Local Climate Change Adaptation and Resilience Plan

Village of Philmont

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Cornell Cooperative Extension

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Key Terms

Adaptation (climate change): Actions that reduce the level of physical, social, or economic impact of climate change and variability, or take advantage of new opportunities emerging from climate change . It includes reducing the vulnerability of people, places, and ecosystems to the impacts of climate change.

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Climate: The weather conditions prevailing in an area in general or over a long period of time.

Climate change: A statistically significant variation in either the mean state of the climate, most often surface variables such as temperature, precipitation, and wind, or in its variability, persisting for an extended period (typically decades or longer).

Climate change impacts: The effects experienced by a human, natural system, or man-made system as a result of climate variation including changes in average conditions or extreme weather. Example climate impacts include flooding or ecological changes.

Drought: A period of unusually persistent dry weather that persists long enough to cause a water supply shortage.

Ecosystem-based Adaptation (EbA): The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change.

Ecosystem services: Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food or fiber, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation.

Exposure: The degree to which elements of a system are in direct contact with climate variables, may be affected by long-term changes in climate conditions or by changes in climate variability, including the frequency and magnitude of extreme weather.

Extreme heat: Individual days with a maximum temperature at or above 90°F or above 95°F; threshold used depends on the region within the state.

Extreme cold: Individual days with a maximum temperature at or below 32°F or below 0°F; threshold used depends on the region within the state.

Extreme precipitation: Event with more than 1, 2, or 4 inches of precipitation over a 24-hour period; threshold used depends on the region within the state.

Extreme weather: A period of abnormal weather conditions that can negatively affect humans, natural and man-made resources. Extreme weather is used in this report as an umbrella term referring to a combination of extreme heat, extreme cold, extreme precipitation, and extreme wind.

Extreme wind: Period with sustained or gusting wind speeds high enough to cause damage to trees, power lines, and other types of natural or man-made resources.

Flood or flooding: A temporary inundation of normally dry land area caused by an increase in water levels in nearby water bodies including lakes, rivers, estuaries, and oceans or by localized accumulation of precipitation.

Greenhouse Gas (GHG): Any gas that absorbs infrared radiation in the atmosphere; examples include carbon dioxide, methane, nitrous oxide, ozone, and water vapor.

Heat wave: Three consecutive days with maximum temperatures above 90°F.

Maladaptation: Adaptive actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future.

Mitigation (climate change): Actions that reduce the levels of greenhouse gases in the atmosphere; includes reducing emissions of greenhouse gases and enhancing sinks (things that absorb more greenhouse gases than they emit). Examples include switching to renewable energy sources and implementing energy efficiency measures.

Nature-based Solutions (NbS): Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.

Nor'easters: A large-scale extratropical cyclone in the western North Atlantic Ocean.

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

Sensitivity: How much a system is directly or indirectly affected by changes in climate conditions (e.g., temperature and precipitation) or specific climate change impacts (e.g., sea level rise and increased water temperature). If a system is likely to be affected as a result of projected climate change, it should be considered sensitive to climate change.

Severe winter storm: A storm that occurs at near or below freezing temperatures, and can include snowfall, sleet and/or freezing rain.

Straight-line winds: A significant push of air in one direction usually associated with thunderstorms. They can cause damage to trees, buildings and vehicles. Straight-line winds are usually the outflow from strong to severe thunderstorms and exceed 50-60mph.

Tornado: A local storm formed by winds rotating at very high speeds. Tornados are typically of short duration and have a vortex of up to several hundred yards wide. The severity of tornados is measured using the Enhanced Fujita Scale (EF) based on estimated wind speeds and typical damage.

Vulnerability: The degree to which systems are susceptible to, and unable to cope with, adverse impacts of climate change. Generally, systems that are sensitive to climate and less able to adapt to changes are considered to be vulnerable to climate change impacts.

Wildfire: An uncontrolled and unpredictable fire in an area of combustible vegetation.

Winter warming: The average temperature increase over December, January, and February.

Introduction

A Climate Change Adaptation and Resilience Plan (CARP) outlines a vision and set of strategies to improve a community's resilience to climate change based on its physical, economic, and social vulnerabilities. Adaptation, in the context of climate change, refers to the process of adjusting or modifying human and natural systems to cope with the impacts and challenges posed by changing climatic conditions. Recognizing the risks and vulnerabilities associated with climate change and taking proactive measures to reduce these risks and enhance resilience is an essential component of this CARP.

Adaptation strategies can address various sectors of a municipality, such as infrastructural, ecological, or societal, and aim to minimize negative impacts while maximizing positive opportunities in a changing climate. Effective adaptation requires understanding the specific climate risks and impacts a particular region or community faces. By adapting to climate change, communities and ecosystems can become more resilient, better equipped to withstand climate-related hazards, and able to thrive in a changing world.

Columbia County is already experiencing impacts due to climate change. Observed and projected climate change include increasing annual temperature and precipitation, more prevalent extreme weather events, and sea level rise. These climate shifts will present wide-ranging impacts to communities locally. Climate adaptation recognizes the inevitable impacts from climate change and focuses on preparing for those impacts. CARP differs from other types of plans due to its focus on future uncertainties, such as the unpredictability of social and ecological systems and the unknowns of climate change dynamics.

Climate adaptation offers a distinct approach compared to climate mitigation. Climate adaptation centers on actions that are meant to reduce or adapt to the adverse impacts that arise from changes in the Earth's climate. Climate mitigation, on the other hand, focuses on actions or changes in social behaviors to reduce or eliminate greenhouse gas emissions from the atmosphere to prevent significant adverse effects from climate change.

The CARP process involves addressing vulnerabilities, envisioning and strategizing for the future, building community resilience, and evolving with a changing world. It aims to facilitate a community's ability to plan for, withstand, and recover from severe events without suffering permanent loss of functions, devastating damage, diminished productivity or decreased quality of life. The CARP assesses vulnerability to current and future climate hazards and seeks to uncover future uncertainties, such as the unpredictability of social and ecological systems and the unknowns of climate change dynamics. The plan addresses those vulnerabilities and strives to improve a community's resilience to climate change by establishing a community vision and a set of climate adaptation strategies.

CARP is a problem-solving framework that functions to equip community members with the tools and knowledge to direct their efforts from the ground-up. The planning process is participatory, collaborative, and adaptable to local communities. Key objectives of the CARP include gathering information to document community assets, conducting a climate vulnerability assessment of existing and future threats, developing a community climate resilience vision, and identifying adaptation strategies that a municipality can implement.

The CARP in Columbia County was modeled after the Multi-Jurisdictional Hazard Mitigation Plan format in which the County and committed (participating) municipalities move through the process as a cohort. Facilitation, guidance, and technical support were provided by the Climate Resilience Partnership (CRP) with support from the Capital District Regional Planning Commission and funded through the Climate Leadership Services contract with the New York State Department of Environmental Conservation. The CRP is a regional team of Cornell Cooperative Extension (CCE) engaging communities in the Climate Smart Communities Program and climate adaptation planning.

Columbia County committed to engage in the CARP process first through a resolution on August 11th, 2022. Municipalities with interest in participating adopted a resolution confirming their commitment to complete the CARP. These communities established a local leadership team who served as the main point of contact for the process. A total of 17 Columbia County municipalities, as well as Columbia County itself, participated in the process including:

- Columbia County
- Town of Ancram
- Town of Austerlitz
- Town of Canaan
- Town of Chatham
- Town of Claverack
- Town of Copake
- Town of Gallatin
- Town of Germantown
- Town of Ghent
- Town of Hillsdale
- Town of Kinderhook
- Town of New Lebanon
- Town of Taghkanic
- Village of Kinderhook
- Village of Philmont
- Village of Valatie
- City of Hudson

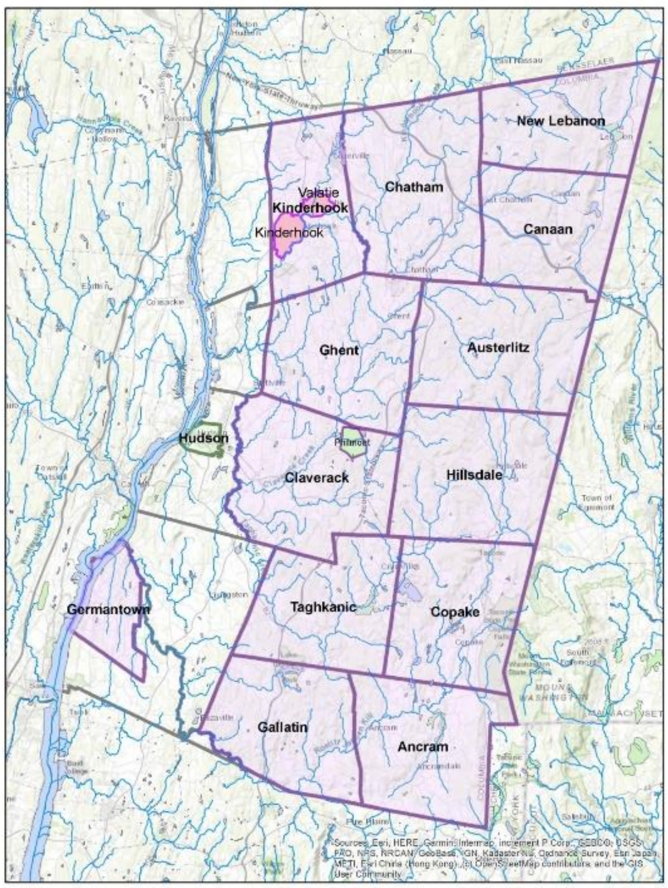

Figure 1. Columbia County Municipalities that participated in the Climate Adaptation & Resiliency Plan (Created by Audrey Kropp, CCE Columbia-Greene)

Public and community stakeholders' involvement in this process was critical. Input-gathering techniques were utilized to reach a broad and representative subset of the community. An outreach plan that used multiple platforms to reach as much of the community as possible included webinars, public workshops, social media, emails, websites, online surveys and printed public postings. Public webinars were conducted to implement community outreach and to introduce the CARP process. Public surveys and workshops provided valuable insights into the local context, specific vulnerabilities, strengths, and resources that shape the community's ability to adapt to climate change.

When local leaders work with their communities to adapt to climate change, they build the capacity to evolve with changing conditions and protect resources for generations to come.

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CARP Leadership, Engagement, and Framework

Organizational Structure

The Columbia County Climate Adaptation and Resilience Planning (CARP) process was facilitated by members of the Climate Resilience Partnership, a regional collaboration of Cornell Cooperative Extensions (CCEs) working to engage communities in the Climate Smart Communities Program and adapt to climate change. The CCEs provided guidance and technical support facilitating both the planning process and the development of the plans. The Local Leadership, Outreach, and Process Questionnaire outlines the working organizational structure and the community outreach and engagement strategy. Lead contacts in each community used the questionnaire to establish the Leadership Team, identify key stakeholder groups, and evaluate methods for input gathering. The main points of contact and key stakeholders identified for Philmont are listed in the questionnaire summary (see Appendix).

The leadership team was established to provide the organizational structure to help coordinate and refine the planning process. In Philmont, this team consisted of a member of the Climate Smart Communities Task Force and the Conservation Advisory Committee Chair. Members of this team were involved in all steps of the plan development, served as a point of contact for CCE, and as a liaison with the municipality. The leadership team also played an important role in supporting stakeholder outreach and engagement. Groups of key stakeholders included municipal staff, municipal boards and committees, and the community. All key stakeholders were contacted to participate in educational and stakeholder input-gathering activities. Municipal stakeholders from the town board, highway department, and code enforcement were identified. Additional stakeholders identified included representatives of the community rescue squad, the fire department, and police department.

Community (Stakeholder) Outreach and Engagement Strategy

The community of Philmont was engaged throughout the CARP process through a series of educational input gathering efforts. A variety of methods were employed to outreach to the community about climate change adaptation, the planning effort in progress and the engagement opportunities available.

Columbia County Climate Adaptation and Resilience Plan Launch Meeting

The CARP process launched with a meeting of climate leaders from all participating communities, hosted virtually by the CCE team on January 25th, 2023. The purpose of this meeting was to define the leadership team as well as outline the participatory engagement process and framework for the CARP. The organizational structure, strategies for community engagement and approach to the planning process were discussed as part of this meeting.

Municipal Stakeholder Climate Smart Planning Meeting

The purpose of this meeting was to gather information for the vulnerability assessment, identify strengths and gaps in municipal climate change resilience, and discuss underlying threats and challenges. A Climate Smart Resiliency Policy Analysis was conducted using the Climate Smart Resilience Planning Tool developed by the NYS DEC. The meeting was facilitated by CCE and scheduled with the municipal stakeholders identified in the Local Leadership, Outreach and Process Questionnaire. Stakeholders were polled to ensure availability for the 2-hour virtual meeting and sent reminders as the date approached.

Climate Change and Adaptation Planning in Columbia County Public Educational Webinar

A public educational webinar was developed and delivered by CCE on June 28, 2023. The purpose of the webinar was to inform Columbia County community members about the effort to develop a CARP and how to get involved. Participants learned about the impacts of climate change and explored strategies to minimize risks and protect community assets. The webinar provided a general overview of climate change adaptation and planning along with an outline of the process underway in Columbia County. Numerous methods were used to promote the webinar. Email announcements were sent directly to the leadership team, all identified stakeholders, all town clerks in the county, and registrants for the launch presentation. CCE developed a stylized set of promotional materials which included a flyer with a QR code registration link, and a social media post with an image. The promotional package was provided to the leadership team with instructions to post the materials on the town website and social media, to share widely in the community and information about the outreach CCE would be doing. The announcement was also posted on both the Cornell Cooperative Extension of Columbia Greene Counties and the Columbia County CSC webpage and social media. CCE sent notifications to relevant county departments, agencies, organizations, and farms in the county and distributed fliers to all town halls and libraries in the county.

Public Surveys

The first of two public surveys was launched following the public educational webinar and was promoted widely throughout the county. The purpose of this survey was to gather public input on climate vulnerabilities and community assets. The survey was also intended to inform the place narrative and local history of extreme events. The second survey was launched following the completion of a series of facilitated stakeholder workshops. The purpose of the second survey was to identify and prioritize potential adaptation strategies. The survey also sought input on the development of a climate resilience vision for the community. The surveys were available as a fillable online form in print for use at tabling events. Numerous efforts were used to outreach for the survey. CCE developed a stylized set of promotional materials which included a flyer with a QR code link to the survey and a social media post. The promotional package was provided to the leadership team with instructions to post on the town website and social media, how to request paper copies to bring to tabling events, and information about the outreach CCE would be doing. The survey link was also posted on both the Cornell Cooperative Extension of Columbia Greene Counties and the Columbia County CSC webpage and social media. Requests to take the survey were sent to relevant county departments, agencies, organizations and farms in the county. Fliers were distributed at all town halls and libraries in the county.

Facilitated Workshops

A series of two facilitated stakeholder workshops were conducted for vulnerability assessment, community visioning and adaptation strategy selection. These in-person workshops provided an opportunity for stakeholders to actively participate in a collaborative and adaptive community engagement process. For the purposes of the workshop facilitation, participating communities were divided into Northern and Southern Cohorts in order to maintain a manageable workshop size. The two sequential workshops were conducted at the end of September and October respectively for each cohort in locations centered in the Northerly and Southerly regions of the County. Each workshop consisted of sessions engaging the full group and small group (1-3 municipalities) facilitated sessions. Invitations to the workshop were extended to the Leadership Team and all stakeholders identified in the Local Leadership, Outreach and Process Questionnaire. The Leadership team was also asked to extend invitations to any other newly identified stakeholders. CCE monitored registration and worked to ensure a minimum of two stakeholders per municipality participated in the workshops.

Climate Change Adaptation and Resilience Planning Steps

CCE worked with advisory committees, local governments, and residents to facilitate the CARP through the following framework:

Figure 2. The Climate Adaptation & Resiliency Planning Process (Created by Anna Harrod-McGrew)

Develop a Place Narrative

The first step in the CARP process involved gathering relevant information to develop a place narrative for the municipality. This "story of place" was captured through socio-economic data, ecosystem studies, and information on the history of extreme storms and weather. Resources specific to the municipality that informed the place narrative included comprehensive plans, natural resource inventories, hazard mitigation plans, emergency plans, and local codes and ordinances.

Determine Climate Vulnerability

Community assets and vulnerabilities were further analyzed through data collection, mapping, and utilization of the Climate Smart Resilience Planning Tool. Existing plans and resources were reviewed to identify possible gaps in policies for climate adaptation and resilience. Meetings were conducted with each municipality's government officials to complete the Climate Smart Resilience Planning Tool. Public input on climate vulnerabilities was incorporated through a vulnerability survey and through a Vulnerability Assessment Workshop. At the workshop, committee members and community stakeholders participated in community mapping to identify, analyze, and prioritize the effects of climate hazards and risks such as flooding, extreme heat, and drought.

