



# Climate Vulnerability Analysis

## Seasonal Drought

New Lebanon  
Climate Smart  
Communities  
Task Force

December 29, 2020

# Climate Smart Categories

● 1. Build a climate-smart community.

● 2. Inventory emissions, set goals, and plan for climate action.

● 3. Decrease energy use.

● 4. Shift to clean, renewable energy.

● 5. Use climate-smart materials management.

● 6. Implement climate-smart land use.

● 7. Enhance community resilience to climate change.

● 8. Support a green innovation economy.

● 9. Inform and inspire the public.

● 10. Engage in an evolving process of climate action.

● 11. Innovation

● 12. Performance

# PE7 Actions

- Identify Top Hazards and Vulnerability
- Evaluate Existing Policies
- Create a climate adaptation plan
- Update Hazard Mitigation Plan

## 7. Enhance community resilience to climate change.

### PE7 Action: Climate Vulnerability Assessment

4 Points

 Bronze Priority  Silver Priority

▪ THIS ACTION HAS VARIABLE POINTS: 4, 8, 16 ▪ COMPETITIVE FUNDING AVAILABLE

### PE7 Action: Evaluate Policies for Climate Resilience

6 Points

 Bronze Priority  Silver Priority

▪ COMPETITIVE FUNDING AVAILABLE

### PE7 Action: Climate Adaptation Plan

3 Points

# Climate Vulnerability Assessment

Based on review of climate models, identify top hazards for community,



determine:

- Exposure
- Sensitivity
- Adaptive Capacity

## ● 7. Enhance community resilience to climate change.

### PE7 Action: Climate Vulnerability Assessment

4 Points

 Bronze Priority  Silver Priority

• THIS ACTION HAS VARIABLE POINTS: 4, 8, 16 • COMPETITIVE FUNDING AVAILABLE

# Climate Projection for New Lebanon

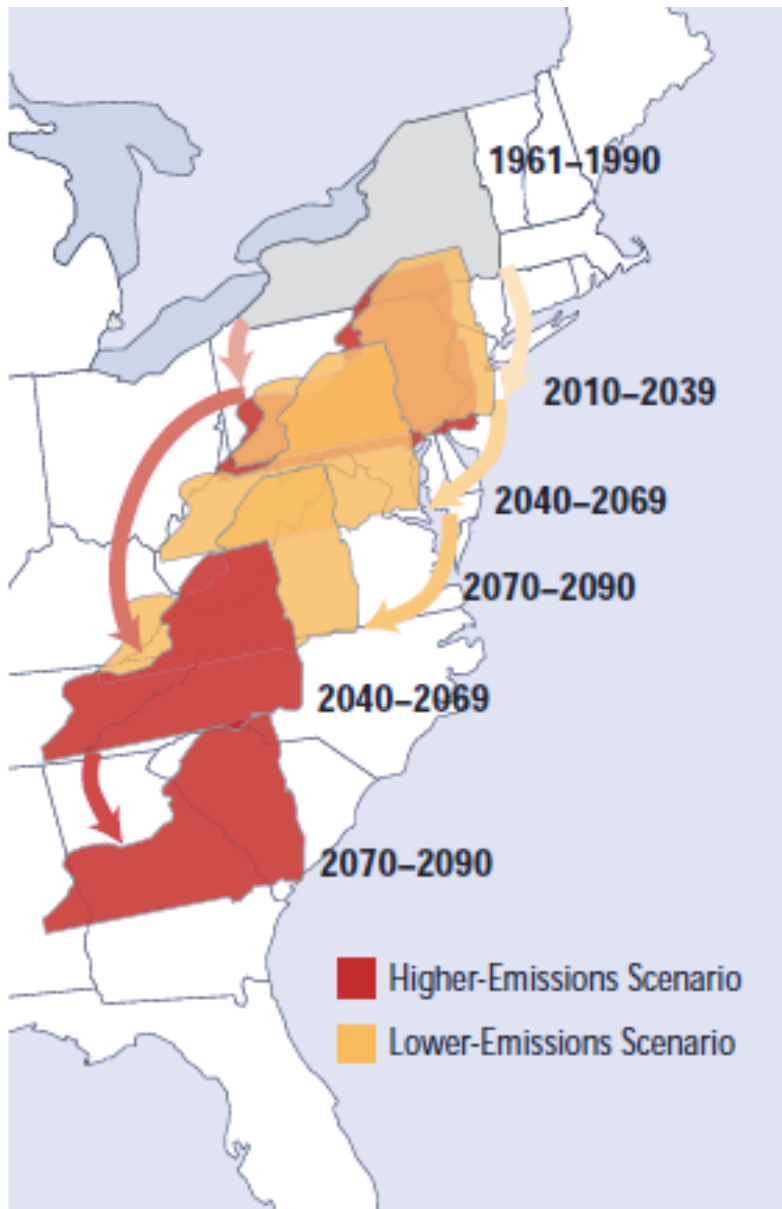
- Reviewed climate projections provided by New York State, Massachusetts, NOAA, scientific literature
- Time scale is 2020-2100

