperature increase of about 1.5 degrees.
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- Spring is arriving earlier and bringing more precipitation, and summers are hotter and drier.
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**RISING TEMPERATURES COULD INCREASE HEAT-RELATED ILLNESS AND DEATH**

- Warmer weather could increase the risk of insect-borne diseases.
- Ticks that transmit Lyme disease and other diseases are active when temperatures are higher than 45 degrees.
- Increased levels of anxiety, post-traumatic stress disorder (PTSD), and other long-term mental health effects
- Increased levels of water-borne diseases and harmful algal blooms
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- Injuries and fatalities due to severe/extreme weather and flooding
- More mosquito-borne and tick-borne illnesses related to changes in ecology
- Asthma, allergies, and other respiratory illness from increasing allergens/air pollution
In recent years, there have been higher-than-average temperatures, warmer summers, and more extreme-heat days. These changing conditions can cause more illnesses and deaths, especially for people who have cardiac or breathing problems. During an extreme-heat event, nighttime temperatures may be too warm to allow the body to cool down. It is important to be aware of both the temperature and the heat index. The heat index combines heat and humidity to measure how hot it feels to your body.

**DATA AND PROJECTIONS**

**CURRENT:**
90° FOR 10 DAYS
During an average Rhode Island summer, the heat index reaches 90°F for 10 days.

**PROJECTED:**
ABOVE 90° FOR 13-44 DAYS
Between 2020-2099, Rhode Island may experience 13-44 more days each summer that are above 90°F.

**3°
Rhode Island’s average temperature has increased by more than 3°F in the past century.

**WHAT YOU CAN DO**

**STAY UPDATED**
Check local news for extreme heat alerts and safety tips. Check on friends, family, and neighbors.

**STAY HYDRATED**
Drink plenty of fluids. (Avoid alcohol and caffeine.)

**DRESS LIGHTLY**
Wear light-colored, light-weight clothing. Use hats with brims and sunscreen with an SPF of 30 or higher.

**SEEK SHADE**
Stay out of the direct sun. Seek shady or air-conditioned areas such as libraries or malls.

**SCHEDULE**
Schedule outdoor events early in the morning when it’s cooler.

**PACE YOURSELF**
Pace yourself when you exercise.

**HEAT-RELATED ILLNESSES**
- **HEAT SPASM**: Muscle cramps that occur during or after exercise or work in a hot environment.
- **HEAT EXHAUSTION**: The body’s response (thirst, cool and moist skin, weak/fast pulse, shallow/fast breathing) to an excessive loss of water and salt, usually through excessive sweating.
- **HEAT STROKE**: A life-threatening condition characterized by high body temperature, rapid pulse, difficulty breathing, and confusion.
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**WHAT YOU CAN DO**

**VEHICLE DANGER**
Never leave a child, a disabled or elderly person, or a pet in an unattended car. A closed vehicle can heat up to dangerous levels in only 10 minutes.

**CONSERVE ENERGY**
Use solar energy to power air conditioning units. Incorporate shade trees into landscaping and use energy efficiency measures at home. Conserving energy can help decrease temperatures and the impacts of climate change.

**CHECK RHODE ISLAND EMERGENCY MANAGEMENT AGENCY WEBSITE**
(riema.ri.gov), social media, and media reports for updates of cooling center locations.

**HEAT-RELATED ILLNESSES**

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**HEAT STROKE**
A life-threatening condition characterized by high body temperature, rapid pulse, difficulty breathing, and confusion.

**AT-RISK POPULATIONS**

- Infants and young children
- Anyone with chronic, long-term medical conditions
- Disabled
- Outdoor workers
- Those who use certain medications/illegal drugs
- Low-income residents
- Elderly
- Overweight/obese
- Pregnant women
- Athletes
- Socially isolated

**DATA AND PROJECTIONS**

Extreme heat events, or heat waves, are the leading cause of extreme weather-related deaths in the United States.

Rhode Island's average temperature has increased by more than 3°F in the past century. Between 2020-2099, Rhode Island may experience 13-44 more days each summer that are above 90°F. Many Rhode Islanders do not have air conditioning, including at-risk groups.
The Northeast Regional Heat Collaborative (NERHC) was started by the Rhode Island Department of Health (RIDOH) Climate Change Program. The Collaborative seeks to reduce the number of heat-related illnesses and deaths in New England through data analysis, new partnerships, improved public health messaging, and policy changes. The group is focused on coordinating responses to protect vulnerable populations and warn the public about those risks. The Collaborative works to improve health messaging across the region and facilitate collaboration on various climate change issues.