Imagine Future Scenarios and Shared Vision

An Adaptation and Vision Workshop was conducted to facilitate community members' imagining of potential future scenarios based on climate change projections for a specific climate hazard in their community. The workshop also led participants in developing a shared future vision for climate adaptation and resiliency in their community. Vision statements created by community members helped to identify the future that is possible in their community if climate strategies are implemented. A Community Adaptation and Vision Survey was used to prioritize recommendations using public input.

Recommend Adaptation Strategies

Based on an analysis of the community's climate impacts, vulnerabilities, and climate resilience vision, appropriate strategies aimed at reducing climate risk were identified. Committee members and municipal officials provided feedback on assessing and prioritizing these recommended strategies and a CARP Final communications and meetings with municipal leaders were completed to evaluate the CARP and establish a timeline for implementation of the plan.

Get the Word Out

The final phase of the CARP process centers on sharing the plan's vision with the community and enacting the resiliency strategies detailed in the plan. This involves local approval, adoption, and implementation of the final CARP by the municipality.

Community Profile and History of Climate Impacts

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Columbia County Context

Columbia County is a rural county in the Hudson Valley of southeastern New York. The County covers 648 square miles of land, bordered on the west by the Hudson River and the Taconic Ridge along the east. Formally established in 1786 after the Revolutionary War, today there are 23 municipalities within Columbia County: the towns of Ancram, Austerlitz, Canaan, Chatham, Claverack, Clermont, Copake, Gallatin, Germantown, Ghent, Greenport, Hillsdale, Kinderhook, Livingston, New Lebanon, Stockport, Stuyvesant, and Taghkanic; the villages of Chatham, Kinderhook, Philmont, and Valatie; and the city of Hudson (HMP, 2018).

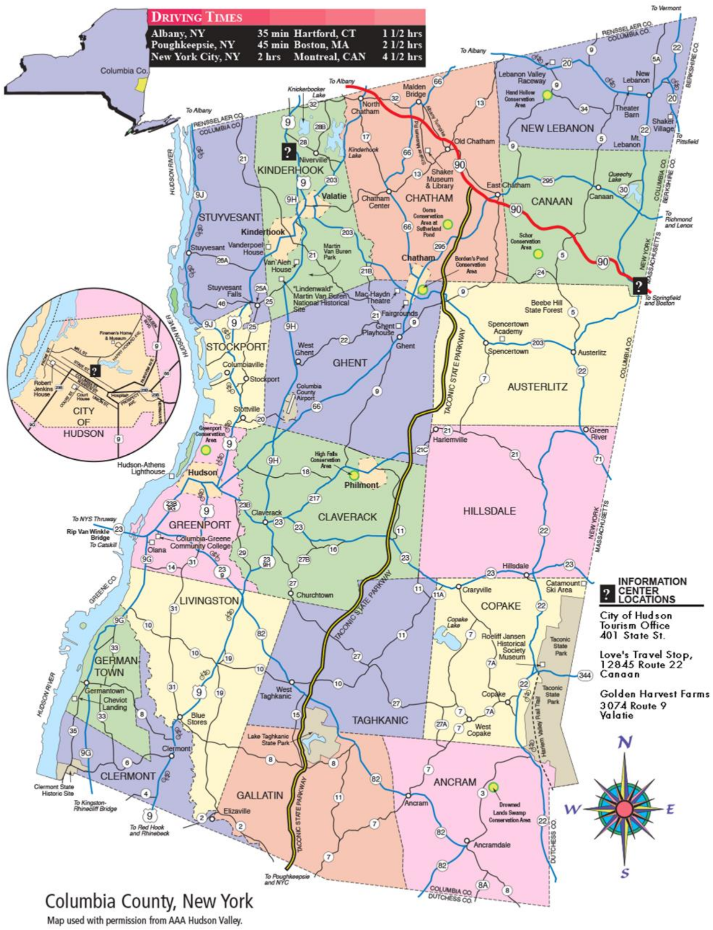

Figure 3. The 23 Municipalities within Columbia County (Source: http://www.columbiacountyny.com/map.html)

Socio-Economic Context of Columbia County

Columbia County's scenery has long drawn visitors, artists, and writers. In all these ways and more, natural resources have been central factors in the economy and cultural life of the economy (NRI 2018, 23). A vital figure of the Columbia County landscape, the Hudson River, provides the county with approximately 30 miles of waterfront. The Hudson River, along with its tributaries, serves important roles in the ecological health of the county as well as in the recreational, agricultural, and commercial livelihood of the region (HMP 2018). The Taconic Ridge forms the eastern boundary of Columbia County, providing a unique and biodiverse habitat, as well as ample recreational opportunity. The beauty of the open and forested landscapes throughout the County, the bounty of the farmland, and the opportunities for outdoor recreation are assets much valued by residents and visitors, and ultimately support the economies of many of the County's municipalities and businesses (NRI, 2018, 3).

Historical Background of Columbia County

Indigenous people, predominantly the Mohicans, inhabited the area that is now Columbia County long before the arrival of European settlers. The Hudson River was vital to indigenous people for food, travel, and other uses. The river also served as the transportation corridor responsible for early European settlement. With European colonization came the agriculture that was central to their sustenance and commerce. By the time of peak agriculture in Columbia County, around 1835, 75-80% of the land was cleared as farmland. Significant reforestation occurred in the 20th century as agricultural production shifted away from the Northeast (NRI, 2018).

The County's abundant timber and waterpower fueled early industries. Mineral resources including

iron ore, limestone, clay, sand, and gravel supported foundries, brickmaking, cement manufacturing, (NRI 2018, 23). Saw mills, grist mills, plaster mills, and industrial plants established on streams throughout the County produced lumber, flour, livestock feed, pig iron, tools, paper, and textiles for local use and for distant commercial markets, including New York City (NRI, 2018, 24). The river was a primary avenue of commerce for the county until the arrival of the railroad in the mid-1800s (NRI, 2018).

Columbia County Today

Current Population Trends and Demographics

According to the most recent (2020) U.S. Census Bureau (USCB) Census, Columbia County has a population of 61,570. Since the previous Census, the population of the County has declined from 63,096 residents in 2010. The town of Kinderhook has the largest population in the County, with approximately 8,330 residents, followed by the City of Hudson with 5,894 residents (USCB, 2020c).

The County's racial composition is primarily Caucasian (89.7%), African American or Black (5%), Hispanic (5.9%), and Asian (2.3%). Residents are also a combination of two or more races (2.5%) and 0.5% of residents are Native American, Alaska Native, or Pacific Islander (USCB, 2020b).

Median age in the County is 48.9 years. With 26.6% of residents age 65 or older, the County has a significant aging population when compared to the national average of 17.3%. The largest age group within the County is 55-59 years old, constituting 8.7% of the population (USCB, 2020b).

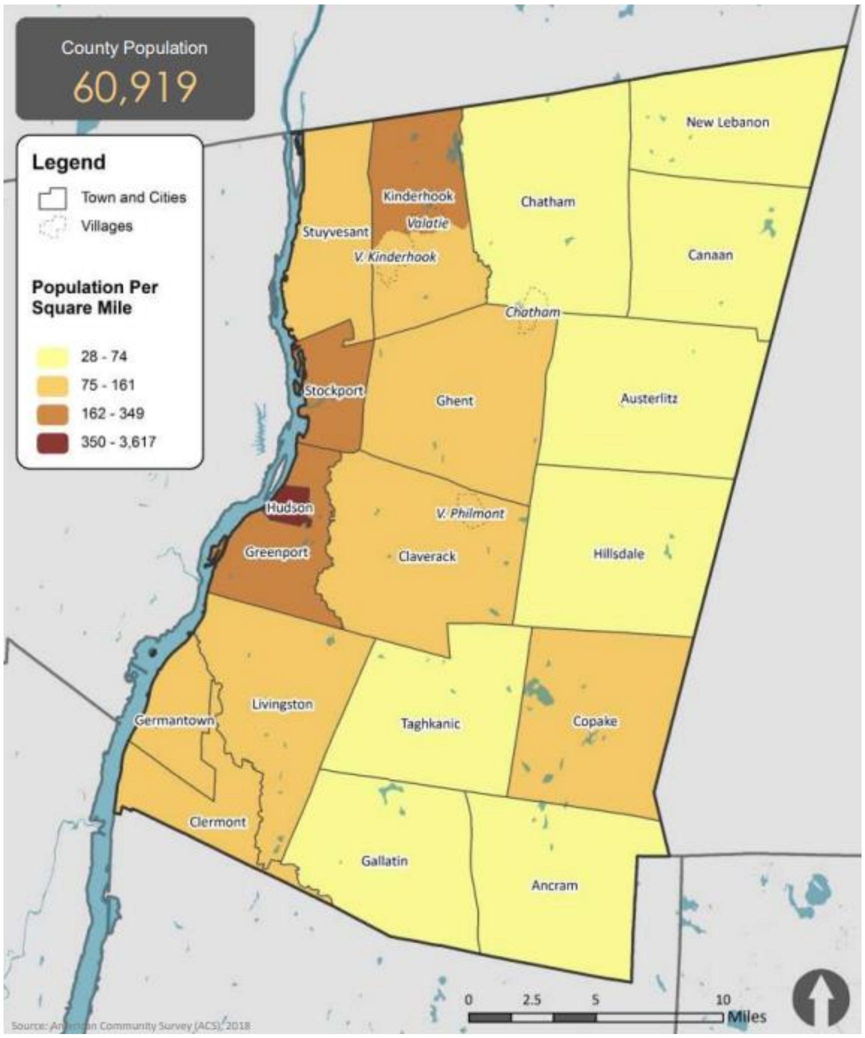

Figure 4. Population Density by Municipality in Columbia County (Source: Columbia Economic Development Corporation, 2020. (https://columbiaedc.com/wp-content/uploads/2023/10/Columbia-Update-draft.pdf)

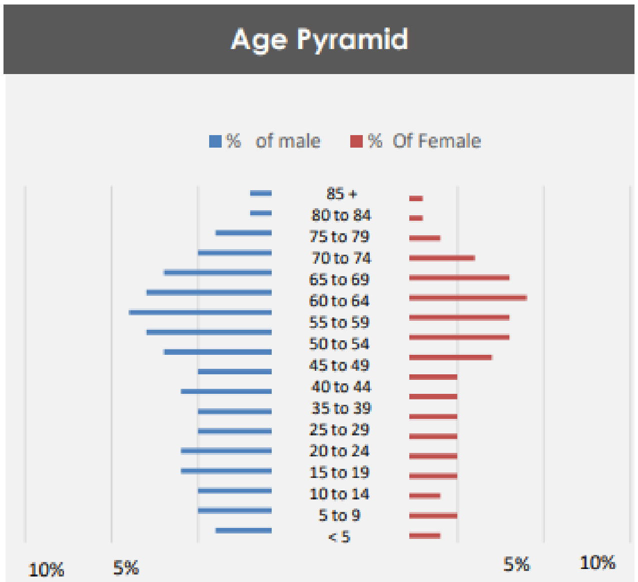

Figure 5. Age Pyramid in Columbia County (Source: Columbia Economic Development Corporation, 2020

Income, Housing, and Education

The median household income between the years of 2017-2021 was $73,065. The County's poverty rate is 10.5%. The largest age group living in poverty are residents under the age of 18. The number of households from 2017-2021 was 25,167, with an average of 2.35 people per household. The County is estimated to contain 33,389 housing units. The median home value for an owner-occupied home is $250,600. Most of the County's residents hold a high school degree (91.2%), and 34.9% have a bachelor's degree or higher (USCB, 2020a).

Governance

Columbia County is within New York State's 19th Congressional District and 41st State Senate District. Two Assembly districts (District 106 and 107) represent the County. One supervisor represents each town and village and five supervisors represent the City of Hudson on the Columbia County Board of Supervisors (Columbia County, n.d.).

Economy

NYS Department of Labor reported a total labor force of 30,500 and an unemployment rate of 2.7% for Columbia County in 2022. According to the Columbia Economic Development Corporation (2020), the top employers in the County are government and public administration, healthcare and social assistance, retail trade, accommodation and food services, construction, and agriculture/forestry/fishing/hunting. The majority of businesses in the County are small; over 90% of businesses have fewer than 20 employees.

According to Columbia Economic Development Corporation (2020), key industries of the County include agribusiness, "creative economy," technology, and tourism. Columbia County has 518 farms constituting 99,179 acres of farmland, with a median farm size of 59 acres according to the USDA (2017a). The 2017 Agriculture Census of Columbia County reported that the total value of the county's agricultural sales is $88 million (USDA, 2017a).

Ecological Inventory

The landscapes of Columbia County are a product of the region's bedrock and glacial history, which are reflected in the habitats and water resources, and human uses of the land. Significant natural features in the county include the Taconic Ridge, the Central Hills, the major valleys, the Lake Albany plain, and the Hudson River and its tributaries (NRI, 2018, 35).

Columbia County consists of two major watersheds: most of the County is located in the Hudson River Estuary Watershed, while a small portion drains into the Housatonic drainage basin in Massachusetts. Over 75 percent of the County's land area drains to the Hudson via three major streams—Kinderhook Creek, Claverack Creek, and the Roeliff Jansen Kill (NRI, 2018, 18-19). The fish and aquatic invertebrate communities of these streams may be diverse, especially in clean, coldwater streams with unsilted bottoms (NRI, 2018, 49).

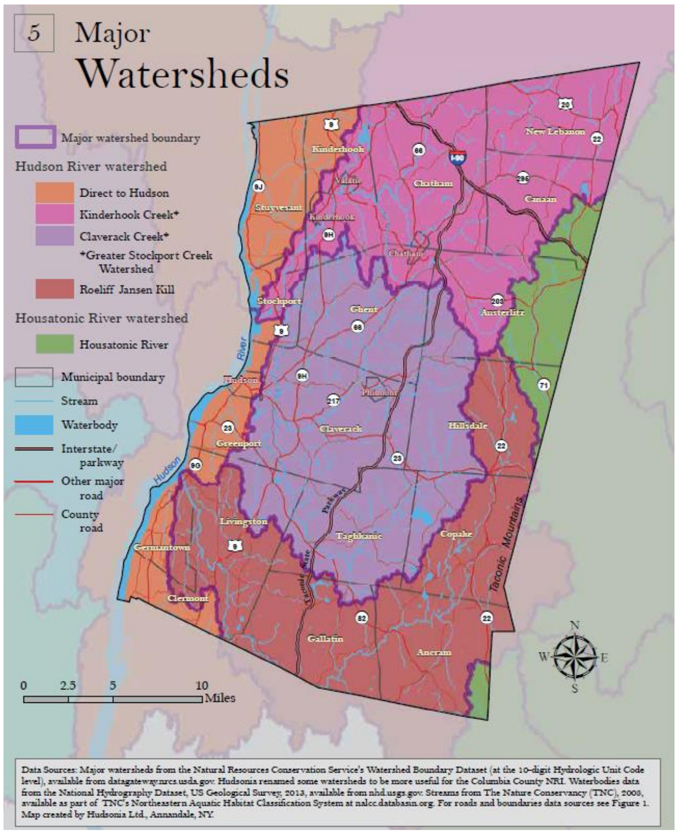

Figure 6. Major Watersheds in Columbia County (Source: NRI 2018, 20)

Numerous ponds and lakes characterize the Columbia County landscape. The four largest lakes in the county, Copake Lake, Kinderhook Lake, Queechy Lake, and Lake Taghkanic, are important wildlife habitat and have long been used for recreation. Lakes and ponds serve as important stopover sites for migrating gulls, loons, herons, and waterfowl and provide habitat for many common animals (NRI, 2018).

The Hudson River and its tidal habitats are identified by NYSDEC as a Significant Biodiversity Area. The river's main channel, tidal tributary mouths, intertidal shores, and tidal swamps and marshes have some of the rarest ecological communities in the state. They support rare plants, important fish spawning and nursery areas, and breeding, nursery and migration habitat for a wide variety of bird species, as well as a variety of essential ecosystem services (NRI, 2018, 2-3). Tidal habitats in the County include the deepwater areas of the Hudson River, as well as subtidal shallows, tidal mudflat, intertidal shore, tidal marsh and swamp, and tidal tributary mouth (NRI, 2018, 85-87).

There is a rich variety of forested land and habitat in Columbia County. Upland hardwood forests, the predominant land cover in the county, are dominated by oaks, hickories, ash, maples, beech, birches, and cherries. Upland conifer forests are dominated by Eastern hemlock, eastern white pine, and eastern red cedar. Upland mixed forests have a mix of hardwood and conifer trees in the overstory. These upland forests provide habitat for a large array of wildlife, including many species of conservation concern. The Taconic Ridge area in eastern Columbia County is the most extensive contiguously forested area in the county (NRI, 2018).