## Temperature Projections for Region 5 NYS ClimAID report (2014)

### Region 5 (Saratoga) – Temperature

Baseline (1971-2000) 47.6 °F	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
2020s	+ 1.7 °F	+ 2.3 to 3.2 °F	+ 3.7 °F
2050s	+ 3.5 °F	+ 4.5 to 6.2 °F	+ 7.1 °F
2080s	+ 4.1 °F	+ 5.6 to 9.7 °F	+ 11.4 °F
2100	+ 4.4 °F	+ 6.1 to 11.4 °F	+ 13.6 °F


# Climate Projections For New Lebanon



Union of Concerned Scientists (2007)



# Possible climate hazards for New Lebanon

- Storms (winter, summer, ice, wind, hurricanes, tornados)
  - Flooding
  - Heat Stress
  - Seasonal Drought
  - Invasive Species
  - Wildfire
- 

## Why focus on drought?

- Emerging threat in Western New York
- Possibly underestimated as a risk in current hazard mitigation planning
- Currently ranked 10<sup>th</sup> in Columbia County

Hazard	Score	Rating
Severe Storm	280	Moderately High
Hurricane	254	Moderately High
Tornado	246	Moderately High
Flood	232	Moderately Low
Earthquake	188	Moderately Low
Winter Storm (Severe)	179	Moderately Low
Dam Failure	143	Low
Ice Storm	126	Low
Ice Jams	124	Low
Drought	117	Low
Wildfire	112	Low
Landslide	110	Low
Infestation	108	Low
Extreme Temps	96	Low
Coastal Storm	N/A	N/A
Hailstorm	N/A	N/A
Expansive Soils	N/A	N/A
Windstorm	N/A	N/A



DROUGHT

Oct

# Second Ithaca Drought in Five Years Threatens Water Supply and Local Ecosystem

By Omsalama Ayoub



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Climate change is driving the development of drought patterns in New York, threatening the agricultural sector and drying up local water sources — including Ithaca.

Last month, the water supply in Six Mile Creek was at a third of its average flow rate: an alarming five cubic feet per second as opposed to its standard rate of 15 cubic feet per second. The low flow rate prompted Cornell and the City of Ithaca to issue a Level 1: Limited Water Use Advisory to encourage more water conservation on Sept. 22. The advisory was only lifted on Oct. 21.

This is the second time in less than five years that Ithaca has experienced a drought. According to the Cornell Institute for Climate Smart Solutions, the 2016 drought caused a majority of unirrigated rain-fed crops in New York to experience crop failures.

