

# adaptation

The best, most recent climate data point to a future of increased temperatures and shifting precipitation patterns for Tompkins County and New York State. With extreme hazard events likely to increase in frequency and intensity, the community needs to take steps now to reduce community risks associated with these anticipated changes.

## PRINCIPLE

Tompkins County should be a place where the entire community is prepared for the economic, environmental, and social impacts of climate change.

## POLICIES

It is the policy of Tompkins County to:

- Maintain floodways and limit development within floodplains to reduce damages from floods.
- Improve connectivity of open space to prevent fragmentation of ecosystems and isolation of plant and wildlife populations.
- Promote adaptation measures that lessen climate impacts on the local economy.
- Encourage actions that protect vulnerable populations from the impacts of climate change.
- Prepare for community recovery in the event of disaster.

## SNAPSHOT OF THE COUNTY TODAY

As has been widely reported, over the last 100 years, average global temperatures have increased 1.4°F, sea levels are rising, and extreme weather events like heat waves and heavy precipitation are occurring with greater frequency. To provide more detailed climate forecasts and specific adaptation strategies for New York State, the New York State Energy Research and Development Authority (NYSERDA) commissioned a report titled, *ClimAID: the Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State* (2011). The ClimAid report, led by scientists from Cornell and Columbia Universities, outlines how climate change is already affecting people and resources across the state, what to expect in the future, and strategies to prepare for those impacts.

The ClimAID report specifically highlights the need for Tompkins County to prepare for the following regional impacts:

- **Heat waves** will become more frequent and intense, increasing heat-related illness and death and posing new challenges to the energy system, air quality, and agriculture.
- **Summer drought** is projected to increase, affecting water supply, agriculture, ecosystems, and energy production.
- **Heavy downpours** are increasing and are projected to increase further. These events can lead to flooding and related impacts on water quality, infrastructure, and agriculture.
- **Ecosystem changes** including species range shifts, population crashes, and other sudden transformations could have wide-ranging impacts, not only for natural systems but also for health, agriculture, and other sectors.

The ClimAID report estimates temperatures will rise 4.1°F to 6.8°F across the state by the 2050s and the average annual precipitation levels may increase by up to 12 percent in the same time period. This precipitation is not predicted to be distributed evenly over the course of the year, but will likely occur largely during the winter months as rain. An increased likelihood of drought is projected for the late summer and early fall. Continuing the latest observed trends, more precipitation is expected to fall in heavy downpours and less in light rains.

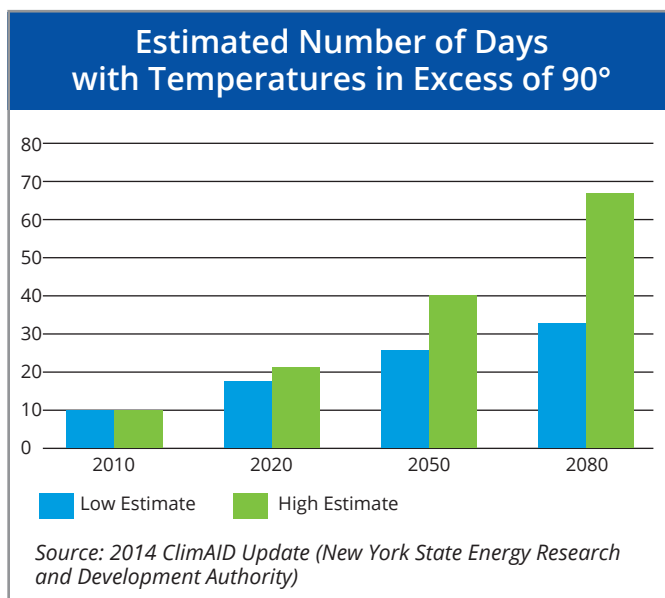
## Community Risks

The climate-related risks in Tompkins County that were emphasized in the ClimAID report point to the following specific vulnerabilities.

- **Heavy downpours** will put those living in or near floodplains at even higher risk. Businesses, roads, and other infrastructure located in floodplains will also be more at-risk. Since many homes located in floodplains are less expensive, lower income residents may be especially vulnerable to the impacts of flooding.
- **Heat waves and summer drought** increases could have impacts throughout the region. In particular, the local dairy industry, which is the county's dominant type of agriculture, is vulnerable because of the impact of heat on dairy cow milk production.
- **Ecosystem changes** will affect the county's many natural features as invasive insects, weeds, and other pests move north. In considering wood boring pests, infrastructure and buildings near heavy forest stands will be particularly vulnerable.