Both wetland forests (swamps) and non-wetland forests occur in floodplains of streams in the County and are important contributors to stream habitats, water quality, and bank stability. Floodplain forests help to absorb and dampen floodwaters, provide habitat and movement corridors for wildlife, maintain cooler stream water temperatures, and contribute organic matter that supports the stream food web and habitat structure (NRI, 2018, 59).

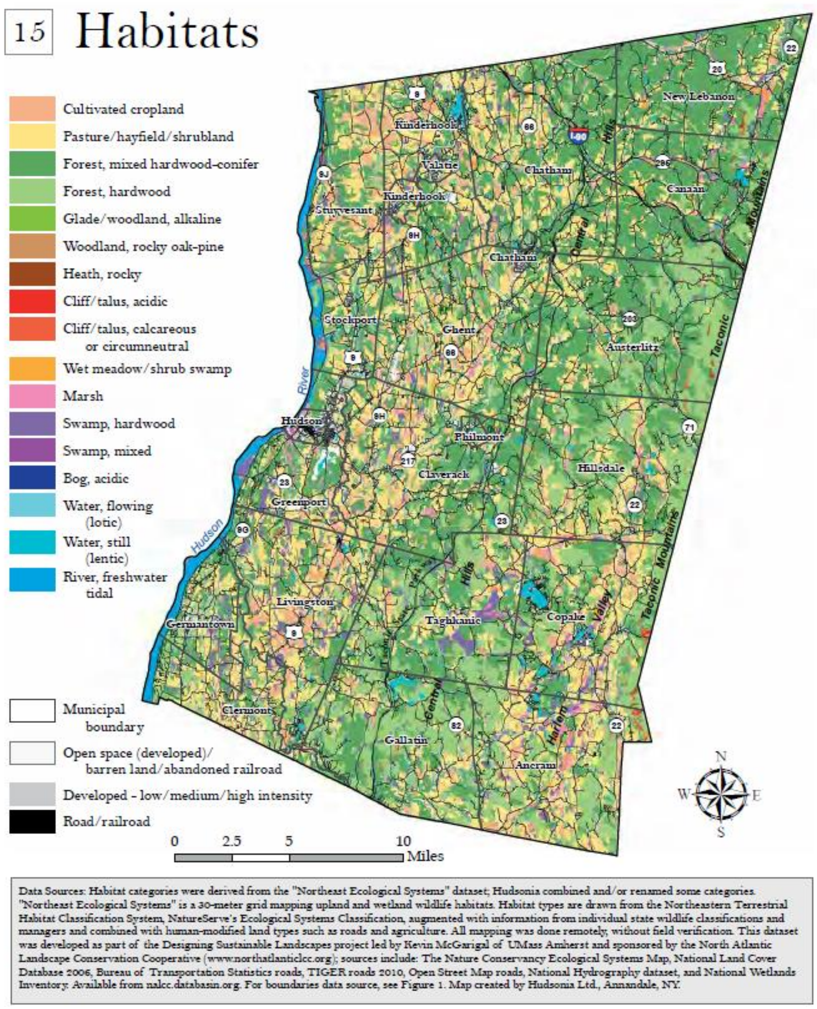

Figure 7. Generalized Habitats of Columbia County (Source: Columbia County Natural Resource Inventory, 2018)

There is also a diversity of wetland habitat types found in Columbia County, including forested swamps, shrub swamps, tidal and nontidal marshes, fens, bogs, and vernal pools (NRI, 2018, 72). These ecosystems provide habitat to rare plant and wildlife species, species of conservation concern, and breeding birds (NRI, 2018, 78-80). Other important habitat types present within the County include open habitats such as shrublands, meadows, pastures, wet meadow/shrub swamp, and farmlands. These habitats are vital to many bird species of conservation concern who nest in upland shrublands and upland meadow habitats (NRI, 2018, 66).

Additionally, Columbia County is well-endowed with good agricultural soils, which, together with the proximity to urban markets, helps explain why farming has been central to the county's economic and cultural history, and is still prominent today. Additionally, active farmland is an important part of the county's scenic landscapes that attract visitors and businesses, as well as county residents (NRI, 2018, 111-112).

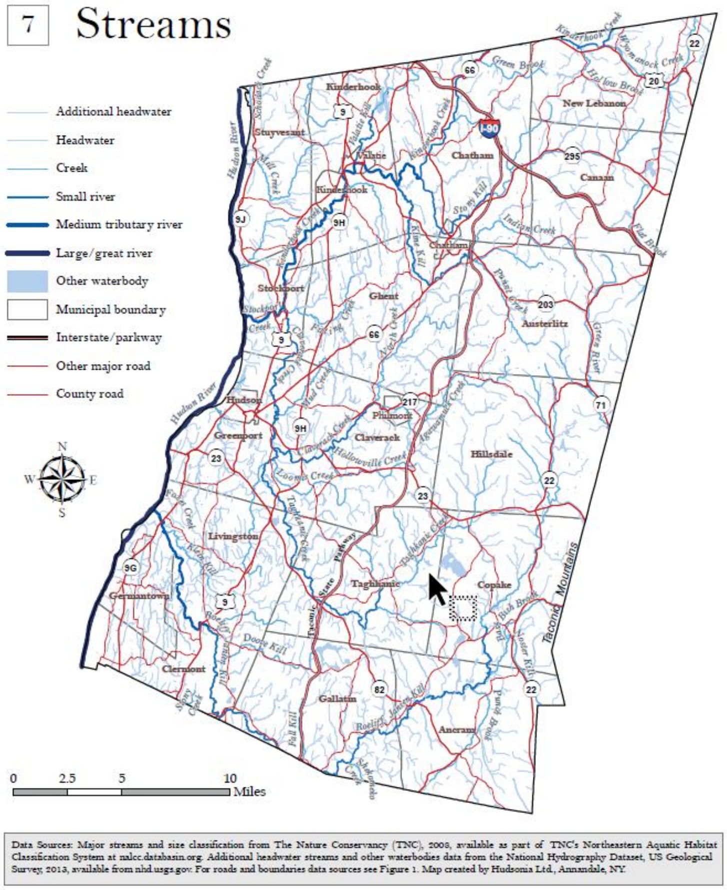

Figure 8. Stream Habitats in Columbia County (Source: Columbia County Natural Resource Inventory, 2018)

Threats to Columbia County's natural resources include development of natural habitats such as meadows, forests, or unprotected wetlands. Habitat degradation is also a threat to natural resources. Habitat degradation can happen in many different ways and is difficult to detect in the short term. The most common form of habitat degradation is habitat fragmentation. The local or regional disappearance of a habitat can lead to the local or regional extirpation of species and loss of ecosystem services. The primary cause of ongoing habitat fragmentation in Columbia County is rural sprawl— low-density development that occurs outside of population centers such as hamlets or villages (NRI, 2018, 139-141).

Fragmentation and development along riparian corridors can have a negative effect on aquatic organisms as well as human infrastructure. Loss of coolwater and coldwater streams has led to a decline in aquatic biodiversity throughout Columbia County. Coolwater and coldwater stream habitats, essential for various native fish including brook trout, have declined dramatically throughout Columbia County due to loss of stream corridor forest canopy, siltation, pollution, altered stream flows, and other consequences of human activities (NRI, 2018, 49). Loss of vegetation alongside streams and rivers can exacerbate the frequency and severity of flooding, given woody plants ability to store water and absorb excessive runoff, in addition to serving as a physical barrier (NRI, 2018, 44).

The effects of climate change in Columbia County are wide ranging and threaten many resources. Sea level rise will impact the Hudson River shoreline communities. The timing and magnitude of sea level rise will depend on the level of global greenhouse gas emissions and a variety of other known and unknown factors, but shoreline communities in Columbia County could experience an increase of as much as 71 inches (5.9 ft) by the end of the 21st century. Sea level rise together with increased storm surges are likely to destroy some of the natural wetland and upland habitats that have served as storm barriers to landward property, infrastructure, and buildings (NRI, 2018, 127).

Droughts, which may increase due to climate change, can threaten local drinking water supplies, crop production, and livestock, and can severely stress aquatic communities of streams and ponds, and plants and wildlife in natural upland and wetland habitats (NRI, 2018, 130). More frequent and intense heat waves pose threats to human health, agriculture, wildlife, and native plants, and are likely to alter many aspects of the natural landscape. Warming temperatures are likely to significantly affect the composition and distribution of wildlife habitats and force many species to migrate to more northern latitudes or higher elevations as former habitats become unsuitable (NRI, 2018, 130).

Non-native invasive species also pose a threat to Columbia County's natural resources. Approximately 25% of the documented plants in the county are non-native species that establish and persist outside of lawns, gardens, and cultivated land. Non-native invasive species reproduce and spread rapidly, and threaten native plants and communities directly through competition, or indirectly by changing habitat characteristics (NRI, 2018, 92-93).

Socio-economic Information

Philmont Place Narrative

The Village of Philmont is a small community located in central Columbia County, in the Hudson Valley Region of New York State. Philmont is approximately 8 miles east of Hudson, 40 miles southeast of Albany, and 120 miles north of New York City. Located within the Town of Claverack, Philmont is its own municipality and is governed separately from the town of Claverack. (HMP, 2018).

Philmont was founded in 1892 and spans 1.2 square miles in area. It is the fourth most densely populated municipality in Columbia County. The Village's most notable natural resource is the Agawamuck Creek, a tributary of the Claverack Creek, and its associated reservoir in downtown Philmont (Comprehensive Plan, 2001).

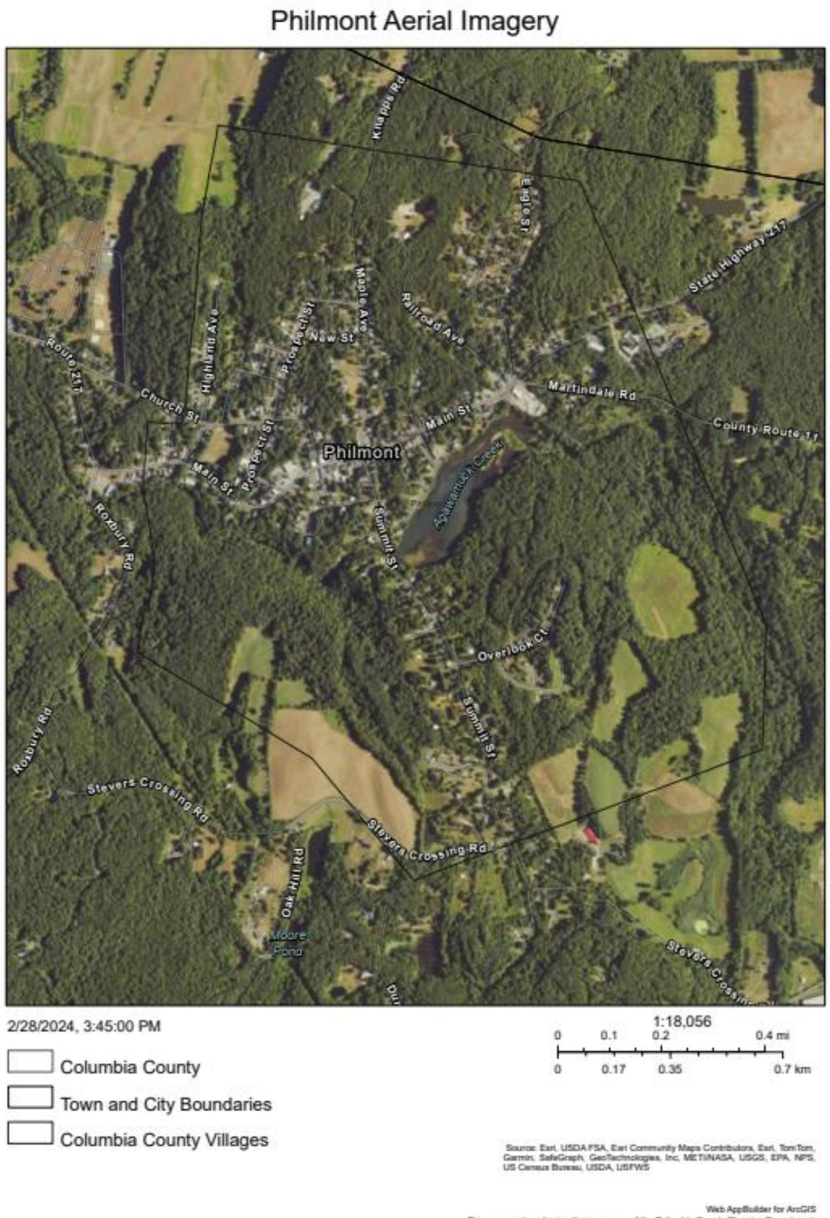

Figure 9. Village of Philmont Aerial Imagery and surrounding region (Source: Columbia County GIS)

Socio-Economic Context of Philmont

Philmont is a historic community with residences, farms, and open space found throughout the village. The central area of the village has higher density housing and businesses, while the northern and southern portions of the village are primarily farms and open spaces with residences more sparsely distributed. The Village of Philmont serves as one of the cultural and commercial centers of the Town of Claverack and surrounding area (Comprehensive Plan, 2001).

Philmont's small-town character, open space, historic identity, and scenic vistas are culturally, economically, and ecologically important resources that should be preserved (Comprehensive Plan, 2001).

Historical Background

Indigenous people occupied the area of Philmont and its surrounding land for millennia before the arrival of Europeans in the 1600s. At the time of early European arrival, the predominant group of people in much of Columbia County, including Philmont, were the Mohican people. The Mohicans lived off the land by hunting, gathering, fishing, and small-scale farming (Columbia County NRI, 2018, 23).

Philmont was first settled by Europeans in the early 1800s. The waterfalls of Agawamuck Creek (also referred to as Ockawamick Creek) powered many mills and factories in the village. In 1852, the Harlem Railroad came to Philmont, linking its mills to markets throughout the country. Philmont prospered during this time, becoming a regional manufacturing center that attracted many immigrants and rural residents to work in their mills and factories. This prosperity continued into the mid-1900s until manufacturing converted from waterpower to electricity, causing much of Philmont's manufacturing infrastructure to become obsolete (Comprehensive Plan, 2001).

Today, Philmont has renovated many of the abandoned mill buildings, storefronts, and other properties that had fallen into disrepair during the village's economic downturn. Philmont's small town charm, central location in the county, ease of access to the Taconic State Parkway and Amtrak, and established infrastructure has made it an attractive destination to live for both longtime residents and newcomers (Comprehensive Plan, 2001).

Current Population Trends and Demographics

According to the most recent (2020) U.S. Census Bureau (USCB) Census, Philmont has a population of 1,377. Since the previous Census, the population of the Village has decreased slightly from 1,379 residents in 2010 (USCB 2020).

The Village's racial composition is primarily Caucasian (83.1%), African American or Black (12.8%), Hispanic (3.3%), and Asian (0.1%). Residents are also a combination of two or more races (4.0%) and 0% of residents are Native American, Alaska Native, or Pacific Islander (2022 ACS 5 Year Estimates Data Profile).

The median age in the Village is 50.4 years. The largest age group within Philmont is 50-59 years old, constituting 29% of the population (2022 ACS 5 Year Estimates).

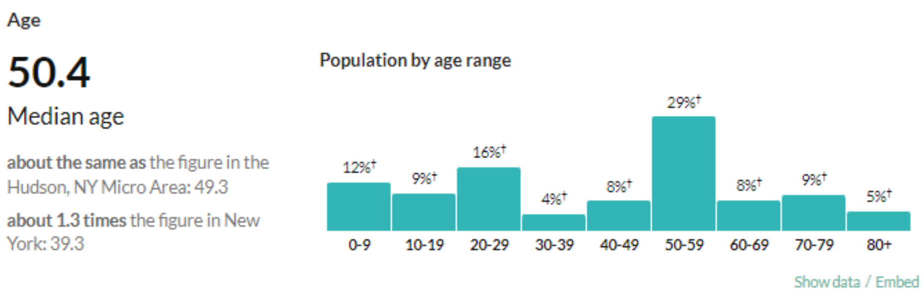

Figure 10. Population by Age Range in Philmont (Source: USCB 2020)

Income, Housing, and Education

The median household income in Philmont is $60,848 while the median individual income is $42,692. Philmont's poverty rate is 13.4%. The largest age group living in poverty are residents under the age of 18 (2022 ACS 5 Year Estimates).

The total number of housing units is 698, while the number of occupied units is 559. Of these occupied units 58.3% are owner-occupied and 41.7% are renter-occupied. The number of households is 559, with an average of 2.63 people per household (2022 ACS 5 Year Estimates).