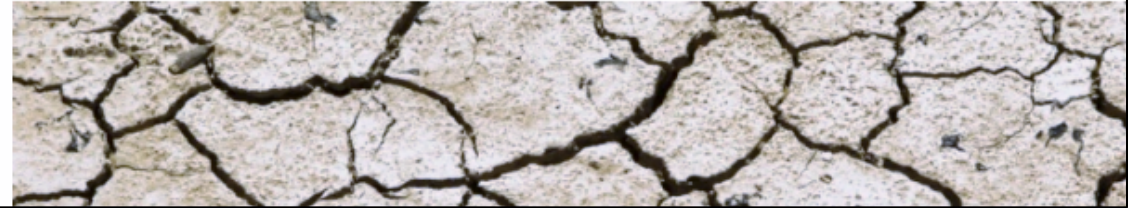
“Drought is how far we are from our normal amount of rainfall relative to what the ecosystem has evolved to need,” said Prof. M. Todd Walter, biological and environmental engineering.

*Cornell Daily Sun*  
October 26, 2020

# 2020 water shortages near New Lebanon

NEWS

## Pittsfield steps up drought prevention measures, mandates water conservation



### Berlin/Petersburgh

AUGUST 8, 2020 BY [STEVE BRADLEY](#) — [LEAVE A COMMENT](#)

#### Water Woes Impact Municipal Supplies

*Doug La Rocque*

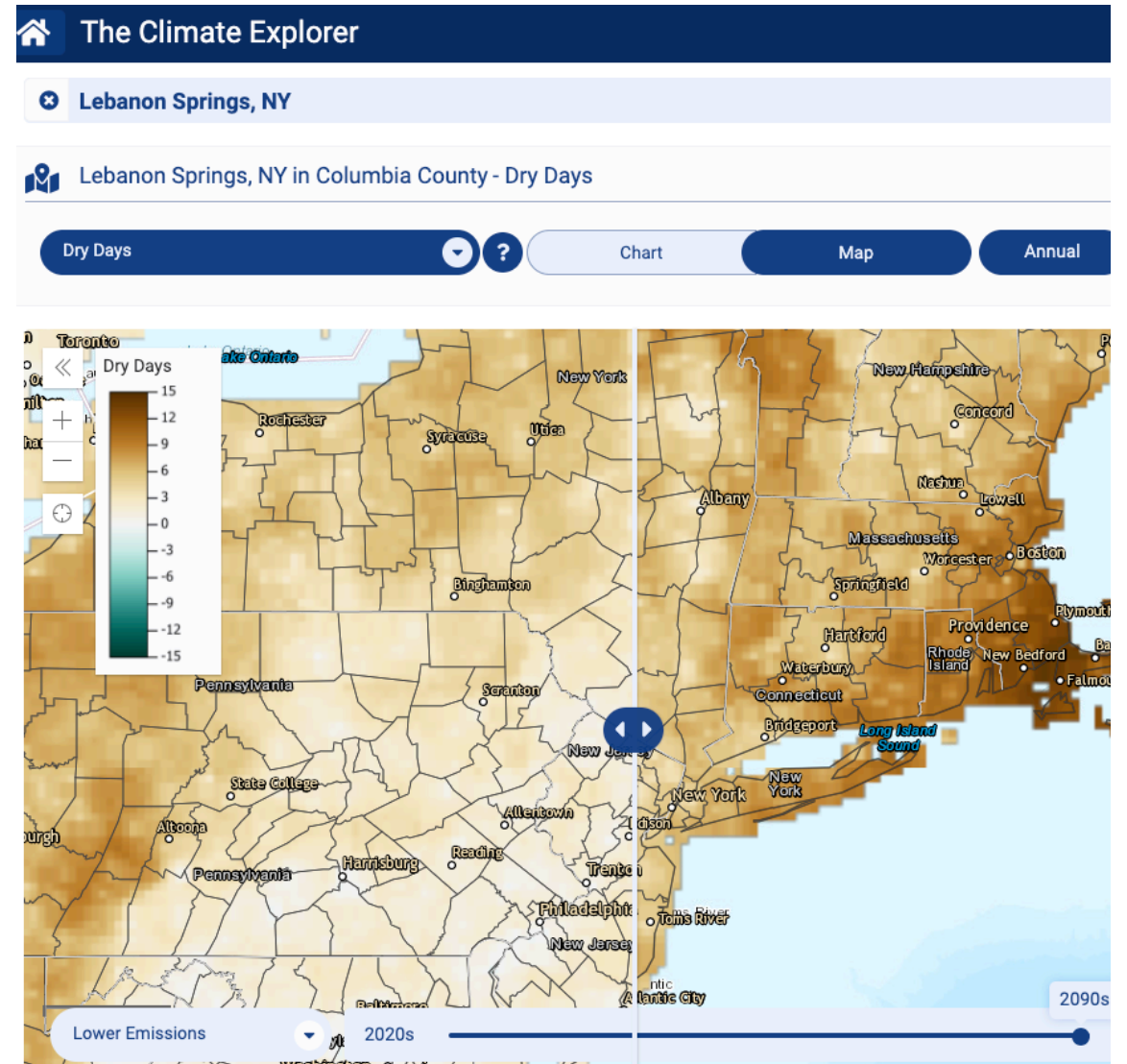
During the past week, the Water District Superintendents in both Berlin and Petersburgh have issued boil water advisories, although Berlin's has since been rescinded. The reasons for the advisories differ although the inconvenience is the same.