In addition, the ClimAID report highlights rural areas as being more vulnerable to extreme events such as floods, droughts, ice storms, and other climate-related stressors. Outdoor recreation activities, such as fishing, skiing, and snowmobiling, may also be negatively impacted by the changing climate.

In 2013, in response to severe weather events such as Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee, New



York State recommended actions be taken to more effectively respond to, and bounce back from, future storms and other shocks. The 2013 ClimAID report emphasizes the importance of taking immediate proactive actions to address both short-term and long-term needs. As the report states, “Our infrastructure was not built or financed in a day. Making it more resilient will take longer than a day, or a year, or even a decade. But the time to start is now.” It is important the community promote mitigation and adaptation strategies that enable incremental adaptation across all sectors and in every community over time.

## ISSUES AND OPPORTUNITIES

### Climate Impacts on Economy

The ClimAID report estimates that by mid-century the economic impacts of climate change are likely to approach \$10 billion annually. Impacts may be felt unevenly across regions and industries throughout the state. With an increase in severe weather events there is an increased likelihood of damage to property and infrastructure. Should substantial damage occur in the City of Ithaca, economic disruption and transportation gridlock are likely to result. While it may be difficult to determine precise impacts to Tompkins County it seems quite likely that impacts will be felt to the agriculture, tourism, and small business sectors. With anticipated changes to extreme temperatures, milk production is expected to decrease, putting Tompkins County’s largest agricultural sector, with \$37 million dollars in market value (2012), at risk.

As a region that benefits from recreational tourism like fishing, skiing, and snowmobiling, fluctuations in extreme weather events may also have impacts on this thriving industry. Lastly, small businesses may be less likely to cope with long term disruptions that could result from severe weather events and are less likely to have the capital to invest in adaptive measures to lower their risk.

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### Building Community Resilience

Community resilience is sometimes referred to as a three-legged stool of mitigation, adaptation, and response/recovery. Tompkins County has an established history of advancing mitigation measures to lessen the intensity of hazards, as well as a substantial response/recovery network to tackle hazard events during and post-event. Communities in the county have expanded hazard planning to incorporate adaptation or modification of the environment and structures to make them better suited to a changing climate. Greater attention to adaptation will be required as our region embraces new climate realities. To begin thinking more proactively about adaptation and collectively reduce hazard risk, Tompkins County and each of the other 16 municipal partners integrated the latest climate data and adaptation concepts into its *Tompkins County Hazard Mitigation Plan: 2013 Update*.

The *Hazard Mitigation Plan* profiled each of the hazards for which Tompkins County jurisdictions are at risk: 22 types of hazards affect the region. The plan defined each of these hazards, examined their historical occurrence, historic cost and damage estimates, as well as future potential impacts based on the latest available climate data. The existing hazards occurring throughout the county that could be affected by climate change are: severe storm, flash flood, ice storm, severe winter



Dryden Dairy Barn

storm, hurricane, ice jam, infestation of invasive species, lake flood, landslide, fire, utility failure, and water supply contamination. Hazards identified by the plan as areas of emerging concern are epidemics and drought.

As the effects of climate change will be experienced locally, it is imperative local communities take meaningful steps to adapt. It is becoming increasingly clear that state and local governments experiencing the negative impacts of climate change will need to lead adaptation efforts. In an era of tight budgets, it is important to identify cost-effective actions that offer multiple benefits to the community. An example of such an action is stream buffer protection which can reduce flooding downstream while at the same time improving wildlife habitat and reducing the amount of sediment and pollutants entering waterways.

### Vulnerable Populations

Specific groups are particularly vulnerable to climate hazards. These include the elderly, disabled people, and health-compromised individuals who are particularly susceptible to the impacts of heat waves; low-income people who have limited ability to meet higher energy costs; farm workers who may be exposed to more chemicals if pesticide use increases in response to climate change; asthma sufferers who will be more vulnerable to the decline in air quality during heat waves; and people who depend on public transportation and lack private cars for evacuation during emergencies. Small businesses are also identified as being particularly vulnerable, as they are typically less able to cope with costly climate related interruptions and stresses, such as power and communication service disruptions, than larger businesses. By identifying and working with vulnerable populations and assessing barriers they face in building resilience, the community will be able to support those in greatest need in reducing risks from climate change.

### Climate Science and Local Municipalities

One outcome of the Tompkins County hazard mitigation planning process and the release of the region-specific ClimAID report was increasing interest on the part of local governments in staying up-to-date on climate science. Municipalities realize that to prepare towns, villages, and

city for these impacts, it will be crucial to receive regular updates on likely impacts of climate change. This presents an opportunity for researchers at Cornell and State agencies to share the latest climate information with municipalities and discuss implementation strategies on a regular basis.