The median home value is $172,000. 95.6% of Philmont's residents hold a high school degree or higher and 30.3% have a bachelor's degree or higher (2022 ACS 5 Year Estimates).

Governance

The Village of Philmont is in the 19th Congressional District, 41st State Senate District, and 106th Assembly District. Philmont is governed by a mayor and a board of trustees composed of 4 elected members (HMP, 2018).

Philmont has a part-time police force but also law enforcement support is also provided by the County Sheriff's department and the State Police. Philmont has a volunteer fire company called the Philmont Fire Company. Additional firefighting support is provided by A.B. Shaw Fire Company, Churchtown Fire Company, Craryville Fire Company, Mellenville Fire Company, and the West Ghent Fire Company. Ambulance and rescue services are provided by the Greenport Rescue Squad (HMP, 2018).

Philmont Village government has several active committees and boards, including a Climate Smart Communities Task Force (Philmontny.org). The Philmont Climate Smart Communities Task Force mission statement is "take the actions designated by New York State to help Philmont reduce its greenhouse gas emissions to reduce climate change and help New York State meet its climate goals" (Philmont.org).

Economy

Philmont has a labor force participation rate of 59.7% and an unemployment rate of 8.9% (2022 ACS 5 Year Estimates).

The most common occupations among the Philmont labor force are production, transportation, and moving occupations; management, business, science, and arts occupations; and service occupations (2022 ACS 5 Year Estimates).

Ecosystem Information

The natural resources and ecological communities of Philmont are primarily defined by the Hudson River and its tributaries in the western part of Village and the farms, hills, and forests in the eastern part. The natural features of Philmont provide essential ecosystem services as well as aesthetic beauty that is valued by Village residents and visitors alike (Comprehensive Plan, 2009).

All of Philmont is within the Hudson River Estuary Watershed. The major natural waterbody of Philmont is the Agawamuck Kill, which flows into Claverack Creek, a major tributary of the Hudson. The Agawamuck Kill runs east-west across the village. A reservoir (sometimes called Summit Lake) was created by damming the Agawamuck in the center of the village. The reservoir was originally built to provide waterpower to Philmont's mills but now is available for recreational purposes such as swimming and boating. Another area of note along the Agawamuck is the High Falls area of the creek, where the watercourse drops 250 feet over a half-mile in a series of cascades (Comprehensive Plan, 2001).

Figure 11. Summit Lake, located in central Philmont (Photo Credit: Adriana Beltrani)

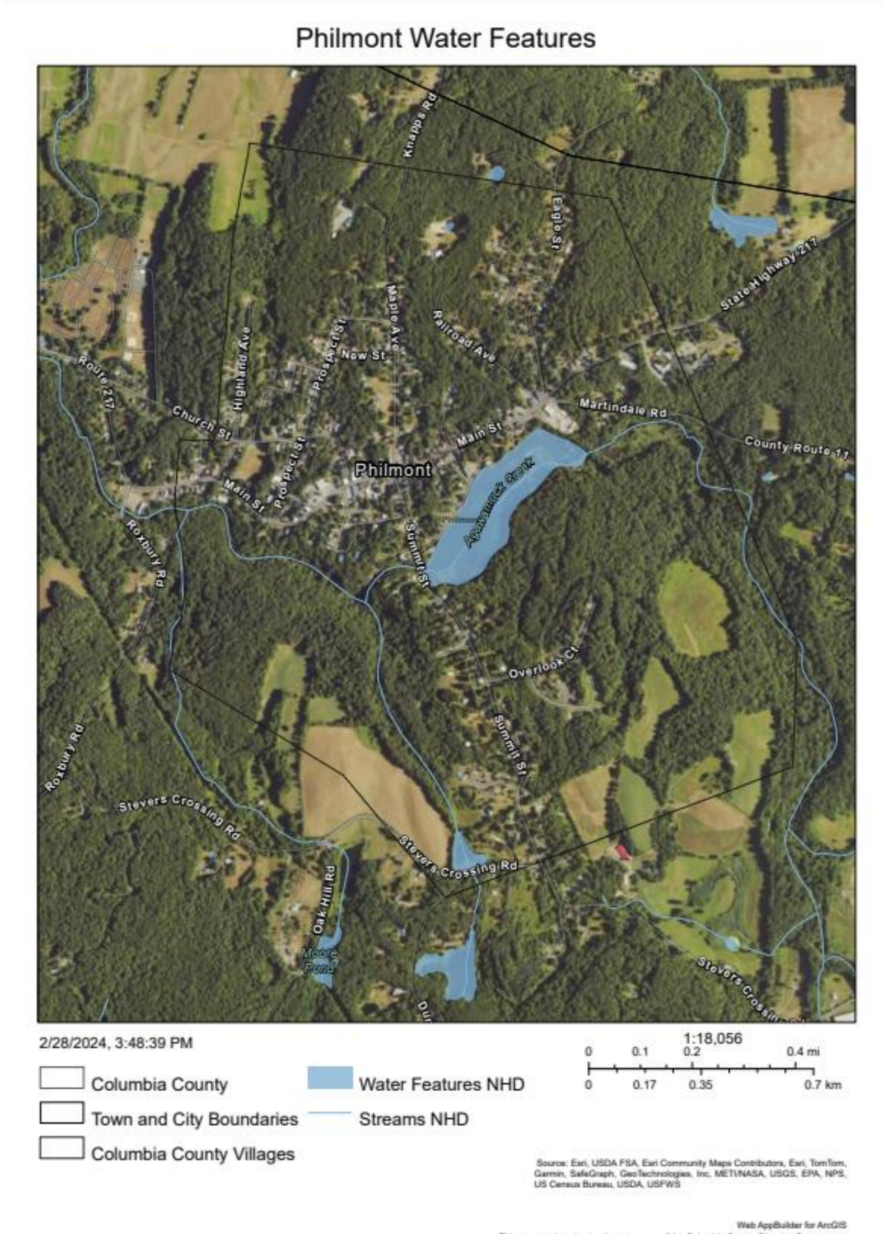

Figure 12. Philmont water features (Source: Columbia County GIS)

Agawamuck Creek provides important wildlife habitat and ecosystem services for Philmont. Stream habitat extends beyond the stream channel itself, including streambanks, floodplains, and non-floodplain areas along the bank and adjacent wetlands. These areas, along with Philmont's reservoir, provide essential habitat for a variety of ecologically important species as well as rare flora and fauna (NRI, 2018, 43-45).

The various streams and small tributaries in Philmont, along with its floodplains, provide essential wildlife habitat and ecosystem services for the village. Stream habitat extends beyond the stream channel itself, including streambanks, floodplains, and non-floodplain areas along the bank and adjacent wetlands. These areas, along with larger waterbodies, provide essential habitat for a variety of ecologically important species as well as rare flora and fauna (NRI, 2018, 43-45).

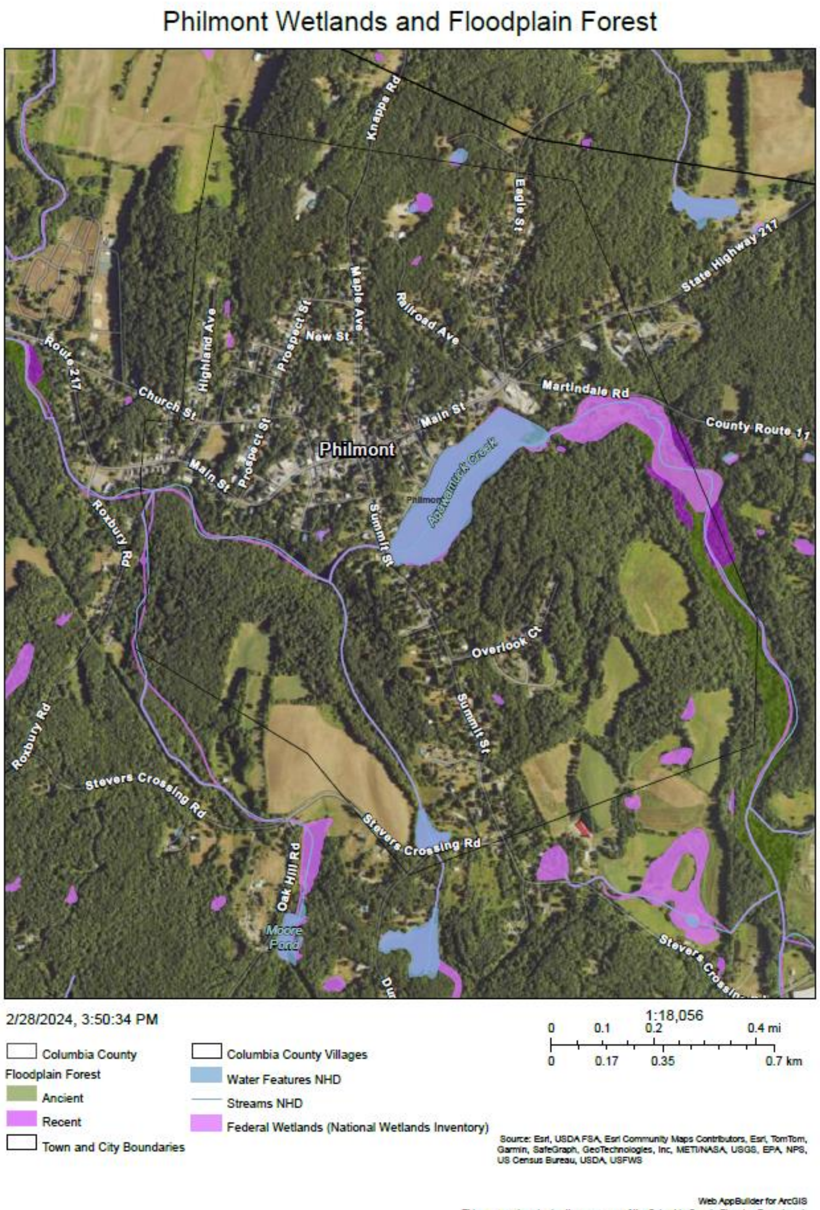

Figure 13. Philmont wetlands and floodplain forest (Source: Columbia County GIS)

Philmont also has a number of wetland areas throughout the village, primarily concentrating along the Agawamuck (Columbia County GIS). Wetlands play an essential role in promoting wildlife habitat, as well as important ecological services for humans such as storing water to reduce flooding and cleaning surface and ground water (NRI, 2018, 70-74).

There are a number of ecosystem stressors that Philmont should be concerned with, including short-term droughts, more frequent and extreme heat waves, more frequent precipitation and flooding events, further proliferation of invasive species, and the direct and indirect effects these events may have on Philmont's habitat and ecosystem services (NRI, 2018, 126).

The effects of climate change are expected to see further increased temperatures which poses a threat to both ecosystem and human health. Heat waves during summers are expected to become more frequent and extreme. Extreme heat is expected to negatively affect habitat, agricultural crop yield, and livestock production. This is expected to stress wildlife and disrupt ecological function and ecosystem services. Additionally, extreme heat poses a threat to human life (NRI, 2018, 126).

Climate change is anticipated to bring more frequent and intense precipitation events, which is expected to cause more frequent and intense flooding (NRI, 2018, 127). Some of the riparian areas surrounding the Agawamuck Creek are prone to minor flooding in Philmont, however there are no areas in Philmont within the FEMA mapped 100-year flood zone (HVNR Mapper).

Short term drought is another stressor that Philmont should prepare for. The effects of climate change are expected to reduce soil moisture as winters become warmer with less snowfall and higher evaporation continues to occur. These factors could help contribute to more frequent and intense short-term drought which threatens local ecosystem health, drinking water supply, and agricultural production (NRI, 2018, 130).

The continued proliferation of non-native invasive species within Philmont also poses a threat to Philmont's natural resources and biodiversity. Invasive forest pests such as the emerald ash borer and hemlock woolly adelgid cause mortality of some of the most common trees within northeastern forests. This forest loss reduces carbon sinks that act to cool the environment and cause warmer microclimates within forested areas that negatively affect biodiversity. Additionally, invasive plants such as multiflora rose and Japanese stiltgrass create monocultures which reduce native biodiversity. The spread of invasives can exacerbate the effects of climate change and lead to further loss of essential ecosystem services (NRI, 2018, 144-146).

History of any Extreme Storms or Extreme Weather Events

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Extreme weather events include extreme cold, extreme heat, drought, wind, and extreme precipitation events with related flooding. As extreme weather events become more frequent and severe, the impacts on infrastructural, societal, and ecological systems can be wide ranging.

Climate patterns across the Northeast remained relatively stable until the late 20th century. In recent years, new climate trends are shifting seasonal patterns. The historical frequency and intensity of extreme weather events vary considerably from year to year across NYS; however, some trends do exist. In Columbia County springs arrive sooner, summers are hotter, fall frosts begin later, spring frosts end earlier, winters are warmer, and the depth and duration of snow cover is reduced. The subsequent effects of climate change will likely be felt more acutely in the coming years. This includes larger and more frequent floods, higher temperatures, droughts, wildfires, and severe storms (NRI 2018, 125).

Extreme Storms

An extreme storm is a type of weather condition characterized by high winds and rainfall and often accompanied by thunder and lightning. Extreme, or severe storms encompass many types of climatic events, including hail and thunderstorms that can sometime spawn tornados as well as Nor'easters and coastal storms that can cause flooding and may occur year-round. The hazard of a severe storm may vary based on type and time of year. Because Columbia County is in a relatively inland location, the effects of costal storms and hurricanes are similar to severe storms and are therefore included in this section. Coastal storms and Nor'easters are large, cyclonic storms that can last several days and produce gale-force winds and heavy precipitation in the form of rain or snow (HMP, 2018, 3-10).

The Atlantic hurricane season begins in June and runs through November. Fueled by climate change, hurricanes are projected to both increase in frequency and strengthen in intensity. The increased precipitation brought by more frequent and intense hurricanes will cause inland river flooding as well as storm surge flooding, resulting in compounding flood events which amplify coastal flooding and erosion. Though exact changes in precipitation patterns are unknown, Atlantic hurricanes such as Hurricane Sandy are more likely to move further up the coast and further inland. Additionally, the region's susceptibility to major storms is impacted by Nor'easters, typically occurring between September and April. Combined with the Atlantic hurricane season, the region is susceptible to major storms and compound flooding nearly year-round (U.S. EPA, 2022, 18).

In August of 2011, two major storm systems caused significant damage across the Northeast. Hurricane Irene and Tropical Storm Lee made landfall within days of each other, following an already wetter-than-normal summer. Widespread flooding from Hurricane Irene caused $2.5 million in damages in Columbia County (HMP, 2018). Tropical Storm Irene dumped between four and eight inches of rainfall in Columbia County over two days (National Weather Service). The already well-saturated watersheds could not absorb the torrential rains, and the region experienced the greatest 60-day streamflow on record (NYSERDA, 2014, ES-1).

Transportation, agricultural, and tourism sectors sustained the worst impact. The extensive flooding caused millions of dollars of damage to infrastructure. Much of the damage occurred as the result of culverts that were not large enough to handle the volume of water from the storms. Wells and public water systems were submerged and contaminated with chemicals and pathogens, degrading safe drinking water supplies (NYSERDA, 2014, ES-2).

Figure 14. Flooding as a Result of Extreme Storms in Columbia County (Image by Robert Kaufmann/FEMA)

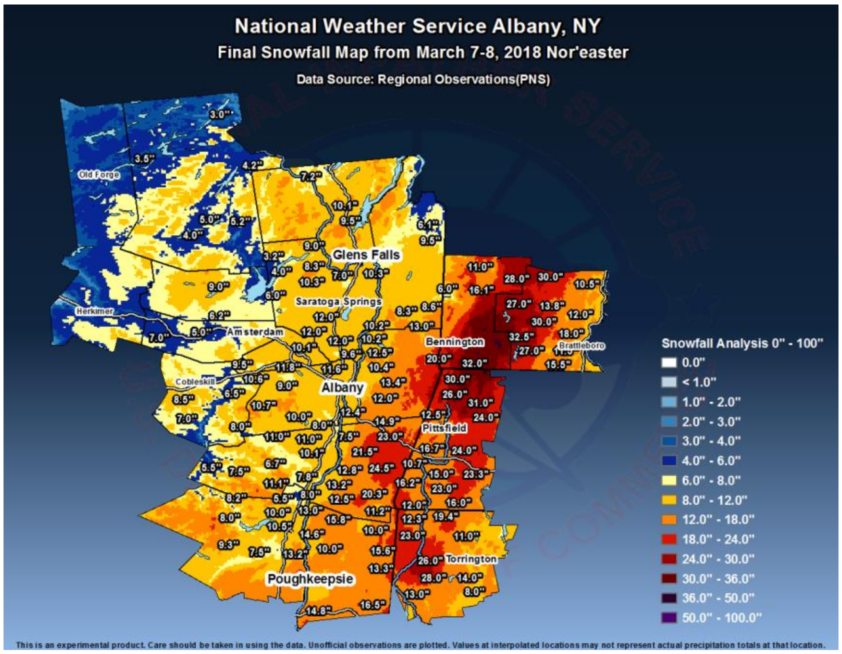


Figure 15. National Weather Service Final Snowfall Map from March 7-8, 2018 Nor'easter (Source: National Weather Service Albany, NY)

In late winter of 2018, a series of Nor'easters brought strong winds, heavy snow, and coastal flooding. While winter storms are common, the strength and close timing of the Nor'easters was significant. Snowfall accumulation continued for over 48 hours, resulting in more than 24 inches of snow in some parts of Columbia County. Less than a week later, the East Coast experienced another Nor'easter, also resulting in heavy snowfall (Di Liberto, NOAA, 2018).