In Petersburgh, the Town has posted a letter to its website that explains the root cause is a lack of water in the water tower, which town officials believe is a combination of the recent drought impacting Rensselaer county and possible leaks in the distribution system.

# Drought analysis for New Lebanon

Extrapolating regional climate projections down to town level:

- From 2020-2100 possible to see gradual increase in number of consecutive dry days



# Possible impacts of longer seasonal drought

## Possible impacts

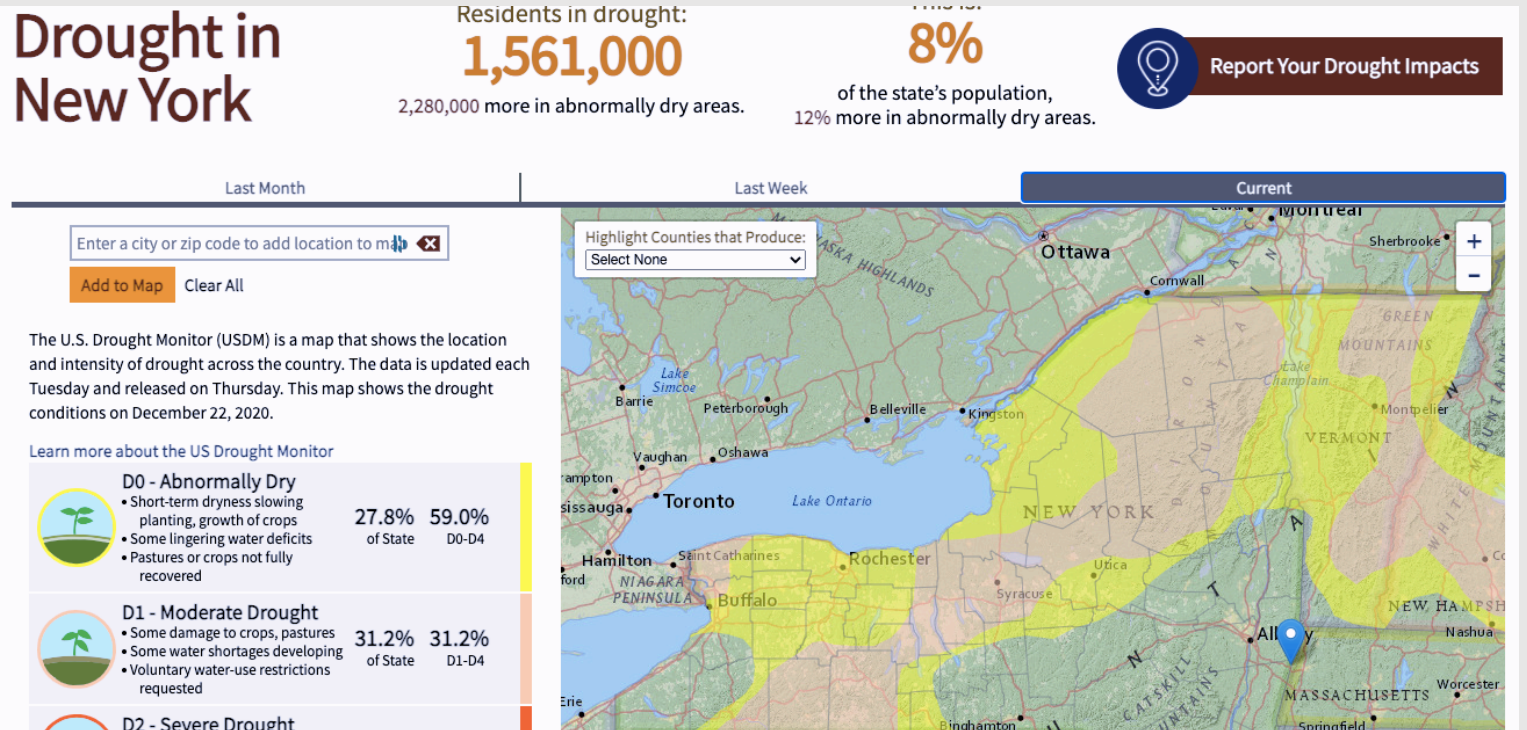
- More frequent dry wells
- Crop damage
- Impact on ecosystem
- Increase in wildfire risk