**CURRENT DAYS ABOVE 90°F**

During an average Rhode Island summer, the heat index reaches 90 degrees on 10 days.

**PROJECTED DAYS ABOVE 90°F**

Between 2020 and 2099, Rhode Island may experience 13-44 more days each year above 90°F.

**INCREASED HOSPITALIZATIONS AND DEATHS**

Emergency department visits and deaths from all causes in Rhode Island, Maine, and New Hampshire increased by 7.5% and 5.1% respectively on days when the heat index reached 95°F, as compared to days with a maximum heat index of 75°F.

**HEAT INDEX**

Heat index is a combined measure of heat and humidity that quantifies how the weather feels.
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HEAT WARNING
The National Weather Service threshold for issuing a heat warning in the region that includes New England remains at a heat index of 105°F and above.

HEAT ADVISORY
Based on the findings of their studies, NERHC worked with the National Weather Service to lower the threshold for issuing a heat advisory in New England. The new threshold to issue a heat advisory is when the heat index is forecast to reach 95°F for any amount of time on two or more consecutive days or 100°F for any amount of time on a single day.

DATA AND KEY FINDINGS

POLICY CHANGES

NEXT STEPS
The Collaborative will continue to work with regional, state, local, and academic partners to collectively improve communication systems and focus on protecting vulnerable populations from high-heat dangers.

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STORMS AND FLOODING

With more than 400 miles of coastline and several rivers that have risen above flood stage in the past, Rhode Island may experience increases in waterborne diseases, mold growth, bacterial contamination, psychological trauma, and long-term effects on local economies. Sea level rise will magnify these impacts.

DATA AND PROJECTIONS

Rhode Island can expect greater impacts to people, homes, businesses, and utilities during and after storms.

Rhode Islanders have homes or businesses in designated flood zones.

The intensity and frequency of North Atlantic hurricanes has increased since the early 1980s.

Rhode Island sea level is rising faster than the global average, projected up to 6.6 feet by 2100.

Rhode Islanders are at risk of coastal flooding impacts. By 2050, 8,000 more could be at risk.

15TH IN THE NATION

In potential residential exposure to hurricane storm-surge damage (estimated $7.2 billion).

27K

Rhode Island sea level is rising faster than the global average, projected up to 6.6 feet by 2100.

25K

Rhode Islanders are at risk of coastal flooding impacts. By 2050, 8,000 more could be at risk.

WHAT YOU CAN DO

GET INSURANCE

If your home or business is located in a flood zone, buy flood insurance. Most standard policies do not cover damage caused by floods.

MAKE A KIT

Gather supplies, including a flashlight and extra batteries, first-aid kit, cash, food and water, essential medicines, and copies of important documents stored in waterproof containers.

MAKE A PLAN

During an emergency, it is important to know how to reach family members. Pick meeting spots and designate a Rhode Island family emergency contact. Gather and make copies of contact and medical information. Make a plan for your pets. Make sure everyone is familiar with evacuation routes.

ENROLL NOW

Rhode Island adults and children with disabilities, chronic conditions, and special healthcare needs are urged to enroll in the Rhode Island Special Needs Emergency Registry. Visit health.ri.gov/emregistry.

Lessons from Superstorm Sandy: “… Redesign your business model. Rethink. Think about the future. Think about the fact that Mother Nature is knocking on your front door, and this is not going to be the last time.” – Lisa Konicki, President, Ocean Community Chamber of Commerce (Westerly)
Rhode Island has seen the highest increase of extreme precipitation in the US since the 1950s.

During an emergency, it is important to know how to reach family members. Pick meeting spots and designate a Rhode Island Special Needs Emergency Registry.

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Rhode Islanders have homes or businesses in designated flood zones.

The intensity and frequency of North Atlantic hurricanes has increased since the early 1980s.

In potential residential exposure to hurricane storm-surge damage (estimated $7.2 billion).

Anyone who lives in a designated flood zone

Anyone who has not purchased flood insurance or has not flood-proofed their home or business

Low-income renters and homeowners

Elderly

People with special healthcare needs

People with limited transportation options

People with limited mobility

Socially isolated individuals

WHAT YOU CAN DO

Know how to turn off your gas and electricity at the main switch or valve. This helps prevent fires and explosions.