In early September 2021, the remnants of Tropical Cyclone Ida resulted in widespread flash flooding over Ulster and Dutchess counties. In Dutchess County, 35 roads were either damaged or closed and at least one bridge was washed out. The County Executive declared a state of emergency and restricted travel, Metro North rail service was shut down, and 2,000 people were without power. A federal major disaster was declared for the county, which reported $2.5 million in damages to public assets and municipal facilities, as well as $1 million in damages to private residences and businesses. Heavy rainfall from Tropical Storm Henri only ten days earlier resulted in already saturated conditions, leaving the area more vulnerable to flash flooding (National Weather Service New York).

A Nor'easter in mid-March of 2023 brought heavy, wet snow to most of Columbia County. Austerlitz received 31 inches of snow, the highest snowfall total in the County. The weight and amount of snow led to numerous downed trees and powerlines (National Weather Service).

An extreme storm impacted areas of Columbia County in early September 2023. Severe thunderstorms brought heavy rains which downed trees and caused heavy damage. Over 19,000 people lost power and some school districts had to close. The village of Chatham and New Lebanon experienced the most significant storm damage, with roads closed by downed trees and power lines (Silva, 2023).

On December 17-18, 2023, Columbia County was impacted by a Nor'easter which brought widespread heavy rain and high winds (NEWS10, 2023). A flood advisory was issued for the County, with flooding occurring in Hudson and in other towns.

See the Appendix for information on severe storms in Columbia County from 2000-2015.

Severe Winter Storms

A severe winter storm can occur at near or below freezing temperatures, and include snowfall, sleet and/or freezing rain. Severe winter storms may include one or more of the following conditions: ice storms, extreme cold, blizzard conditions, or heavy snow. Severe winter storms are characterized as: severe ice storms – a storm comprising mostly freezing rain; heavy snow storms – six inches or more within 12 hours; and blizzard conditions – considerable or heavy snow, wind in excess of 35 mph, low visibility (1/4 mile or less), and low temperatures for at least three hours (HMP, 2018, 3-12).

Ice storms, heavy snowstorms, and blizzard conditions often result in downed power lines, communications interference, exposure, dangerous road conditions, and infrastructure damage. Past severe winter storms have collapsed roofs, damaged and destroyed trees and crops, downed power lines, and have caused motor vehicle accidents (HMP, 2018, 3-12).

A powerful artic airmass moved through Columbia County in early February 2023, bringing extreme cold and strong wind gusts. The combination of very cold air and strong winds resulted in wind chill values much lower than the actual air temperature. Windchills in Columbia County reached as low as -35ºF (National Weather Service).

In May 2023, a late season frost/freeze occurred across the region, impacting many farmers. Columbia County was one of 31 counties declared USDA primary natural disaster areas due to the unseasonable frost. Reports of damage included vineyards and other crops, such as apples and peaches (New York State Department of Agriculture and Markets). One farming expert estimated that 30-35 percent of the Hudson Valley's apple crop had been lost. Grapes were hit harder, with some vineyards reporting losses of 100 percent (Gilson, 2023).

In general, climate change results in reduced average snowfall, however, the impacts of new weather patterns and stronger storms vary. The National Climate Assessment notes an increase in both the number and strength of winter storms since 1950. Research shows that while the total amount of snowfall is decreasing, extreme precipitation events are increasing. Additionally, more powerful frontal systems coming out of the Arctic may contain higher winds with larger amounts of precipitation throughout the year, posing a risk to the county (HMP, 2018, 3-12).

Columbia County has experienced many historic severe winter storm events. Columbia County's average annual snowfall from 1979 to 2009 was 41.3 inches. The Appendix provides information from 2000-2015 on the events, impacts, and estimated losses from these types of winter storms. Climate change projections indicate an increase in the number of severe winter storms and related damages in Columbia County (HMP, 2018, 3-13).

Wind

Figure 16. Damages caused by Extreme Storms in Columbia County
(Image by Skip Dickstein/Times Union)

Extreme storms bring high winds. The average maximum wind speeds in Columbia County are higher than what they were 30 years ago, with 86% of homes now facing a moderate risk. In addition to property damage, severe wind events can damage utilities, emergency services, and other vital infrastructure (Risk Factor).

Columbia County is also susceptible to tornados. A tornado is a local storm formed by winds rotating at very high speeds. Past tornado events in the County have caused substantial damage to buildings, homes, trees, power lines, automobiles, and agricultural crops. In total, Columbia County and its municipalities have sustained approximately $11.2 million in damages as well as eight injuries from tornados between 1973 and 2018 (HMP, 2018, 3-16).

On average, Columbia County saw a 0.25% chance of a tornado in any given year between 1980 and 1999 according to NOAA's National Severe Storms Laboratory's Time Series of Tornado Annual Cycle Probability. However, recent tornado activity, including events in 2003, 1997, and 1995, suggests that tornadoes may now be more frequent than the previous twenty-year average. The risk of tornados is directly tied to that of severe storms. Cascading hazard events such as tornados may be more likely to spawn from more powerful frontal systems than individual stand-alone events. (HMP, 2018, 3-17).

On November 17, 2010 a National Weather Service Storm Survey Team confirmed an EF1 tornado in the town of Ghent. An EF1 tornado has wind speeds from 73 to 112 mph and typically causes moderate damage. Although the path length was approximately 2 miles, damage was intermittent along the line. The most concentrated damage was observed at the intersection of Soller Heights Road and County Road 9. Damage was mainly confined to downed trees, although some damage to shingles and siding were noted (National Oceanic and Atmospheric Administration b).

Significant and widespread damage in parts of Columbia County were caused by straight-line winds of up to 100 miles per hour on July 5, 2023. The intense winds, spurred by severe thunderstorms, caused pockets of isolated damage with downed trees and powerlines (WNYT, 2023). Only a week later, on July 13, 2023, four tornado warnings, paired with extreme thunderstorms, were issued for Columbia County. Damage was concentrated near Chatham, Ghent, Ancram and Valatie, although no touchdown of any tornados were confirmed (News 10, 2023). The Appendix lists tornados in Columbia County, 1990 – Current.

Floods

A flood may occur as the result of heavy precipitation, river overflow, flash floods, dam-breaks, local draining with high groundwater levels, and fluctuating lake levels. Variations in weather patterns from thunderstorms, tropical storms and hurricanes, Nor'easters, and ice storms can especially increase flood risk. Floods in the winter months are often caused by ice jams which impede river flow. Flash flood events pose the highest risks because of their low predictability, quick onset, and turbulent water flow (HMP, 2018, 3-7).

Sea level rise has led to a 13-inch rise in the Hudson River and New York Harbor. Projections indicate that the Hudson River could rise 5-27 inches by 2050 (NRI, 2018, 127). Some existing tidal wetlands along the shoreline in Columbia County will be drowned by sea level rise, while others will see their characteristics change (NRI, 2018, 126). Municipalities located within or near floodplains along rivers and streams are most susceptible to flood damage. The towns of Ancram, Austerlitz, Canaan, Chatham, Claverack, Clermont, Copake, Gallatin, Germantown, Ghent, Greenport, Hillsdale, Hudson, Kinderhook, Livingston, New Lebanon, Stockport, Stuyvesant, Taghkanic, and Valatie, as well as the villages of Chatham and Kinderhook, are partially located within floodplains and are therefore subject to significant flood risk (HMP, 2018, 3-7).

Since 1987, Columbia County has experienced many historic floods. As of 2018, the County has recorded 26 floods that have caused approximately $18.9 million in damages, nine injuries, and three deaths. Flood damages in the county have included bridge collapses, tree and fence loss, road inundation, and road/bridge closure. Widespread flooding was caused by heavy rains associated with Hurricane Irene which resulted in the closure of major transportation routes for approximately one month due to washouts and inundation (HMP, 2018, 3-8).

Risk Factor identifies 4,683 properties in Columbia County that have a greater than 26% chance of being severely affected by flooding within the next 30 years. This represents 17% of all properties in the County. In addition to property damage, flooding can also cut off access to utilities, emergency services, and transportation (Risk Factor). In the County, 25 properties are filed as “repetitive loss properties” with an estimated $1,970,200 in losses (HMP, 2018, 4-5).

Increases in precipitation and storm events are likely to increase the risk of flooding. Average precipitation in the Mid-Hudson region from 1971-2000 was 48 inches per year. Annual precipitation is expected to change from 0 to +5% by 2020, 0 to +10% by 2050 and +5 to 10% by 2080 (Mid-Hudson Regional Sustainability Plan, 2013, 3-9). Warming climate results in increased heavy rainfall and extreme precipitation events. The predicted increase in the number of hurricanes may lead to more frequent flooding events. Much of the historical industrial development in New York is along rivers, canals, and other bodies of water. Flooding poses environmental issues by increasing the spread of contaminants into soils and waterways, causing risks to nearby populations and wildlife ecosystems (U.S. EPA, 2022, 21).

See the Appendix for a list of major flooding events 2000-2015.

Extreme Heat

Unusually hot summers have become more common in New York over the past decades. The annual average temperatures have risen two degrees Fahrenheit since 1970, while average winter temperatures have increased five degrees Fahrenheit. The average annual temperature in Columbia County is projected to increase four to six degrees Fahrenheit by mid-century and as much as 11 degrees by the end of the century (NRI, 2018, 126).

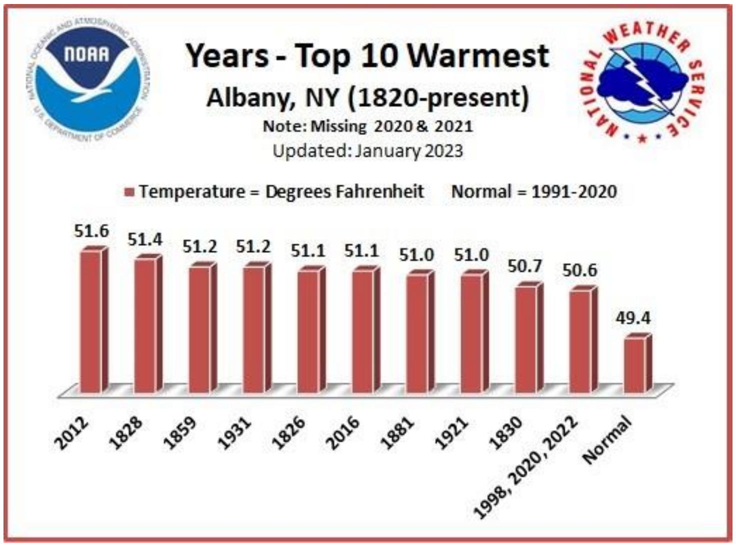


Figure 17. Top 10 Warmest Years in Albany, NY 1820-Present (Source: National Weather Service)

A heat wave, defined by the National Weather Service as a period of abnormally hot weather lasting for more than two days, can have high or low humidity, cover large areas, and potentially expose a high number of people to hazardous heat. Columbia County has been identified as having 35,789 properties at risk of high heat days (days where the "feels like" temperature is at least 96℉). The county was projected to experience seven of these high heat days in the year 2023, with this number increasing to 16 high heat days in 30 years (Risk Factor). Heat projections show an increase in the number of days above 90℉. While the 1970s-2000s saw about 10 days a year above 90℉, that is expected to increase to 26-31 days in the 2020s, 39-52 days in the 2050s, and 44-76 days in the 2080s (NYDEC, 2018, 8).

In 2022, low precipitation, nearly four and half inches below average, made July through September particularly dry. August 4, 2022 was the hottest day of the year, with the Capital Region reporting temperatures of 99℉. In general, heat waves in the United States went from an average of two days a year in the 1960s to six days per year by the 2010s. The last seven years have been the warmest in recorded history (Watkins, 2022) and major heat waves have affected the area in 2006, 2010, 2011, 2012, 2018, and 2022.

Globally, the summer of 2023 was declared the hottest on record (NASA, 2023). Average annual temperatures are on the rise regionally as well. Between the years of 1971-2000 average annual temperature in Albany was 47.5℉. By 1981-2010 average annual temperature increased to 48.3℉; and additional temperature rise was detected from 1991-2020, which had an average annual temperature of 49.4℉ (NOAAa).

Increasing average temperatures are expected to be more pronounced during summer months, and decreased summer precipitation will likely accompany this shift (HMP, 2018, 4-8). This trend includes an increase in the number of extremely hot summer days (above 90℉). July is consistently the hottest month in the region. Summer (June-August) daily maximum temperature in NYS ranged from 42.8°F to 93.7°F in 1979 and 46.9°F to 99.2°F in 2016. Figure 18 from the Heat and Health Profile Report displays the summer (June-August) maximum temperature anomalies between 1979 and 2016 in Columbia County. Figure 19 shows the average monthly summer (June-August) maximum temperature between 1979 and 2016 in Columbia County (New York State Department of Health, 2019, 2).

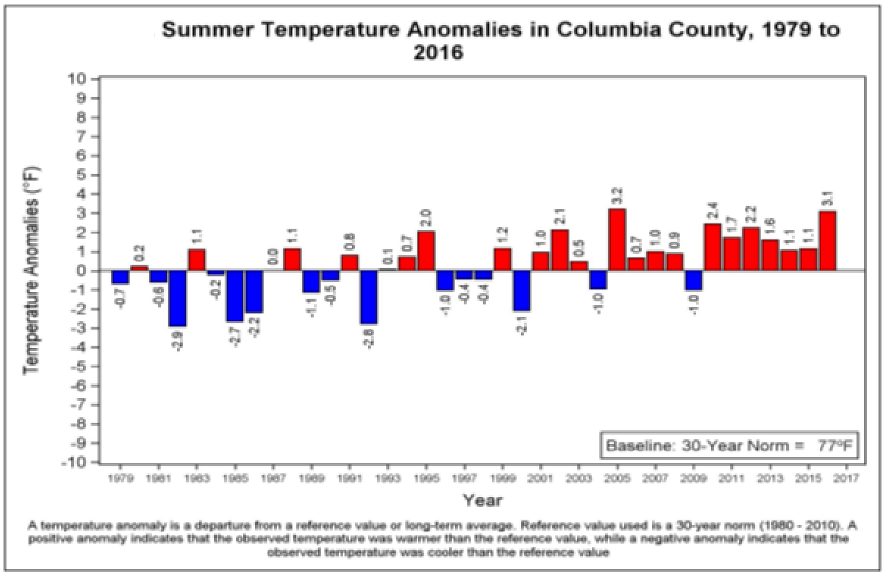


Figure 18. Summer Temperature Anomalies in Columbia County, 1979 to 2016 (Source: New York State Department of Health, 2019)

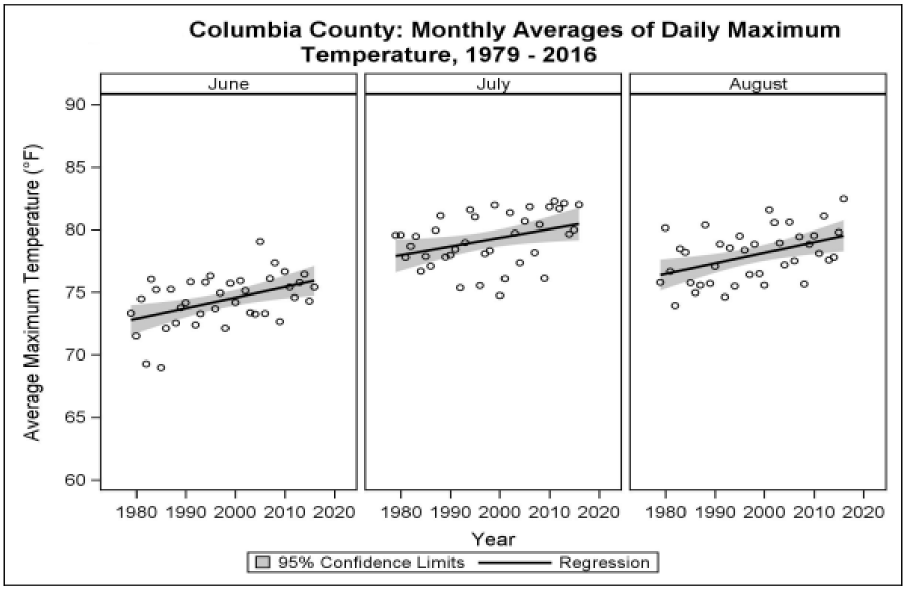


Figure 19. Columbia County: Monthly Averages of Daily Maximum Temperature, 1979-2016 (Source: New York State Department of Health, 2019)

Variations and sudden spikes in temperature can affect health, especially among the elderly who may need time to adjust to the rising temperatures (New York State Department of Health, 2019, 2). Extreme heat is a leading cause of death among hazardous weather events. Heat-related health effects may disproportionately affect the elderly, poor, ailing, those with limited social mobility, those lacking access to public facilities, transportation, and air conditioning, and those who work outdoors (NRI, 2018, 136).