## Sensitivity

- Digging wells may impose financial cost
- Lower income residents may have higher financial exposure
- As more residents move here, this could further strain underground water supplies

# Drought mitigation

- Early Monitoring
- Watershed management to reduce stormwater runoff
- Crop insurance for farms
- Drought response plan
  - Reducing water usage
  - Emergency water supplies



# Next steps

- Community engagement
- Identify vulnerable drought areas
- Assess and prioritize other hazards
- Use hazard prioritization to inform:
  - CSC Climate Resilience Plan
  - New Lebanon Emergency Management Plan
  - Columbia County Hazard Mitigation plan

Climate Smart  
Communities Task Force  
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# References

- Anderson, M. G., Barnett, A., Clark, M., Ferree, C., Sheldon, A. O., & Prince, J. (2016). Resilient Sites for Terrestrial Conservation in Eastern North America 2016 Edition. *The Nature Conservancy*. 202. [https://climatechange.lta.org/wp-content/uploads/cct/2016/07/Resilient\\_Sites\\_for\\_Terrestrial\\_Conservation.pdf](https://climatechange.lta.org/wp-content/uploads/cct/2016/07/Resilient_Sites_for_Terrestrial_Conservation.pdf)
- ArcGIS [GIS software]. Version 10.7.1 Redlands, CA: Environmental Systems Research Institute, Inc., 2019.
- Climate Explorer* (n.d.). National Oceanic and Atmospheric Administration (NOAA). Retrieved December 17, 2020, from <https://toolkit.climate.gov/>
- Climate Smart Communities - Actions* (n.d.). New York State Department of Environmental Conservation. <https://climatesmart.ny.gov/actions-certification/actions/>
- Columbia County, NY (2020). Columbia County Geo-Data. Retrieved December 17, 2020, from <https://geodata-cc-ny.opendata.arcgis.com/>
- Columbia County Hazard Mitigation Plan, 2018*. (2018, April). Columbia County, NY. <https://docs.google.com/a/columbiacountyny.com/viewer?a=v&pid=sites&srcid=Y29sdW1iaWFJb3VudHlueS5jb218Y29sdW1iaWFtY291bnR5LXNoZXJpZmYtcy1vZmZpY2V8Z3g6NDNmYzY3YWZhZTk5ZGY2Mg>
- Current Drought Conditions* (n.d.). NYS Dept. Of Environmental Conservation. Retrieved December 24, 2020, from <https://www.dec.ny.gov/lands/5017.html>
- Downen, R. (2017, April 29). Devastation of 2016 drought looms in farmers' minds, plans, wallets. *Times Union*. <https://www.timesunion.com/tuplus-business/article/Devastation-of-2016-drought-looms-in-farmers-11109159.php>
- Fernandez, R., & Zegre, N. (2019). Seasonal Changes in Water and Energy Balances over the Appalachian Region and Beyond throughout the Twenty-First Century. *Journal of Applied Meteorology & Climatology*, 58(5), 1079–1102. <https://doi.org/10.1175/JAMC-D-18-0093.1>
- Frumhoff, Peter C., James J. McCarthy, Jerry M. Melillo, Susanne C. Moser, and Donald J. Wuebbles. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*. Cambridge, MA: Union of Concerned Scientists (UCS), 2007. <https://www.ucsusa.org/sites/default/files/2019-09/confronting-climate-change-in-the-u-s-northeast.pdf>
- Horton, R., Yohe, G., Easterling, W., Kates, R., Ruth, M., Sussman, E., Whelchel, A., Wolfe, D., & Lipschultz, F. (2014). Ch. 16: Northeast. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program. <https://doi.org/10.7930/J0SF2T3P>
- La Roque, D. (2020, August 8). Water Woes Impact Municipal Supplies. *The Eastwick Press*. <https://eastwickpress.com/news/2020/08/51887/>
- Massachusetts Climate Change Adaptation Report* (2011). Massachusetts Executive Office of Energy and Environmental Affairs.. Retrieved December 24, 2020, from <https://www.mass.gov/service-details/2011-massachusetts-climate-change-adaptation-report>

