SECTION 3.2 CLIMATE AND PRECIPITATION

Municipal Climate Data

The average temperatures for Wawarsing, Rosendale, Marbletown and Rochester are all similar to each other and the US average. None of the towns have average temperatures above 80^0F or below 10^0F. Precipitation within each town is greater than the US average, with no town receiving more than 5 inches of precipitation. Rosendale has the least variation in precipitation with Marbletown, Wawarsing and Rochester having periods of lows of 3 inches followed by highs of 4 to 5 inches.

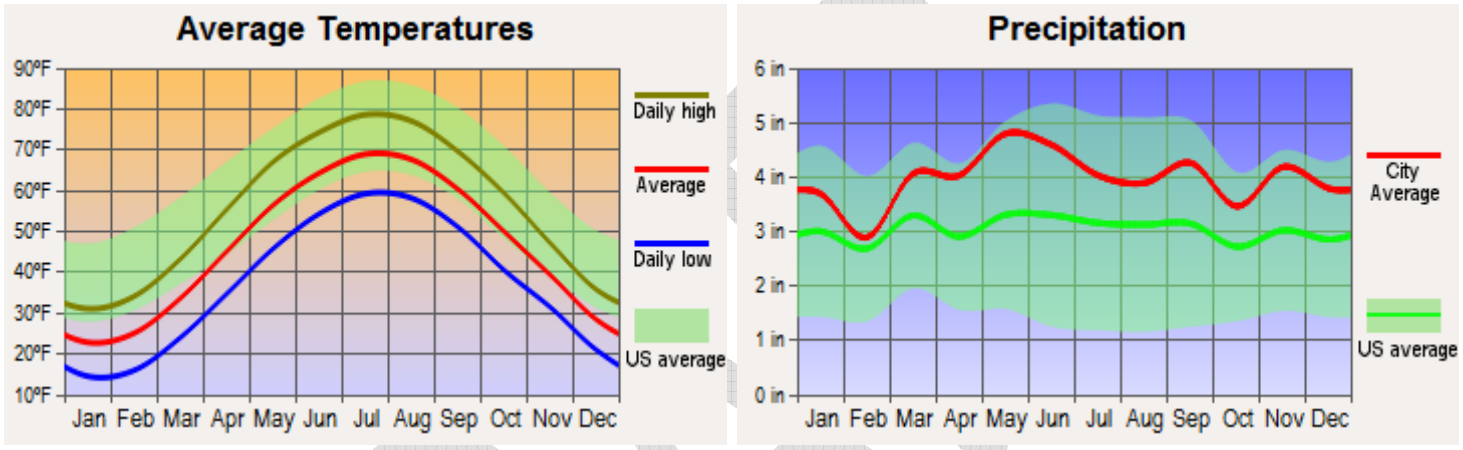

Figure 3.2.1: **Average climate in Wawarsing, NY.** Data for this graphs is based on reports from over 4,000 weather stations *(cite)*

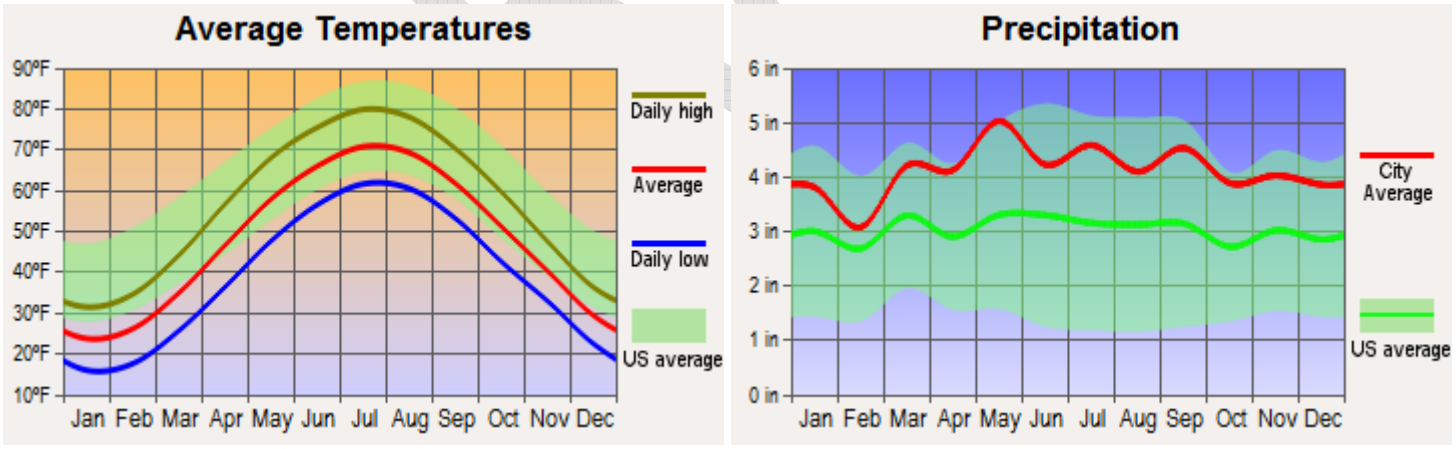

Figure. 3.2.2: **Average climate in Accord NY** – one of Rochester's largest hamlets.