Drought

Periods of drought are predicted to become more frequent and severe in New York. Since droughts are a function of temperature and precipitation, they are often more difficult to predict. Drought can threaten drinking water supplies, agriculture, aquatic communities, and wetland habitats. Drought may become a long-term concern for the area, resulting in challenges for surface water reservoirs and ground water wells. The potential drying of wetlands during periods of drought could also result in large releases of carbon to the atmosphere (NRI, 2018, 130).

New York experienced historic drought conditions in 2016 and 2020 that had previously not occurred since the 1960s. In the summer months of 2020, the United States Department of Agriculture designated four New York counties as primary natural disaster areas, while other areas in Southern New York also suffered from extreme drought conditions. The Northeast region frequently experiences “flash” droughts, which are short term dry periods. While these “flash” droughts may not last more than a few months, they can have profound impacts on the local region. They cause public water shortages and low streamflow, which affect agricultural and economic systems. New York’s large agricultural industry is impacted when drought occurs during growing season, particularly because many farms do not have irrigation systems (NOAA & National Integrated Drought Information System).

In August of 2022, Governor Kathy Hochul directed the Department of Environmental Conservation to issue a statewide Drought Watch due to below-normal precipitation during the prior three months. An increasing number of water supply issues were reported because of concern over reservoir and lake levels, stream flow, and groundwater levels (New York State Department of Environmental Conservation, 2022). According to the NOAA Storm Events Database, August 16, and September 1 of 2022 were officially reported periods of drought, the last reported period being August of 1999 (NOAAb).

Figure 20. Drought Impacts to Aquatic Habitats (Image by Tony Adamis/Special to the Times Union)

Wildfire

Drought and persistent heat set the stage for extraordinary wildfire seasons. Temperature increases due to climate change have led to an increase in wildfire season length, frequency, and area coverage. Wildfire smoke can have far-reaching impacts, causing air quality and health problems. During the summer of 2021, parts of the New York and the Northeast were covered in a blanket of smoke from wildfires in the Western U.S. and Canada. The region was widely impacted by wildfire smoke again in 2023. In early June of 2023, the NYS Department of Environmental Conservation reported that the state experienced the worst air quality since 2002 due to wildfires in Canada.

During periods of drought, Columbia County can also be at risk of wildfire. As recently as April of 2023, the National Weather Service of Albany warned the Hudson Valley and Catskill Mountain region of low humidity and gusty winds, issuing Red Flag and Fire Watch Warnings. On April 9, 2023, local rangers in Columbia County responded to a six-acre brush fire, caused by a fallen powerline (New York Almanac).

While wildfires generally pose a minor hazard in Columbia County, Risk Factor indicates 26,534 properties within the County that are at risk of wildfire over the next 30 years. Rising average air temperatures, changing patterns of precipitation, and a decrease in humidity all create conditions that are prime for wildfires to spread.

Climate Change Effects and Impacts

Observed and Projected Climate Change in New York

The recently published New York State Climate Impacts Assessment (Lamie et al., 2024) highlights several key findings regarding the impacts of observed and projected climate change within the state. This study, along with the previously published ClimAID report, points to the current and future climate changes anticipated regionally and locally for Columbia County, NY.

Average Annual Temperature Change

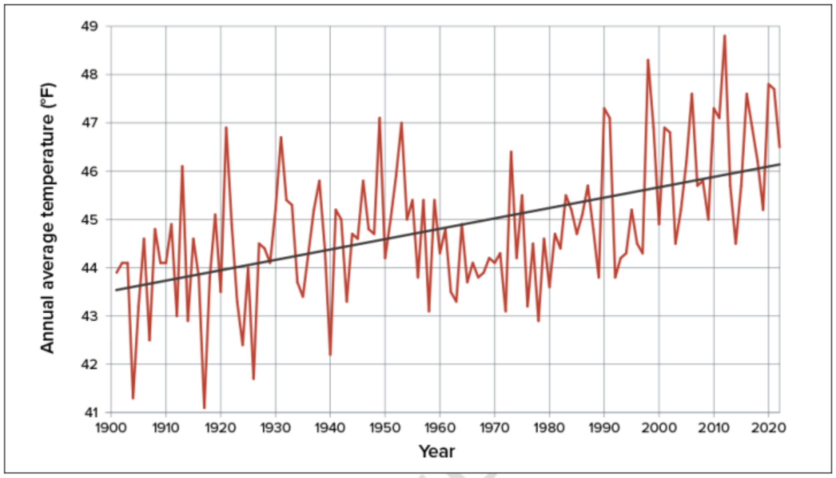
The Northeast region of the U.S. has been experiencing milder winters and earlier spring conditions (Dupigny-Giroux et al., 2018). According to ClimAID, average temperature increases have occurred every decade between 1901 and 2012 in all parts of NYS. All regions have experienced temperature increases ranging from 0.09 (Region 3) to 0.35 (Region 2) degrees Fahrenheit (°F) per decade (Horton et al., 2014).

Observed Climate Trends by ClimAID Region (1901-2012)

Region	Average Annual and Cumulative Temperature Increase		Average Annual and Cumulative Precipitation Increase	
	°F/decade	Cumulative °F	Inches/decade	Cumulative inches
1 – Western New York, Great Lakes Plain	0.32	3.52	0.34	3.74
2 – Catskill Mountains and West Hudson River Valley	0.35	3.85	0.35	3.85
3 – Southern Tier	0.09	0.99	0.58	6.38
4 – New York City and Long Island	0.33	3.63	0.76	8.36
5 – East Hudson and Mohawk River Valleys	0.22	2.42	0.90	9.9
6 – Tug Hill Plateau	0.22	2.42	0.54	5.94
7 – Adirondack Mountains	0.21	2.31	0.19	2.09

Figure 21. Observed Climate Trends by ClimAID Region (1901-2012) (Source: Adapted from Horton et al., 2014. Cumulative increases were calculated by the decadal increments provided by Horton et al., 2014 and represent 11 decades of change.)

Additionally, the New York State Climate Impacts Assessment indicates that from 1901 to 2022, average temperatures in New York State increased by almost 2.6°F, and the warmest 10- year periods in recorded history have occurred since 2000. Among the 27 long-term weather stations that this assessment used for downscaling projections, all experienced warming, and 24 had warming trends that were statistically significant over the 1901–2020 time period. As a whole, New York State warmed at an average rate of approximately 0.21°F per decade from 1901 to 2022 (Lamie et al., 2024). This rate of warming is higher than the contiguous 48 states' average rate of 0.17°F per decade over the same time frame. Additional statistical testing of the data shows that the warming in New York State has occurred at a faster rate over the last 40 years (1983– 2022) than between the years of 1901–2022 (Lamie et al., 2024, 9).



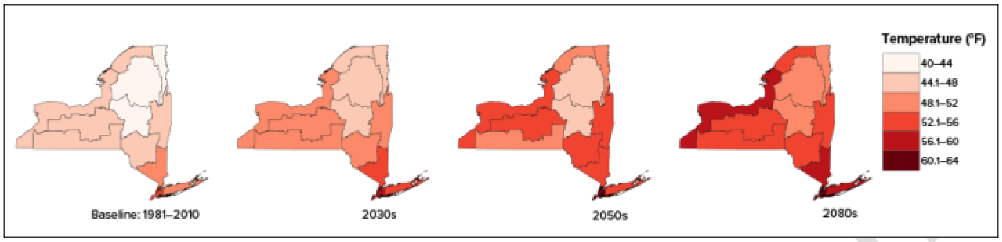
Annual average temperature in New York State, 1901–2022. Daily mean air temperatures are averaged over the entire year, calculated for each NOAA climate division as part of NOAA's nClimDiv data set, and then averaged across all of New York's climate divisions, weighted by each division's area. The black line shows the ordinary least-squares linear trend (+0.21°F per decade), which is significant to a 99% confidence level ($p < 0.001$). Data from NOAA (2023).[14]

Figure 22. Annual Average Temperature in New York State (1902-2022) (Source: New York State Climate Impacts Assessment (Lamie et al., 2024)

Seasonal average temperature—daily mean temperatures averaged over an entire season—can provide a useful indication of how climate change might affect processes that depend on the temperature at a particular time of year, such as frozen conditions in winter. Analyzing seasonal average temperatures can also reveal whether certain seasons are changing more rapidly than others (Lamie et al., 2024, 11).

National and regional analyses consistently show that winter is warming more rapidly than any other season across the contiguous 48 states, particularly in the Northeast, and New York follows suit. The state's winters have warmed at a rate almost double that of spring and fall, and more than double that of summer. Over the period 1901–2022, winter average temperatures increased at an average rate of 0.34°F per decade, compared with 0.18°F in spring, 0.15°F in summer, and 0.18°F in fall (Lamie et al., 2024, 11). Furthermore, in the period between 1970 and 2008 winter warming trends exceeded an average of 1.1°F per decade (Rosenzweig et al., 2011). This trend is anticipated to continue as winter temperatures are projected to increase the most (Lamie et al., 2024, 12).

According to the New York State Climate Impacts Assessment annual average temperatures are projected to increase in all regions of New York progressively throughout the 21st century (Figure 23). Across the state, annual average temperatures are projected to increase by 2.5– 4.4°F by the 2030s, 3.8–6.7°F by the 2050s, and 5.1–10.9°F by the 2080s, depending on global greenhouse gas emission rates (Lamie et al., 2024, 10).



Projected annual average temperature in New York State during the 21st century. The maps show median (50th percentile) modeled results from a blend of the SSP2-4.5 and SSP5-8.5 greenhouse gas emissions scenarios. Data from projections developed for this assessment.[3]

Figure 23. Projected Annual Average Temperature in New York State during the 21st Century (Source: New York State Climate Impacts Assessment (Lamie et al., 2024)

ClimAID data also projects average annual temperature to increase from baseline conditions (1971 to 2000). As shown in Figure 24, temperatures are expected to increase across all regions in the future. The most drastic increase is projected to occur in NYS regions 1, 3, 6, and 7, with temperatures in the 2100s projected to be 13.8 to 13.9°F higher than baseline. Specifically for counties east of the Hudson estuary, such as Columbia County, models project annual average temperature to increase by 3 to 5.5 degrees F by 2050 and an increase of 4 to 9.5 degrees F by 2100 (NYSDEC, 2014).

Projected Changes in Average Annual Temperature by ClimAID Region, 90th Percentile

Region	Mean Temperature				
	Baseline	2020s	2050s	2080s	2100s
1 - Western New York, Great Lakes Region	47.7°F	+ 4.0°F	+ 7.3°F	+ 12.0°F	+ 13.8°F
2 - Catskill Mountain and West Hudson River Valley	50.0°F	+ 3.5°F	+ 6.9°F	+ 10.7°F	+ 12.6°F
3 - Southern Tier	47.5°F	+ 3.8°F	+ 7.1°F	+ 11.6°F	+ 13.8°F
4 - New York City and Long Island	54.6°F	+ 3.2°F	+ 6.6°F	+ 10.3°F	+ 12.1°F
5 - East Hudson and Mohawk River Valleys	47.6°F	+ 3.7°F	+ 7.1°F	+ 11.4°F	+ 13.6°F
6 - Tug Hill Plateau	45.4°F	+ 3.9°F	+ 7.2°F	+ 11.8°F	+ 13.9°F
7 - Adirondack Mountains	39.9°F	+ 3.8°F	+ 7.4°F	+ 11.8°F	+ 13.9°F

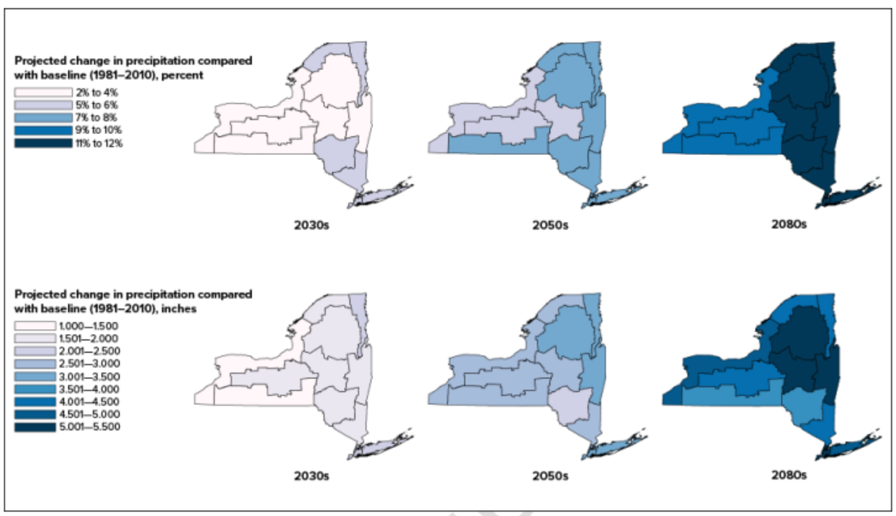
Figure 24. Projected Changes in Average Annual Temperature by ClimAID Region (Source: Adapted from Horton et al., 2014)

Average Annual Precipitation Change

From 1901 to 2022, New York received an average of 41.1 inches of precipitation per year statewide. Annual precipitation across the state increased at a rate of 0.47 inches per decade from 1901 to 2022. Annual precipitation is projected to increase progressively in all New York State climate regions through the late 21st century (Figure 25). Across the state, precipitation is projected to increase by approximately 1% to 8% by the 2030s, 2% to 12% by the 2050s, and 6% to 17% by the 2080s, relative to a 1981–2010 baseline (Lamie et al., 2024, 23-24).

Average annual precipitation has increased in all of New York's seven ClimAID regions, and the increases are projected to continue (Rosenzweig et al., 2011). The greatest increases in precipitation are projected in the northern parts of the state, with much of this additional precipitation anticipated to occur during winter, but increasingly as rain rather than snow (DEC, 2015). There is natural variability in precipitation throughout any given year and on a decadal time scale, as well as in terms of geographic regions throughout the state (Rosenzweig et al., 2011). However, changes in climate are affecting this natural variability.

Average annual precipitation is projected to continue to increase state-wide from baseline conditions (1971 to 2000). The most drastic increases are projected to occur in Regions 3, 5, 6, and 7, with mean precipitation 26 percent higher than baseline by the 2100s (Figure 26) (Rosenzweig et al., 2011).



Projected annual precipitation in New York State during the 21st century, relative to the 1981–2010 baseline. The maps show median (50th percentile) modeled results from a blend of the SSP2-4.5 and SSP5-8.5 greenhouse gas emissions scenarios. Data from projections developed for this assessment.[3]

Figure 25. Projected Annual Precipitation in New York State during the 21st Century (Source: New York State Climate Impacts Assessment (Lamie et al., 2024)

Projected Changes in Average Annual Precipitation by ClimAID Region, 90th Percentile

Region	Mean Precipitation (Rain)				
	Baseline	2020s	2050s	2080s	2100s
1 - Western New York, Great Lakes Region	34.0 inches	+ 8%	+ 12%	+ 17%	+ 24%
2 - Catskill Mountain and West Hudson River Valley	46.0 inches	+ 10%	+ 14%	+ 18%	+ 24%
3 - Southern Tier	35.0 inches	+ 9%	+ 15%	+ 16%	+ 26%
4 - New York City and Long Island	49.7 inches	+ 10%	+ 13%	+ 19%	+ 25%
5 - East Hudson and Mohawk River Valleys	38.6 inches	+ 10%	+ 15%	+ 17%	+ 26%
6 - Tug Hill Plateau	42.6 inches	+ 8%	+ 13%	+ 15%	+ 26%
7 - Adirondack Mountains	40.8 inches	+ 9%	+ 15%	+ 17%	+ 26%

Figure 26. Projected Changes in Average Annual Precipitation by ClimAID Region (Source: Adapted from Horton et al., 2014)

Risk: Changing Precipitation Patterns

Precipitation has become more variable and extreme, whereas total rainfall has changed only marginally. Heavy downpours increased 74% between the periods of 1950-1979 and 1980-2009 in the Northeast. Projections indicate total annual precipitation should increase only slightly. Overall, in New York State, we can expect more dry periods intermixed with heavy rain and decreased snow cover in winter. In the future, Columbia County can expect the same (NYSDEC, 2014).