# References

Massachusetts Highway Survey Section (2020, September). *Community Boundaries (Towns) from Survey Points*. <https://docs.digital.mass.gov/dataset/massgis-data-community-boundaries-towns-survey-points>

*Mitigate NY* (n.d.). New York State Division of Homeland Security and Emergency Services (DHSES) - Mitigation Planning. Retrieved December 17, 2020, from <https://mitigateny.avilabs.org/local>

*Natural Hazard Mitigation Saves* (2019). National Institute of Building Sciences. (n.d.). Retrieved December 24, 2020, from <https://www.nibs.org/page/mitigationsaves>

*Responding to Climate Change in New York State (ClimAID)* (2011 & 2014). New York State Energy Research and Development Authority (NYSERDA). Retrieved December 17, 2020, from <https://www.nysERDA.ny.gov/About/Publications/Research%20and%20Development%20Technical%20Reports/Environmental%20Research%20and%20Development%20Technical%20Reports/Response%20to%20Climate%20Change%20in%20New%20York>

Rossman, L. A., & Bernagros, J. T. (2019). National Stormwater Calculator User's Guide—Version 2.0.0.1. 99. U.S. Environmental Protection Agency. [https://www.epa.gov/sites/production/files/2019-04/documents/swc\\_users\\_guide\\_desktop\\_v1.2.0.3\\_april\\_2019.pdf](https://www.epa.gov/sites/production/files/2019-04/documents/swc_users_guide_desktop_v1.2.0.3_april_2019.pdf)

Sheridan, J. (2020, September 7). Pittsfield steps up drought prevention measures, mandates water conservation. *ABC News Albany*. <https://www.news10.com/news/pittsfield-steps-up-drought-prevention-measures-mandates-water-conservation/>

*Town of Richmond Community Resilience Building (CRB) Workshop Series* (2020, December 15). Weston & Sampson, Inc. Retrieved December 24, 2020, from <https://sharefile.wseinc.com/message/m5hzlgbONlhGipKSuQdyDb>

*US Drought Portal* (n.d.) National Integrated Drought Information System. Retrieved December 24, 2020, from <https://www.drought.gov/drought/>

USGS (2018). *National Hydrography Database*. Retrieved December 23, 2020. <https://geodata-cc-ny.opendata.arcgis.com/datasets/streams-nhd?geometry=-84.382%2C40.606%2C-63.289%2C43.461&showData=true>

USGS (2020). *National Elevation Dataset, North America*. Retrieved December 17, 2020 <https://cugir.library.cornell.edu/catalog/cugir-008186>