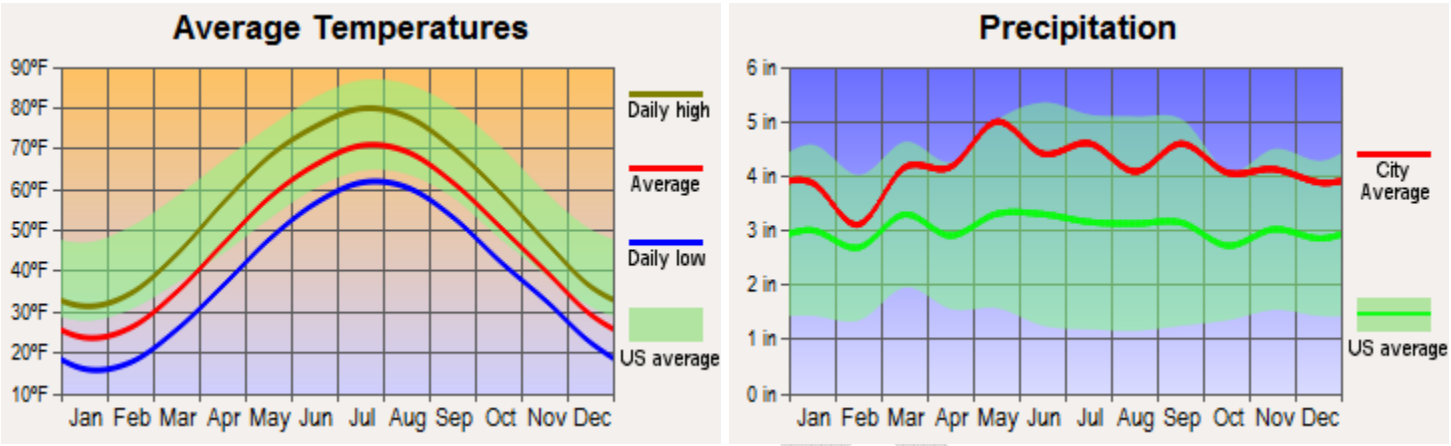

Figure. 3.2.3: **Average climate in Marbletown, NY.**

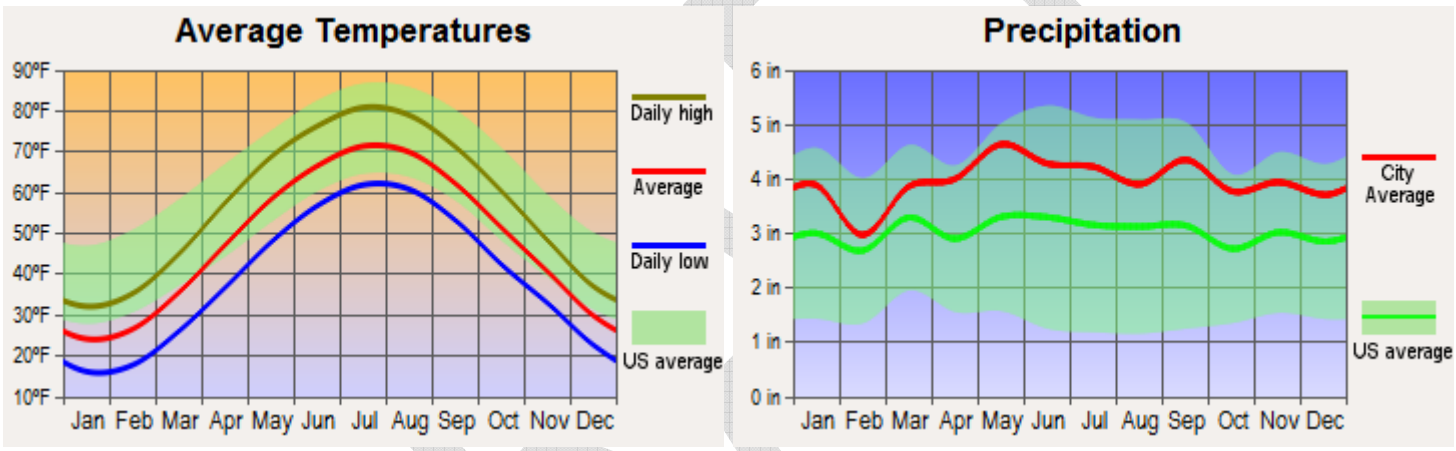

Figure. 3.2.4: **Average climate in Rosendale, NY.**

Climate Change and Sea Level Rise

Our climate is changing. Since 1970 the global annual average temperature has increased nearly 1 degree and annual average temperatures in the United States have increased by 1.8 degrees. More specifically, annual average temperatures in New York State and the Hudson Valley have increased 2 degrees and winters in New York State are almost 5 degrees warmer than they were in the 1970's.

More recently, 2010 from January to August is tied with 1998 as the warmest year on record. Temperature records dates back to 1880. Furthermore the summer of 2010 was the hottest on record in New York City as well as 10 other states. In comparison to other decades, the 2000's were the hottest for the entire globe surpassing the previous record set in the 1990's.