Never touch electrical equipment if you are wet or standing in water. You could be electrocuted.

Avoid walking or driving through flood waters. Turn Around, Don’t Drown! Just six inches of moving water can knock you down, and one foot of water can carry your car away.

Stay tuned to your phone alerts, TV, or radio for weather updates, emergency instructions, or evacuation orders.

Don’t Touch

Don’t Drown

Stay Tuned In

Rhode Island Department of Health
Sponsored by the Rhode Island Department of Health Climate Change Program, the Senior Resiliency Project offered free, on-site emergency planning assistance for elderly housing facilities in Rhode Island. The program was developed in partnership with the Rhode Island Division of Elderly Affairs and is funded through the Rhode Island Office of Housing and Community Development and by the federal Department of Housing and Urban Development Community Development Block Grant Disaster Recovery Grant. The program partnered with consultants from Yale New Haven Health Systems Corporation.

Rhode Island’s 65 and older population is expected to double by 2050. One-quarter of Rhode Island’s population will be 65 or older by 2030. Nearly half of people older than 65 have a disability.

LIMITATIONS
Mental and physical limitations associated with aging can lower seniors’ ability to protect themselves in an emergency.

RISK OF DEATH
Extreme heat can increase the risk of illness and death, particularly among those with congestive heart failure, diabetes, and other chronic conditions. People with certain diseases or who are taking certain medications are less able to tolerate extreme temperatures.

POWER OUTAGES
Elevators, electronic medical equipment, and air conditioning can be disrupted, so anyone who uses life-sustaining medical equipment or has impaired mobility may be impacted by prolonged power outages.

EMERGENCY
In an emergency, interruptions in medical care can be harmful or even deadly for the most vulnerable patients.
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PROJECT OUTCOMES

PREPARE
Worked with partners, stakeholders, and consultants to assist qualified long-term care facilities, assisted living residences, and independent senior housing facilities to prepare for extreme weather and disasters.

AUDIT
Provided free, site-specific energy resiliency audits and assisted in the development of all-hazards plans, including provisions for sheltering-in-place.

1. Worked with 15 sites that were directly impacted by Hurricane Irene, Super Storm Sandy, or Winter Storm Nemo.
2. Worked closely with partners to develop energy resiliency plans, shelter-in-place plans, and staff/resident training.
3. Distributed assessments and sample all-hazard plans. Comprehensive steps were taken by all partners to improve their resiliency and preparedness for future disasters.

TESTIMONIAL
“We loved the personalized site assessments that evaluated our specific facility, its equipment, and its preparedness plans ... The identification of our strengths and challenges was so helpful, but even more terrific was the fact that RIDOH offered solutions to help us reduce or eliminate vulnerabilities. The sample plans and checklists helped to keep us prepared and allowed us to self-evaluate areas for improvement.” - Rhonda Mitchell, Newport Housing Authority

For more information and to download Senior Resiliency Project templates and guides, visit health.ri.gov/srp
Climate change is expected to influence mosquitoes and the viruses they carry. Changes in precipitation and temperature may alter the primary habitat and range of mosquitoes, and impact survival and spread of viruses transmitted from mosquitoes to humans. West Nile Virus and Eastern Equine Encephalitis may become more common with climate change.

**WHAT YOU CAN DO**

**CLOTHING**
When spending time outside during warm weather, wear long-sleeved shirts/pants whenever possible, especially if outside during dawn or dusk.

**DUMP STANDING WATER**
Remove any water from unused swimming pools, wading pools, boats, planters, trash and recycling bins, tires, and anything else that collects water, and cover them.

**SCREENS**
Put screens on windows and doors. Fix screens that have holes.

**NETTING**
Put insect netting over strollers and playpens.

**BUG SPRAY**
Use EPA-approved bug spray with one of the following active ingredients: DEET (20-30% strength), picaridin, IR3535, and oil of lemon eucalyptus or para-menthane-diol. Do not use DEET on infants.

**CLEAN GUTTERS**
Remove anything around your house and yard that collects water. Clean gutters and downspouts to ensure proper drainage.
**What You Can Do**

**Symptoms of Mosquito-Borne Illnesses**

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**East and West**

**Eastern Equine Encephalitis**
- EEE symptoms include an abrupt onset of chills, fever, generally unhealthy feeling, joint pain, and muscle pain. Signs and symptoms in patients with encephalitis (brain inflammation) are fever, headache, irritability, restlessness, drowsiness, loss of appetite, vomiting, diarrhea, bluish discoloration, convulsions, and coma.