Precipitation is expected to increase in winter and spring across all of New York's climate regions throughout the 21st century (Lamie et al., 2024, 26).

Sea Level Rise

Since 1900, New York's tidally influenced coastlines have experienced sea level rise at an average rate of 1.2 inches per decade (Rosenzweig et al., 2011), with some variability depending on location along the coastline. Figure 27 shows observed sea level rise from 1900 to 2015 as measured at the Battery in New York City.

Observed sea level rise at the Battery, New York City

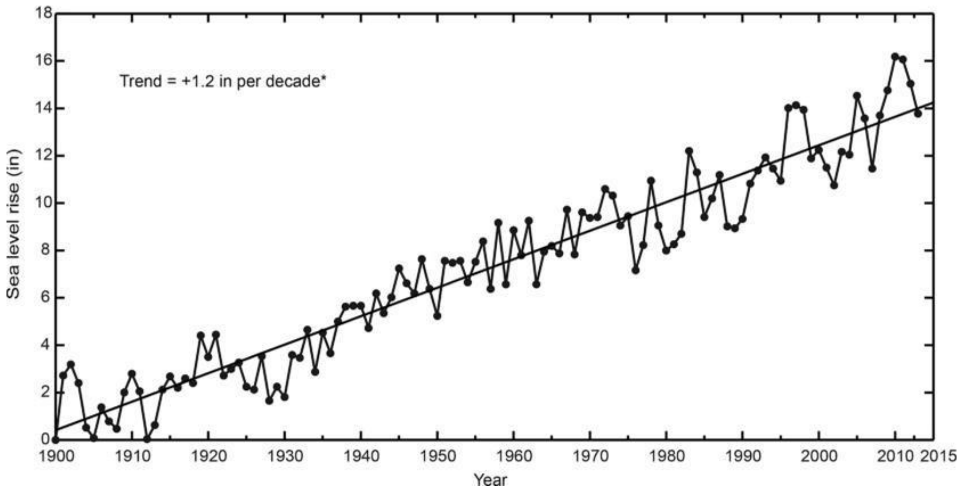


Figure 27. Observed Sea Level Rise at the Battery, New York City (Source: Horton et al., 2014)

Sea level is projected to continue to rise along the New York State coastline and in the tidal Hudson throughout the 21st century and beyond. Figure 28 presents projections from this assessment, all computed relative to a 1995– 2014 baseline. These projections show sea level rising by up to 1 foot by the 2030s, about 2–3 feet by the 2080s, and more than 4 feet by the year 2150. Under certain scenarios with a high rate of ice loss from Greenland, Antarctica, and glaciers—such as a collapse of the West Antarctic ice sheet—New York could plausibly experience sea level rise much higher than 4 feet by 2150. The ranges shown in Figure 28 reflect a combination of three possible scenarios, including a rapid ice melt scenario at the upper end. Looking at a rapid ice melt scenario alone (not blended with other scenarios) would lead to higher estimates. For example, the 2019 New York City Panel on Climate Change report examined an Antarctic rapid ice melt (ARIM) scenario and projected that it would lead to sea level rise of 81 inches by the 2080s and 114 inches by the year 2100 in New York City (Lamie et al., 2024, 41-42).

Projected sea level rise at three locations in New York State during the 21st and 22nd centuries.

Station	2030s (inches)	2050s (inches)	2080s (inches)	2100 (inches)	2150 (inches)
Montauk	8–12	15–21	26–41	32–54	50–94
The Battery	7–11	14–19	25–39	30–50	47–89
Albany (Troy Dam)	7–10	12–17	21–35	25–46	41–82

Note: Sea level rise in inches relative to a 1995–2014 baseline. Ranges given represent the 25th to 75th percentiles of a blended set of three scenarios used by the IPCC: SSP2-4.5 with medium confidence, SSP5-8.5 with medium confidence, and SSP5-8.5 with low confidence. The latter scenario reflects the plausibility of higher-end sea level rise associated with accelerated loss of land-based ice. Data from projections developed for this assessment.[3]

Figure 28. Projected Sea Level Rise during the 21st and 22nd Centuries (Source: New York State Climate Impacts Assessment (Lamie et al., 2024)

Along New York's tidal areas, sea levels are projected to rise from baseline conditions with a potential increase of 71 to 75 inches by the 2100s (Figure 29). ClimAID defines baseline conditions in this case as the average level recorded from the years 2000 through 2004. The projected ranges increase as time progresses due to the uncertainty in land-based ice mass change, the expansion of ocean water as it warms, and regional ocean dynamics.

The science-based projections of sea level rise developed for the ClimAID report were adopted by DEC as Title 6 of the New York Codes, Rules and Regulations (NYCRR) Part 490, Projected Sea-level Rise. These sea level rise projections, shown in Figure 29, apply to the tidally influenced coastlines in New York, including Nassau, Suffolk, and Westchester counties; the five boroughs of New York City; and the main stem of the Hudson River, north from New York City to the federal dam at Troy. The rule does not impose any compliance obligations on any entity; rather, the information was made formally and publicly available as a planning aid (DEC, 2017).

Sea level rise is projected to disrupt coastal ecosystems, erode coastal habitats, produce sunny day flooding, and cause saltwater intrusion into wetlands. This can destroy wetlands that create natural buffers to coastal flooding (NYCCSC, n.d.).

Projected Sea Level Rise for New York Tidal Areas

Time Interval	New York State Tidal Area														
	Long Island (1)					New York City/Lower Hudson (2)					Mid-Hudson (3)				
	Projection (in inches)					Projection (in inches)					Projection (in inches)				
	Low	Low-medium	Medium	High-medium	High	Low	Low-medium	Medium	High-medium	High	Low	Low-medium	Medium	High-medium	High
2020s	2	4	6	8	10	2	4	6	8	10	1	3	5	7	9
2050s	8	11	16	21	30	8	11	16	21	30	5	9	14	19	27
2080s	13	18	29	39	58	13	18	29	39	58	10	14	25	36	54
2100	15	21	34	47	72	15	22	36	50	75	11	18	32	46	71

Figure 29. Projected Sea Level Rise for New York Tidal Areas *Baseline levels are the average level of the surface of marine or tidal water over the years 2000 through 2004.

(1) Marine coast of Nassau and Suffolk counties.

(2) Main stem of the Hudson River, south from the mouth of Rondout Creek at Kingston, New York, and the marine coast of the five boroughs of New York City and the Long Island Sound in Westchester County.

(3) The main stem of the Hudson River, from the federal dam at Troy to the mouth of Rondout Creek at Kingston, New York. Source: Adapted from DEC, http://www.dec.ny.gov/regulations/103877.html.

As highlighted by the impacts suffered by Hurricanes Sandy (2012) and Irene (2011) and Tropical Storm Lee (2011), Hudson Valley communities could benefit from improved planning, response, and recovery relevant to climate events. Three significant climate hazards are expected to affect New York State residents during the 21st century: increasing temperatures, rising sea level, and changing precipitation patterns. Rising sea level will affect the Hudson Valley on a regional scale and municipalities along the Hudson River will face direct impacts associated with sea level rise (NYSDEC, 2014).

Sea Level Rise Projections for the Hudson River Estuary

Projection component	Baseline (1971-2000)	2020s	2050s	2080s	2100
Mid-Hudson region	-	1 - 9"	5 - 27"	10 - 54"	11 - 71"
NYC/Lower Hudson region	-	2 - 10"	8 - 30"	13 - 58"	15 - 75"

Figure 30. Sea Level Rise Projections for the Hudson River Estuary (Source: Cornell College of Agriculture and Life Sciences, New York State Water Resources Institute)

Risk: Flooding

Sea level rise is expected to continue to increase the height and frequency of the state's coastal floods in future decades (Lamie et al., 2024). Increased intense precipitation could lead to more frequent flooding in low lying areas in Columbia County, potentially threatening waterfront assets such as homes, businesses, sewage infrastructure, roads and more. To manage flood risk over time, the County could consider projected flooding in future development proposals. There is a very strong relationship between land use and flooding that is essential to addressing increased flood risk from climate change along streams. Healthy watersheds, including both land and water resources, can reduce erosion and flooding impacts, minimize public infrastructure costs, and be more resilient to climate change—all ecosystem services that directly benefit our communities and cost less than the alternatives (NYSDEC, 2014).

Extreme Weather

Extreme weather events include extreme cold (days with temperatures below 32°F), extreme heat (days with temperatures at or above 90°F), drought, wind, and extreme precipitation events with related flooding.-

The historical frequency and intensity of extreme weather events vary considerably from year to year across NYS; however, some trends do exist. Data collected since the 1970s reveal that the number of days with temperatures below 32°F decreased overall, while the number of days at or above 90°F increased (Rosenzweig et al., 2011).

Extreme heat is further exacerbated by the lower surface albedo in urban areas, where structures (such as concrete buildings, parking lots, or roads) reemit heat to a higher degree than in outlying areas, increasing nighttime temperatures in particular. The heat-trapping effects are often coupled with a lack of shade and cooling effects provided by tree cover and other green infrastructure.

These areas of increased temperatures are referred to as "urban heat islands" (UHI). Temperatures in UHIs are about 1 to 7°F warmer in the daytime and 2 to 5°F warmer at night than the surrounding areas, causing greater concern for heat impacts and health risks (EPA, 2020).

Flooding related to extreme precipitation has occurred in all seasons across the state. Spring flooding is more frequent within central and northern areas of New York due to the potential for rapid snowmelt and ice jams, while summertime flooding is more prevalent in the state's south and in urban areas. The number of extreme precipitation events is projected to increase across the state (Figure 31; Horton et al., 2014).

According to the Northeast Regional Climate Center (NRCC), the frequency of 2-inch precipitation events has increased since the 1950s across New York and New England. 40 New York has experienced an above average number of 2-inch precipitation events since 1995, with the frequency of 2-inch precipitation events peaking from 2010 to 2014.39 Across New York and New England, storms previously considered once in 100-year events (an event with a 1% chance of occurring in any given year) are also becoming more frequent, occurring nearly twice as often as expected in recent years. Days with more than 1 inch and days with more than 2 inches of precipitation are projected to become more frequent. By the 2080s, days with more than 4 inches of precipitation are also projected to become more frequent (Lamie, 2024, 28).

Intense precipitation associated with tropical systems, such as hurricanes, in late summer and fall has caused flooding to the state's larger riverine systems (Rosenzweig et al., 2011). Storms, such as nor'easters and tropical storms, have also caused wind damage and inland flooding. In 2011 Tropical Storm Lee and Hurricane Irene caused severe inland flooding and in 2012, Superstorm Sandy caused coastal and inland flooding. Extreme precipitation during Tropical Storm Lee also illuminated inland flooding risks at higher elevations in the state (Horton et al., 2014). Remnants of Hurricane Ida battered the Northeast days after making landfall in the U.S. Gulf Coast and set new hourly rainfall records that quickly overwhelmed New York City's stormwater management infrastructure, leading to at least 16 deaths in New York State (University at Albany, 2021). Nor'easters in NYS have also been known to bring crippling amounts of snowfall and dangerously low temperatures (Frankson et al., 2017). High wind or ice storms can also greatly impact ecosystems by causing tree fall and gaps in the forest cover where invasive species can more easily proliferate (NYCCSC, n.d.). Hurricanes and associated extreme wind events may become more frequent in New York due to rising sea surface temperatures, which allow storms to gain strength. That said, critical factors related to the formation and intensity of these storms are not well understood (Rosenzweig et al., 2011).

The frequency and intensity of extreme weather events are expected to change state-wide. The ClimAID report provides projections of changes in the frequency of extreme cold, and the changes in frequency and intensity of extreme heat, and extreme rain. While total days of extreme cold are projected to decrease statewide, total days of extreme heat and the frequency and duration of heat waves; are expected to increase in the coming decades (Figure 31). Extreme rain events (additional days with more than 1 inch) are also expected to increase. In addition to the projected increased frequency of heat- and rain-related extreme weather events, the intensity (duration) of these extreme weather events is also expected to increase statewide. Reduction in extreme cold also reduces winter die-offs of certain pests, such as ticks, which can contribute to increased incidences of vector-borne illnesses and ecosystem degradation.

Since droughts are a function of both temperature and precipitation, they are more difficult to predict. Droughts have been recorded in NYS historically. Drought frequency is projected to increase by the end of this century as increased rates of evaporation associated with warmer temperatures outweigh increases in precipitation (Horton et al., 2014). Droughts could exacerbate wildfire risks, primarily when coupled with excess growth of forest fuels due to increasing temperatures (NYCCSC, n.d.).

Projected Changes to New York State Extreme Weather, 90th Percentile

Future Time Period*	Extreme Heat (additional days above 90°F)	Extreme Cold (change in # of days below 32°F)	Number of Heat Waves (# of additional periods of 3+ days of extreme heat)	Duration of Heat Waves (additional days)	Extreme Rain (additional days with more than 1 inch)
Baseline	0.3 to 18 days	71 to 193 days	0 to 2 / year	3 to 4 days	5 to 13 days
2020s	1.7 to 15	-18 to -11	0.2 to 3	0 to 1	1 to 3
2050s	9.7 to 44	-32 to -19	1 to 7	1 to 2	1 to 4
2080s	26.7 to 73	-37 to -22	3 to 8	2 to 5	2 to 5

Figure 31. Projected Changes to New York State Extreme Weather (Source: Adapted from data in Horton et al., 2014)

Risk: Heat Waves

Increasing annual temperatures will lead to more frequent, intense, and long-lasting heat waves during the summer, posing a serious threat to human health. This will also impact agriculture as heat stress reduces crop yield and livestock productivity. With over 99,000 acres of agricultural land, according to the USDA (2017), heat is a significant climate risk for the County. The number of days above 95 degrees is expected to more than triple by 2050 in communities east of the Hudson and rise dramatically by 2080, while days below freezing will steadily decrease (NYSDEC, 2014).

Risk: Short-term Drought

Soil moisture will likely decrease with warmer, less snowy winters, fewer steady rainfalls, and higher evaporation from increased temperatures. This could lead to more frequent and intense periods of short-term drought, threatening local drinking water supplies, agricultural production and aquatic ecosystems. Drought may be of particular concern for Columbia County given its abundance of low well yields and high percentage of agricultural land (NYSDEC, 2014).

Ecosystems and Natural Resources in a Changing Climate

Along with climate change, widescale ecological and ecosystem changes are anticipated. Changes in average precipitation and temperature, in frequency and severity of extreme weather, and in sea levels all will severely alter ecosystems and impact natural resources, both abruptly as well as gradually. Impacts are summarized in the ClimAID report's chapter on ecosystems (Wolfe et al, 2011).

Ecosystems and Average Temperature and Precipitation Changes

The impacts of changing temperatures and precipitation have already affected habitats and interacted with species and food webs across the country.

Many North American plants and animals have been found to have moved roughly 36 feet to higher elevations or 10.5 miles to higher latitudes every 10 years over the last several decades, due to rising average temperatures (Cho, 2017). Shifts in precipitation patterns caused habitat alterations and movement as well. Reduced snow cover impacts winter survival, especially for species that depend on snow for insulation and protective habitat (animals) or seed development (plants) (Wolf et al., 2011).

As a result, plants and animals can find themselves in newly inhospitable or overcrowded environments. Ecosystems retreat or are entirely lost. Species could potentially be cut off from retreating due to fragmentation or the pace of change. Research has shown that almost 50 percent

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of species that move to a cooler environment go extinct (Cho, 2017). This is of particular concern to endangered and threatened species, which are already at high risk of extinction and in need of habitat protection.

In NYS, some of the most vulnerable species to temperature change include the eastern tiger salamander; spruce grouse; shortnose, lake and Atlantic sturgeon; and bog turtle (Schlesinger et al., 2011). Cold-water fish and shellfish will likely decline dramatically as warmer water fish species become more abundant. The Adirondacks and Catskill Mountains are projected to lose all spruce-fir forests by 2100 as tree species move north or to higher elevations (Wolfe et al., 2011).

Warmer waters will also increase the incidence of algal blooms and can affect water composition, dissolvent CO2, eutrophication, salinity, and toxins, which all impact the viability of ecosystems. It also changes the thermal and hydrologic regimes of ice-out dates and extreme flow events and can drastically change thermodynamics, thermal stress, and the metabolism of native species (Cho, 2017). Increased runoff from agriculture and urban areas can lead to significant impacts on ecosystems as well. Heavy rain events saturate plant roots which can prevent efficient photosynthesis and limit carbon sequestration.