On a local level, warmer winters, hotter summers and more extreme heat have been observed and these trends are predicted to continue. Scientists also project that the most intense rainfall events will become even more intense. With warmer air temperatures we are likely to see more winter

precipitation come as rain rather than snow. The snow that does fall is likely to be wetter and heavier than average. Snow pack is also melting earlier in the year. When combined with changes in precipitation patterns this will lead to seasonally early and more intense high river flows.

The effects of global warming have been and will continue to contribute significantly to sea level rise. Sea level has risen fifteen inches over the last 150 years in New York Harbor and 4-6 inches since 1960. Effects of sea level rise are compounded by potential increases in extreme precipitation and storms associated with climate change.

Shoreline communities along the Rondout are very likely to see an increase in the frequency of flooding and erosion events. For example, the City of Kingston is in the tidal portion of the Rondout Creek watershed and is vulnerable to a variety of impacts from sea level rise and storm surge. Shoreline communities with brownfields or contaminated sites in areas at high risk of flooding could see the regular resuspension of waterborne pollutants that may put public health at risk. Critical infrastructure and facilities may be inundated leading to a loss of services at great cost to the community. Degraded stormwater and sewage systems will be further stressed by more intense large rainfall events and the vulnerability of bridges, culverts and road failures will increase. Rising temperatures or flood events reducing water quality may affect drinking water. Short term drought may affect water quantity and quality both for drinking water and for aquatic life in the creek. Warmer air and water temperatures will affect recreational fish species of the region and may lead to an increase in pests and insect epidemics.

ClimAIDis a state-funded integrated assessment program for effective climate change adaptation strategies in New York State with the goals of providing the state with cutting-edge information on its vulnerability to climate change and to facilitate the development of adaptation policies informed by both local experience and state-of-the-art scientific knowledge. Through this effort the state has developed sea level rise projections. See Figure 3.3.5.

Draft ClimAID Sea Level Rise Projections:

Lower Hudson Valley & Long Island	**2020s**	**2050s**	**2080s**
Sea Level Rise[1]	+ 2 to 5 in	+ 7 to 12 in	+ 12 to 23 in
Sea Level Rise[2] Rapid Ice Melt	~ 5 to 10 in	~ 19 to 29 in	~ 41 to 55 in
Mid-Hudson Valley & Capitol Region	**2020s**	**2050s**	**2080s**
Sea Level Rise[1]	+ 1 to 4 in	+ 5 to 9 in	+ 8 to 18 in
Seal Level Rise[2] Rapid Ice Melt	~4 to 9 in	~ 17 to 26 in	~ 37 to 50 in

Figure. 3.3.5: 1. Shown is the central range (middle 67%) of values from model-based probabilities (16 models x 3 scenarios) rounded to the nearest inch. 2. The rapid ice melt scenario is based on acceleration of recent rates of ice melt in the Greenland and West Antarctic Ice sheets and paleclimate studies. Note: Baseline is average sea level from 1971-2000.

Recommendations:

The communities of the Lower Non-Tidal Rondout Creek watershed have to be prepared. The warming of the globe will continue even if all greenhouse gas emissions are halted. Recommends the following for communities that border the Rondout Creek.

1. Based on the ClimAID Sea Level Rise Projections, the municipalities of the lower non-tidal Rondout Creek watershed should revise land use and zoning ordinances to require a buffer between mean high water and any proposed structures.

2. All communities bordering the Rondout should adopt the Climate Smart Communities Pledge (Appendix H)

3. Join and be an active member of the Hudson Valley Climate Change Network of the DEC Hudson River Estuary Program

4. Get involved in the 10% Challenge. This can best been managed through the local CAC. – I think this program is run through Sustainable Hudson Valley.

5. Pass a local law to insure that predevelopment runoff is equal to post development runoff for all proposed projects in your community.

6. Require that all proposed development designs include tree plantings to prevent the expansion of impervious surfaces.

7. Map vulnerable stream bank areas that need to be revegetated and collaborate with state partners to rehabilitate them over a set period of time.

8. Pass a local law to increase the protection of wetlands in your community.

9. Engage CACs in reviewing development proposals and providing guidance to the planning board on ways to reduce the impact of development on natural systems.

10. Limit development in the 100-year floodplain and/or require developers to show how they will be addressing the projections of sea level rise in their proposal.

11. Direct new development away from high risk areas and develop programs to fund elevation and/or relocation of structures or systems in high risk areas.

12. Work on seeking funding through joint projects or proposals with neighboring municipalities.

13. Make use of mapping tools to identify at risk areas. Define areas of both greatest <u>current</u> and <u>future</u> vulnerability to flooding with the intent of reducing vulnerability in high risk areas and transition to long term cost-effective measures that emphasize natural flood protection systems.

14. Adopt NYS Sea Level Rise (SLR) projections (Appendix I) as guideline measures from which to base strategies for addressing climate change and the affects of flooding on land use. Incorporate climate change and increased vulnerability to flooding into local emergency management planning.