**Western Equine Encephalitis**
- EEE symptoms include an abrupt onset of chills, fever, generally unhealthy feeling, joint pain, and muscle pain. Signs and symptoms in patients with encephalitis (brain inflammation) are fever, headache, irritability, restlessness, drowsiness, loss of appetite, vomiting, diarrhea, bluish discoloration, convulsions, and coma.

**Zika Virus**
- Common symptoms of Zika include fever, rash, joint pain, headache, muscle pain, and pink eye. Zika can also be spread from pregnant mothers to their unborn children, and can cause birth defects.

**At-Risk Populations**

- Anyone who works or plays outdoors, such as athletes, hikers, gardeners, and landscapers
- Elderly
- Pregnant women (Zika virus)
- Children
- Anyone with a weakened immune system
- Travelers (Zika virus)
Ticks are found throughout Rhode Island. Tick-borne diseases are transmitted through the bite of an infected tick. You are most likely to be bitten by a tick in the spring, summer, or fall; however, ticks can survive in the winter if temperatures are above freezing. Warmer winters could increase the number of ticks and the risk for spreading tickborne diseases like Lyme disease, babesiosis, anaplasmosis, ehrlichiosis, Rocky Mountain spotted fever, and Powassan.

Ticks can be infected with bacteria, viruses, or parasites. If you are bitten by an infected tick, you may become infected. Ticks usually are found in tall grass and leafy areas and often attach themselves to you in your armpits, groin, waistline, or in your hair.

DATA AND PROJECTIONS

900+
CASES PER YEAR
Lyme disease is extremely common in Rhode Island.

4
Rhode Island has the fourth-highest rate of Lyme disease in the country.

2x
Washington County has the highest rate of Lyme disease in the state; nearly twice the rate of Newport and Bristol counties.

Changing temperature and precipitation patterns could make conditions more hospitable for ticks.

WHAT YOU CAN DO

AVOID DIRECT CONTACT WITH TICKS

Avoid wooded and brushy areas with high grass and leaf litter and walk in the center of trails.

Tuck your pants into your socks so ticks don’t crawl under your clothes.

Use products that contain permethrin on shoes and clothing.

Where to look:
- Along your hairline
- Ears
- Back of your neck
- Armpits
- Groin
- Behind the knees
- Legs
- Between your toes

Deer Tick actual size:
- Nymph
- Adult Male
- Adult Female
**WHAT YOU CAN DO**

**CHECK FOR TICKS**

Bathe or shower as soon as possible after coming indoors (preferably within 2 hours) to wash off and more easily find ticks that are crawling on you.

Conduct a full-body tick check using a hand-held or full-length mirror to view all parts of your body upon return from tick-infested areas.

Examine gear and pets. Ticks can ride into the home on clothing and pets, then attach to a person later, so carefully examine pets, coats, and day packs.

**REMOVE TICKS FROM YOUR BODY**

To remove an attached tick, grasp with tweezers as close as possible to the attachment (skin) site, and pull upward and out with a firm and steady pressure. If tweezers are not available, use fingers shielded with tissue paper or rubber gloves.

**TICK-BORNE ILLNESS AND SYMPTOMS**

**COMMON SYMPTOMS**

can include tiredness, body/muscle aches, joint pain, fever, rash, stiff neck, and facial paralysis. The type and severity of symptoms vary with the specific disease.

**SYMPTOMS CAN START**

as soon as a few days after being bitten or as late as a few months after a tick bite. Some people may have no symptoms at all.

**TICKS CAN CARRY**

Lyme disease, anaplasmosis, ehrlichiosis, babesiosis, powassan and Rocky Mountain spotted fever (rare in Rhode Island).

**EARLY DIAGNOSIS**

is helpful in successfully treating tick-borne diseases. It is important to contact your healthcare provider if you are experiencing any of these symptoms.

**AT-RISK POPULATIONS**

- People who spend recreational time outdoors
- Outdoor workers
- Pet owners
- Gardeners

**RHODE ISLAND DEPARTMENT OF HEALTH**
Climate change impacts the air we breathe, both indoors and outdoors. The changing climate has modified weather patterns, which then influence the levels and location of outdoor air pollutants such as ground-level ozone and fine-particle matter.