### Protecting Natural and Physical Infrastructure\*

The potential for more flooding in the area calls for an increased vigilance as to how and where development occurs. It is critical new development occur outside of high risk areas, such as floodplains, and decisions on infrastructure investments be made with climate change in mind. Actions that advance both resilience and quality of life offer multiple community benefits.

It is particularly important to protect floodplains, stream buffers, and wetlands as they all play critical roles in water management. These areas can be maintained in their natural state as well as restored when their ability to function have

declined. Future development, including fill, can be located away from floodplains, streams, and wetlands and existing structures can be relocated out of those critical areas. A community priority is the updating of area Flood Insurance Rate Maps to better identify high risk floodplains. The New York State Department of Environmental Conservation is currently creating the process by which floodmaps will be updated in Tompkins County.

One tool to help in the protection of floodplains is FEMA's Community Rating System which provides flood insurance premium reductions to residents in communities that participate in the program. This program requires municipalities meet higher flood risk awareness, like providing property owners with technical advice on how to protect their building from flooding and having stronger floodplain regulations to ensure currently vacant floodplain parcels will be kept free from development. To date, none of the communities in Tompkins County are participating in this program.

Expensive investments in physical infrastructure, such as water and sewer mains, treatment plants, roads, roadside ditches, bridges, and government offices should all include climate change projections in the design, maintenance, and

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\* For more information see the Water Resources Chapter, "Stormwater Runoff and Flooding" section.

decision-making process. With significant public investment expected to be required in the future to help overcome the impacts of climate change, decisions now should be made with an eye toward making sure these investments can endure.

## Climate Displacement

Although Tompkins County is at risk to many of the aforementioned hazards, it remains a comparatively resilient place. The county has bountiful and high-quality natural resources, including clean and abundant water, and fewer dramatic swings in weather patterns than is predicted for other regions of the United States and world. As more communities experience severe effects of climatically induced hazards, areas like Tompkins County may become highly attractive to people currently living outside of the county. An influx of “climate refugees” would require adaptation of local plans and strategies.

## Communicating Adaptation

Despite a growing awareness that climate change is happening and already impacting Tompkins County, much needs to be done to improve how these critical risks and necessary adaptation measures are communicated to the county’s diverse population. Strengthening engagement in all sec-

tors of the community around issues of climate change will increase awareness, decrease risk, and improve resilience.

## TAKING ACTION

**STRATEGIES.** The best framework for advancing adaptation is through implementation of the *Tompkins County Hazard Mitigation Plan*. The 2013 plan examined hazard impacts in relation to the latest climate science and includes recommended steps for advancing adaptation and mitigation measures. These measures included things like performing engineering based risk assessments on critical facilities that take into account climate projections and developing a countywide debris management plan.

Adaptation actions can be categorized as follows:

- Resistance – actions to resist the impacts, like the establishment of manmade barriers
- Adjustment – actions to modify existing practices, like changing development patterns, land use, health programming, and engineered design
- Retreat – actions to leave key areas in a natural state, like abandonment of development and the restriction of development in hazardous areas

Part of the benefit in advancing adaptation through the *Hazard Mitigation Plan* is that each of the municipalities in Tompkins County participated in preparing the plan and implementation meetings occur at least annually. Also, funding is available from FEMA for pre-disaster mitigation work, as long as local hazard mitigation plans are updated every five years.

**PARTNERS.** Adaptation will largely be driven by agencies in the areas of planning, public works, health, and emergency response. To advance adaptation, in part through mitigation, it is essential that each local municipal partner is involved. One of the critical partners to communicate concerns and coordinate actions will be the Tompkins County Council of Governments (TCCOG). Due to the multi-disciplinary nature of adaptation it is further important to work closely with the Tompkins County Climate Protection Initiative (TCCPI), the Tompkins County Emergency Planning Committee, the County Health Department and local climate scientists.



Flooded Community Space at Titus Towers, City of Ithaca

**COUNTY ROLE.** County Government has a number of important roles with respect to adaptation. The County Planning Department, Health Department, Department of Emergency Response, and County Highway Division are all involved in aspects of implementing the *Hazard Mitigation Plan* including those items related to adaptation. In addition, the Tompkins County Environmental Management Council, Water Resources Council, and Agricultural and Farmland Protection Board will play key roles in advancing adaptation into the future.

## **County Actions to be Initiated within Two Years**

- Assess the vulnerability of the County government's critical facilities to the impacts of climate change.
- Prepare a community disaster recovery plan to prepare the community to take the actions; including those that build economic resilience, to bounce back from a disaster should it occur.
- Conduct an inventory of pipeline stream crossings in the county and identify those of highest priority in order to advance measures to reduce risk to human health and the environment.