Increasing carbon dioxide (CO2) levels and longer, warmer seasons also promote the growth of plants that release pollen. These changes to outdoor air quality also affect indoor air quality because pollutants and allergens get into homes, schools, and other buildings through vents, open windows, or other air-handling systems. Poor air quality, either outdoor or indoor, can negatively affect the human respiratory and cardiovascular systems.

### Data

#### One in 10

- One in 10 Rhode Islanders has asthma.

#### Smoke from more and larger wildfires, even in other parts of the country, impacts local air quality.

#### American Lung Association air quality rating for Rhode Island.

#### The onset of spring bloom is occurring earlier, and the first frost is occurring later.

#### An extended growing season means longer periods of exposure to pollen and mold.

#### Increased exposure to allergens and air pollutants can cause more severe allergic reactions.

#### LOW-INCOME ADULTS IN RHODE ISLAND ARE 40% MORE LIKELY THAN OTHER ADULTS TO HAVE ASTHMA.

#### GROUND-LEVEL OZONE CAN LEAD TO REDUCED LUNG FUNCTION, MORE HOSPITAL VISITS AND ADMISSIONS FOR ASTHMA, AND PREMATURE DEATHS. GROUND-LEVEL OZONE (A KEY COMPONENT OF SMOG) IS ASSOCIATED WITH A VARIETY OF HEALTH RISKS.

#### CHANGES IN TEMPERATURE AND/OR PRECIPITATION CAN LEAD TO AN INCREASE OF ACUTE AND CHRONIC RESPIRATORY CONDITIONS.

#### WHAT YOU CAN DO

- **Rhode Island asthma rates are 33% higher than national averages for adults and 40% higher for children.**

- **Air pollution is responsible for 200,000 premature deaths each year.**

- **Ground-level ozone is associated with many health problems, including diminished lung function, emphysema, and COPD, as well as increased hospital admissions and emergency department visits for asthma.**

- **Low-income adults in Rhode Island are 40% more likely than other adults to have asthma.**

#### RESPIRATORY ILLNESSES

- **Changes in temperature and/or precipitation can lead to an increase of acute and chronic respiratory conditions.**

#### RHODE ISLAND ASTHMA RATES ARE 33% HIGHER THAN NATIONAL AVERAGES FOR ADULTS AND 40% HIGHER FOR CHILDREN.
**TRANSPORTATION**
Bike, walk, use public transportation, or car pool to help reduce air pollution and use less gas.

**RENEWABLE ENERGY**
Use renewable energy, like solar and wind, and take advantage of free energy audits.

**AIR QUALITY**
Improve your home’s indoor air quality by using non-toxic cleaners and having house plants.

**LIMIT ACTIVITY**
Limit physical activity on high-pollen-count days.

**AVOID**
Avoid using lawnmowers and charcoal grills on days with poor air quality.

**STAY UPDATED**
Be aware of Rhode Island’s Ozone Alert and see air quality levels at airnow.gov.

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**Pollen & Allergies**
Exposure to allergens and air pollutants at the same time can cause more severe allergic reactions.

People with existing pollen allergies are at an increased risk for acute respiratory effects.

Effects include eye, nose, throat, and lung irritation.

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**At-Risk Populations**
- Anyone who works or plays outdoors, such as athletes, hikers, gardeners, and landscapers.
- Anyone with heart or lung disease
- Elderly
- Children
- Anyone with medical conditions like hypertension (high blood pressure), COPD, or asthma
Climate change has the potential to impact access to safe and affordable food locally, nationally, and internationally. Increasing temperatures, drought, power outages, and ecological changes all threaten the safety and availability of our food and can pose a significant risk to Rhode Islanders’ overall health. The food we eat every day can have an impact on climate change. Eating more locally grown and sourced food helps reduce the impact of climate change.

**PROJECTIONS**

- Ecological and climatological changes are decreasing the nutritional value of some staple crops.
- More frequent droughts, floods, fires, and extreme weather events can have a major impact on crop yields.
- Climate change is making it harder to grow food locally and globally.
- Climate change poses a risk of increased foodborne diseases.

**WHAT YOU CAN DO**

- Grow your own food.
- Try to eat at least one meat-free meal per day. If you’re already doing that, gradually increase the number of meat-free meals you eat.
- Buy organic foods and/or local foods whenever possible. This helps mitigate climate change and supports our farmers and seafood industry.

Impacts of climate change can lead to significant fluctuations in food prices and food security.
WHAT YOU CAN DO

COOK FOOD PROPERLY
Cook food to proper internal temperatures to avoid illness. Keep hot foods hot and cold foods cold.

SEPARATE MEAT
Separate raw meat and poultry away from foods that won’t be cooked.

WASH & SANITIZE
Wash hands, and wash, rinse and sanitize utensils and cutting boards before and after contact with raw meat, poultry, seafood, and eggs.

REFRIGERATE
Refrigerate leftovers within two hours; keep them in the refrigerator at 41°F or below.

SHELLFISH BAN
Be aware of local shellfishing bans due to bacterial contamination.

RAW & UNDERCOOKED
Be aware of the risks or avoid eating raw and undercooked foods.

FOODBORNE ILLNESSES

Foodborne illness may result from consuming food or beverages that are contaminated with bacteria, viruses, parasites, toxins, or chemicals. Foodborne illness can also be caused by eating food that has been stored, handled, prepared, or cooked improperly.

Typical symptoms can include vomiting, diarrhea, and abdominal cramps and can be spread to other people if proper hand hygiene is not practiced.

Vibrio (vibriosis) is a diverse group of marine bacteria found naturally in coastal waters. The highest risk of Vibrio comes from consuming raw or undercooked seafood.

AT-RISK POPULATIONS

- People who eat undercooked or raw food, especially shellfish
- Anyone who loses power for more than 48 hours
- People with weakened immune systems
- Low income individuals or families
- Children
- Elderly

Climate change poses a risk of increased foodborne diseases. Climate change can affect the length and quality of the growing season. More frequent droughts, floods, fires, and extreme weather events can have a major impact on crop yields.

Impacts of climate change can lead to significant fluctuations in food prices and food security. Climate change is making it harder to grow food locally and globally. Ecological and climatological changes are decreasing the nutritional value of some staple crops. Climate change poses a risk of increased foodborne diseases.

Typically, symptoms of Vibrio can include vomiting, diarrhea, and abdominal cramps and can be spread to other people if proper hand hygiene is not practiced. Vibrio (vibriosis) is a diverse group of marine bacteria found naturally in coastal waters. The highest risk of Vibrio comes from consuming raw or undercooked seafood.
Public health, infrastructure, agriculture, and ecosystems are all impacted by water quality and supply. Waterborne bacteria, viruses, parasites, and algae all pose health risks, including gastrointestinal illnesses, liver and kidney damage, or nerve and breathing problems. As climate change contributes to the warming of Rhode Island's waters, contaminants may become more common, leading to increased cases of illness or death.

**DATA AND PROJECTIONS**

- **About 12% of Rhode Islanders get their drinking water from private wells.**
- **Climate change may make drought conditions worse.**
- **Droughts are likely to occur at least once each summer.**
- **More extreme storm events will cause more stormwater runoff and increase the concentrations of nutrients that increase the risk of fish kills in Narragansett Bay.**
- **Microalgae seaweeds, blue-green algae, and swimmer's itch, may all become more common.**
- **Fecal bacteria contamination may increase due to stressed wastewater facilities.**

**WATER QUALITY**

- **UNSTABLE WATER**
  - Heavy rainfall increases the amount of runoff and can result in making water resources unusable, unsafe, or in need of water treatment.

- **SHELLFISH BAN**
  - Summertime bans on shellfishing may increase because toxic bacteria grow better in warmer water.

**WATER SUPPLY**

- **SALINITY**
  - Rising sea level and increased incidence of drought can increase the salinity of both surface water and groundwater.

- **WATER SUPPLY**
  - Municipal water systems that get drinking water from groundwater sources are more vulnerable when there is a significant, prolonged loss of water supply.

**ASK YOUR LOCAL OFFICIALS**

Ask your local officials what actions have been taken to mitigate the impacts of climate change on drinking water.
WATER QUALITY

WHAT YOU CAN DO

TEST WELL WATER
Test well water annually. Learn more at http://www.health.ri.gov/wells

BEACH CLOSURE
Check the Rhode Island Department of Health's beach closure website at health.ri.gov/beaches.

ASK YOUR LOCAL OFFICIALS
Ask your local officials what actions have been taken to mitigate the impacts of climate change on drinking water.

CONSIDER GREEN INFRASTRUCTURE
Consider improvements that can reduce the risk of flooding and pollution.

Tiverton deals with drought: “The lack of water does lead to a health issue ... and it’s a health and safety concern for the entire community. The sanitary systems don’t work if we don’t have water.” — Robert Lloyd, Tiverton Fire Chief

AT-RISK POPULATIONS

- Anyone who lives in an area with treated drinking water systems that are vulnerable to drought, storm surge, sea level rise, or flooding
- Anyone who relies on a private well for their drinking water
- Children
- Elderly
- Anyone with a weakened immune system

WATER SUPPLY

Municipal water systems that get drinking water from groundwater sources are more vulnerable when there is a significant, prolonged loss of water supply.

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Green infrastructure (GI) refers to nature-based, site-specific stormwater management techniques. These techniques are implemented to reduce the volume of stormwater runoff entering sewer systems, while also restoring the natural hydrologic cycle. As opposed to traditional gray infrastructure, green infrastructure manages stormwater through a variety of small, cost-effective landscape features.

**How Green Infrastructure Works**

**Rainwater Capture and Re-Use**
Store runoff to water plants, flush toilets, etc.

**Evaporation and Transpiration**
Use native vegetation.

**Infiltration**
 Allows water to slowly sink into the soil.

**Environmental Benefits**

Provides natural stormwater management.

Improves energy efficiency.

Improves aquatic and wildlife habitat by reducing erosion.

Improves quality of ground and surface waters.

Improves energy efficiency.

Reduces urban heat island effect (hotter temperatures in built up areas).

**Economic Benefits**

Reduces existing and potential future costs of gray infrastructure.

Increases property values.

**Social Benefits**

Improves aesthetics and livability of urban communities.

Increases recreational opportunities.

Improves water and air quality.

Fosters environmental education opportunities.

**Types of Green Infrastructure**

- Trees
- Rain gardens
- Pocket wetlands (shallow marsh systems designed to control/de-pollute stormwater).
- Urban agriculture (backyard, rooftop, balcony, community gardening)
- Vegetated areas
- Green roofs
- Infiltration planters (containers with open bottoms to allow stormwater to slowly infiltrate the ground)
- Infiltration trenches (shallow excavations with rubble or stone to allow for storage of stormwater runoff)
- Permeable pavement
- Cisterns/Rain barrels

For more information, visit the Green Infrastructure Coalition at http://www.greeninfrastructureri.org.
**ENVIRONMENTAL BENEFITS**

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**SOCIAL BENEFITS**

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- Improves water and air quality.
- Increases recreational opportunities.
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**ECONOMIC BENEFITS**

- Increases property values
- Reduces existing and potential future costs of gray infrastructure
- Reduces energy consumption costs

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In 2015, the Rhode Island Department of Health’s Climate Change Program partnered with Brown University’s TRI-Lab (Teaching, Research, Impact), Clean Water Action, and Groundwork Rhode Island to teach a year-long course focused on climate change and environmental justice.

As a part of the course, and with input and feedback from West End residents, students developed climate change adaptation projects. Dexter Street was identified as a location that would benefit from improvements like stormwater management, more green space, and better measures for public safety and walkability. Several neighborhood-based organizations and residents were involved in meetings and with door-to-door surveys. In the spring of 2017, a nature-based project was designed and installed.

Between Potters Avenue and Cranston Street on Dexter Street, 13 trees and 32 decorative shrubs and grasses were planted. This resulted in removing 425 square feet of pavement and creating curb cuts to help direct stormwater into the ground instead of into storm drains. New trees and plants offer beauty and shade to neighborhood residents, especially children walking to and from school along Dexter Street. Groundwork Rhode Island will maintain the trees and plants and will work with community partners to continue the maintenance in future years.
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**BENEFITS OF THE PROJECT**

<table>
<thead>
<tr>
<th>PROTECTS</th>
<th>COOLS</th>
<th>CLEANS</th>
<th>ECONOMY</th>
<th>WELLNESS</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorbs water and reduces flooding</td>
<td>Cools natural and built environments</td>
<td>Uses plants and soils to filter out pollution and absorb CO2</td>
<td>Reduces utility bills and creates jobs</td>
<td>Enhances social aspects of the community</td>
<td>Attracts animals, like butterflies, turtles and frogs</td>
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The Dexter Street project serves as a model for future green infrastructure projects in Providence and throughout Rhode Island. It represents a grassroots effort with state and non-profit partners working collaboratively to develop nature-based solutions to climate change.

To learn more, visit the Rhode Island Green Infrastructure Coalition’s website, [http://greeninfrastructureri.org](http://greeninfrastructureri.org) or email info@groundworkri.org.