Invasive species can exploit all these dynamic changes, increasing their impact on ecosystems. Freshwater ecosystems are particularly vulnerable to changes in streamflow and reduced water quality, which is often brought on by heavy precipitation and excess runoff (Dupigny-Giroux, 2018). Invasive species will likely proliferate overall, due to warming winters, longer growing seasons, and overall increasing temperatures and changed precipitation patterns. This will bring invasive plants northward and foster the spread of pests and pathogens. Kudzu and mile-a-minute vine, both common to the South, are now much more common in NYS than they were 50 years ago. The warmer temperatures as well as new precipitation patterns are expected to result in the proliferation of insect populations, including mosquitoes, ticks, and aphids. These pests would regularly die off during typically harsh cold New York winters; however, with warming winters, the pests are now better able to survive and thrive in New York (Lesk et al., 2017). These pests will affect the health of trees and could compromise the health of New York's forests. One example is the woolly adelgid, which has moved north and westward as winters become milder. This aphid destroys hemlock tree populations and could devastate forests (Cho, 2017). Tree-impacting pests that are now increasing in the Northeast include hemlock woolly adelgid, emerald ash borer, and southern pine beetle (Dupigny-Giroux, 2018).

The growing pest population also may affect the public health of New Yorkers and workers. Mosquitos are a vector for West Nile virus and are expected to continue shifting northward in the next several decades (Dupigny-Giroux et al., 2018). Under a high emissions climate modeling scenario (RCP 8.5), an additional 49 cases of West Nile neuroinvasive disease per year are projected to occur in the Northeast by 2090. Increased exposure to tick-borne Lyme disease and mosquito-borne West Nile virus could affect landscaping and maintenance crews working outdoors to maintain facilities and properties.

Climate change impacts on plants and animals have been found at a range of scales, from individuals to populations to species. Individual characteristics can change from climate stressors, including plant and animal behavior, physiology, and/or physical characteristics. These changes can help that organism survive, but they are not passed down through generations, which would require an evolutionary response – in many cases the climate is now changing faster than species can evolve to adapt. At the population and species level, as discussed above, organisms are undergoing large-scale shifts in range and abundance of species (Lipton et al., 2018).

Ecosystems and Extreme Weather

Extreme weather is a key driver of ecosystem disturbance. Hard to predict shifts in extreme weather patterns are likely to lead to significant ecosystem changes. Already, wind is the key driver of ecosystem disturbance in the U.S. Northeast (Seymour et al., 2002). Changes in natural disturbance regimes are likely to alter ecosystems. As extreme weather events become more frequent and severe, impacts on ecosystems are potentially wide-ranging. Heatwaves and droughts, storms and high wind events, extreme precipitation and temperature events all can significantly impact ecosystems and natural resources, directly and indirectly.

Ecosystems and Sea Level Rise

Rising sea levels have also potentially wide-ranging impacts on New York State ecosystems. Particularly coastal ecosystems and habitats might not be able to adapt to the pace of changes adequately. Recent losses of salt marshes indicate complex interactions between anthropogenic and climate-change impacts that potentially overwhelm systems that are critical to biodiversity as well as the resilience of larger socio-ecological systems (Kracauer-Hartig, 2002). The scale of impacts is hard to understate, as sea level rise will lead to the gradual movement of entire habitats where possible – and potential loss where movement is inhibited by factors such as coastal human development. Coastal wetlands in particular are vulnerable to extreme temperatures, salinity, and tidal inundation. Salt marshes are seen as especially vulnerable and potentially threatened by sea level rise on a global scale, as built-up rates to adapt to rising levels might be outpaced. Conversion of marshland to open water under accelerated sea level rise is not linear to the rise. Rather, once the threshold is reached, where vertical accretion cannot keep pace with rise, relatively rapid transitions can be expected (FitzGerald, 2008).

Retreating barrier islands, coastal erosion due to weather extremes and sea level rise, and other related shifts in the shoreline all must be expected and will impact ecologies and natural resources in varying ways and across varying timescales. Where retreat is inhibited by coastal human development, impacts must be expected to be particularly dramatic. Where saltwater intrusion related to sea level rise further factors into ecosystem losses, effects might be particularly pronounced. In some cases, the movement of the shoreline and the widening of tidal inlets can unfold at relatively dramatic pace, particularly driven by storm impacts (FitzGerald, 2008).

Climate Change Vulnerability Assessment

The Climate Change Vulnerability Assessment was conducted using several methods including an evaluation of policies for climate resilience using the Climate Smart Resiliency Planning Tool (CSRPT), a Community Story of Place and Vulnerability Survey, and the Vulnerability Assessment Workshop. Overall, the assessment involved consideration of the exposure, sensitivity, and adaptive capacity of the community.

Climate Smart Resilient Policy Analysis

This process involved an assessment of community plans, a stakeholder meeting and development of a CSRPT summary report. The leadership team and stakeholders met with CCE staff on August 21, 2023. The purpose of the meeting was to evaluate the Village of Philmont's policies for climate resilience. The meeting was facilitated by CCE and involved a review of existing municipal plans, codes, and services related to climate change resiliency using the Climate Smart Resiliency Planning Tool developed by the NYS Department of Environmental Conservation (DEC). CCE conducted the initial research and review of local plans and policies. A checklist outlining Philmont's local plans relevant to climate change adaptation and resilience was developed and reviewed by stakeholders during the CSRPT stakeholder meeting.

The analysis consisted of facilitated discussions in five categories: plan vulnerability assessment, public outreach, plan integration, emergency preparedness and recovery and hazard mitigation. In addition to discussions about community vulnerabilities and assets, stakeholders were asked to describe experiences or concerns about extreme weather events. Stakeholders were also asked to consider and provide insight on community assets and vulnerabilities to climate change in preparation for a more in-depth Vulnerability Assessment Workshop to take place later on in the year.

To view the full Climate Smart Resiliency Planning Report with footnotes and potential funding sources related to recommended actions within the report, see Appendix.

Municipal staff engaged in the Village of Philmont Climate-Smart Planning assessment:

Debra Gitterman, Trustee, Liaison for Comprehensive Plan

Tom Paino, Philmont CARP Leadership Team

Jason Detzel, Trustee and Volunteer Firefighter

Elyse Deruzzio, Code Enforcement Writer

Robin Andrews, Comprehensive Plan Lead

The completed assessment and recommendations highlight areas of opportunity for the Village of Philmont to integrate storm and climate change preparedness into its municipal operations and planning.

Areas of Strength

- The Village has adopted the New York State Climate Smart Communities Pledge intending to become certified as a climate-smart community by focusing on specific actions within the NYS Climate Smart Communities Program to increase resiliency to climate change.
- The Village of Philmont is making great progress in creating an updated Comprehensive Plan. New planning interests include climate and flood resiliency measures through land-use planning, development planning and incorporating green infrastructure. **CSC PE6 Action: Comprehensive Plan with Sustainability Elements (3-21 pts).**
- Philmont has utilized their zoning code to help manage development in hazard-prone areas by including a conservation district and cluster subdivision codes.
- Along with three other municipalities, the Village has created an Agawamuck Creek Watershed / Summit Lake Reservoir Watershed Assessment and a Biological Report for Summit Lake.
- The 2019 Village of Philmont's *Summit Lake and Its Watercourse* Brownfield Opportunity Area plan was officially accepted by New York State and designated as a BOA consisting of 427 acres in the Village of Philmont with seventeen sites identified as catalytic for revitalization and redevelopment, seven of which are deemed priority sites.
- The Philmont Climate Smart Committee has a page on the Village website that provides up to date information on the committee's news and events, educational resources, and meeting minutes. **CSC PE9 Action: Local Climate Action Website (3 pts).**

Areas of Opportunity

- The Village of Philmont is a participating municipality in the development of Climate Adaptation and Resiliency Plans (CARP) in Columbia County (2023-2024) which can be leveraged for the completion of the following actions through the Climate Smart Communities (CSC) program to earn points towards certification:
  - The Village can leverage completion of the Climate Smart Resiliency Planning Tool for points toward Climate Smart Communities (CSC) certification under **CSC PE7 Action: Evaluate Policies for Climate Resilience (6 pts).** For more information on the Climate Smart Communities Program and the actions listed in this document, visit the Climate Smart Communities portal.
  - The Village can leverage completion of the Climate Adaptation and Resilience Plan for points toward Climate Smart Communities (CSC) certification under **CSC PE7 Action: Climate Adaptation Plan (3-15pts).**
  - The Village can leverage completion of the Climate Vulnerability Assessment as part of the climate adaptation planning process under **CSC PE7 Action: Climate Vulnerability Assessment (4-16 pts)**.
- The Village of Philmont can adopt the new Columbia County Multi-Jurisdictional Hazard Mitigation Plan once developed (2024), which:
  - Successfully identifies and prioritizes climate hazards.
  - Describes the damage and cost of previous storms and disasters, past mitigation

efforts, and estimates future financial losses that may result from flooding.
    - Includes municipal maps that indicate local hazard risks and identify critical facilities and infrastructure.
    - Includes adaptation strategies that have been evaluated and prioritized by cost, feasibility, timing, and efficacy.
- The Village could seek out training opportunities for municipal staff related to emergency management issues, such as the FEMA Emergency Management Institute and similar training available at the National Emergency Training Center.
- The Village website can be utilized in preparation for climate-related emergencies:
    - Storm-preparedness and alerts
    - Locations of emergency operations centers and storm and cooling shelters
    - Emergency and evacuation kits and supply lists
    - Expected inundation areas
    - Inform residents of the NY-Alert Program
- The Village of Philmont could consider developing a Natural Resources Inventory **CSC PE6 Action: Natural Resources Inventory (8-10 pts)**. This could be a useful tool for the Town to create an open space plan that incorporates climate resiliency measures. This plan could coordinate with the New York State Open Space Plan **PE7 Action: Conservation of Natural Habitats (4-16 pts).**
- The Village could participate in The Nature Conservancy Community Resilience Building Workshop, which helps community participants identify hazards, challenges, strengths, and priority actions for community resilience.
- The Village could seek out training opportunities for municipal staff related to emergency management issues, such as the FEMA Emergency Management Institute and similar training available at the National Emergency Training Center campus.

Recommendations

The following opportunities emerged under each of the sections of the Climate Smart Planning assessment:

Section 1- Plan Checklist

- The Village does not have an Evacuation Plan, Disaster Recovery Plan, or Long-term Recovery Plan. Consider encompassing Evacuation and Recovery Plans into an Emergency Preparedness Plan.

Section 2- Vulnerability and Risk Assessment

- Train municipal employees in risk mapping tools such as lake and overland surges, shoreline change analysis, cumulative risk assessments, HAZUS-MH, etc.
- Conduct a Build-Out Analysis, which could be carried out using zoning codes and compared to the extent of storm surge and sea-level rise scenarios.
- Conduct a full vulnerability assessment **CSC PE7 Action: Climate Vulnerability Assessment (4-16 pts)** detailing the magnitude of consequences associated with current and future climate hazards.
    - Include how these events will affect internal operations, people, public health, the environment, the economy, and capital and operating costs.
    - Consider using the Department of the State’s Asset Inventory Worksheet and Risk

Assessment Tool. Ensure that vulnerability and risk assessments are shared with all relevant town officials and emergency managers.

- Adopt the projections of sea-level rise from the State Sea Level Rise Task Force report or more recent studies for planning purposes.

Section 3- Public Outreach and Engagement

- Develop a Flood Preparedness Guide for Residents and Businesses in partnership with Cornell Cooperative Extension that provides information about expected inundation areas, evacuation routes, location of shelters, and location of pet shelters before the threat of a storm**.**
- Inform residents about available disaster resources through Village website links, television, radio, social media, etc. **CSC PE9 Action: Social Media (3pts)**. Additional resources to share with residents could include:
    - ASPCA's disaster preparedness steps for domesticated animals
    - FEMA's "Are You Ready" guide
    - FEMA's Homeowner's Guide to Retrofitting
- Provide residents with guidance on the development of personal and family evacuation plans or what to include in emergency or evacuation kits (FEMA's Ready.gov checklist).
- Consider installing high water mark signs at public locations.
- Take steps to ensure that information is shared using multilingual and culturally sensitive approaches.

Section 4- Integration of Municipal Plans

- The State of New York has regulations to protect wetlands that are 12.4 acres or larger. Consider going beyond the Land Conservation Overlay regulations and adopting an ordinance to protect wetlands that are less than 12.4 acres, with a minimum buffer of 100 feet. Look to Section 2.1 Wetland Protection of the New York State Department of State Model Local Laws to Increase Resilience document for more guidance.
- Consider adopting the International Building Code or American Society of Civil Engineers (ASCE) standards that promote flood-resistant buildings.
- Ensure that the Village budgets include adequate funds for costs related to adapting infrastructure for greater flood and projected sea-level rise resiliency. Incorporating adaptation consideration into an asset management or capital improvement plan is an ideal method to build resiliency into routine maintenance and upgrades. **CSC PE8 Action: Green Economic Development Plans (4 pts).**
- Create floodplain management and stormwater management plans in addition to the local ordinances that are already in place.
- Define a plan for transportation and other needs of vulnerable populations (elderly, special needs, disabled, etc.) in event of an emergency.

Section 5- Disaster Preparedness and Recovery

- Consider participating in the National Weather Service Storm Ready Community program which helps communities take a proactive approach to prepare for extreme weather and natural disasters.
- Take advantage of programs like NY-Alert and FEMA's Community Emergency Response

Team (CERT) training to better prepare for disasters.
- Establish an evacuation plan that identifies a timeframe, multiple evacuation routes, and portions of the community with special circumstances or needs (schools, nursing homes, shelters, and those without personal transportation).

Section 6- Hazard Mitigation Implementation

- Create a Climate Action Plan to enact measures and policies to reduce greenhouse gas emissions and increase the community's resilience to climate change. **CSC PE2 Action: Government Operations Climate Action Plans (12-16 pts)** or **Community Climate Action Plan (16 pts).**
- Engage in shoreline, wetland, or riparian buffer restoration and protection by encouraging sustainable enhanced methods of shoreline protection encouraged through incentives or regulation. **CSC PE7 Floodplain Restoration (1-10 pts)** or **PE7 Action: Nature-based Shoreline Protection.**
- Take part in FEMA's Community Rating System **PE7 Action: National Flood Insurance Program Community Rating System (3-9 pts).**
- Provide training in retrofitting flood-prone residential buildings and NYDEC Post Flood Stream Intervention training for appropriate staff.
- Consider utilizing tools such as transfer/purchase of development rights, rolling easement, or buyouts of vulnerable properties to manage development in hazard prone areas.
- Support land-acquisition programs to purchase land conservation easements in hazard-prone areas. **CSC PE7 Action: Restoration of Floodplains and Riparian Buffers (2 pts)**.

Community Story of Place and Vulnerability Survey Results

The number of survey responses varied by municipality. Village of Philmont received 25 responses. Open-ended questions were optional to complete, and yielded fewer responses compared to the rest of the survey questions. While the number of responses is not statistically significant compared to the population of Philmont, the completed surveys provide important local context. Municipalities are encouraged to continue discussions with their community about climate vulnerabilities and assets. For more information about the methods of survey distribution, see the Community Outreach and Education Strategy section of this plan.

Evaluation of Results

For each of the table survey questions, a four-range scale was provided ranging from very threatening/important/vulnerable to not threatening/important/vulnerable. The following is a summary of these results, where percentages equate to the number of participants who weighed the hazard, asset, vulnerability, or impact as "very" against other options in the scale. The top **climate hazards** identified as potentially "very threatening" to survey participants were: increase in severe storms (70.83%), extreme heat (58.33%), and droughts (54.17%).

When asked which of the following **community assets** were important to protect from the impacts of extreme weather events and climate hazards, the top community assets identified as "very important" were: people (loss of life, health, injuries) at 90.48%, agricultural (damage or loss of farms, supply chain disruption, food security) at 90.48%, and environment (damage or loss to forest, waterways, air quality, etc.) at 85.71%.

The top **vulnerability risk** categories identified as "very vulnerable" to the impacts of extreme weather events and climate hazards included farms and agriculture at 88.89%, utilities (electric infrastructure, renewable energy, water/sewer) at 72.22%, and private property at 55.56%.

When asked how important potential impacts were to their community, the top **potential impacts** identified as "very important" were decreased drinking water availability and quality at 78.57%, loss of natural resources 76.92%, and decreased waterway and surface water quality at 71.43%.

Figure 32. How Threatening Each Potential Climate Hazard Might Be to Your Community

Climate Hazards	Very Threatening	Somewhat Threatening	Not Very Threatening	Not a Threat
Increase in severe storms	70.83%	25.00%	4.17%	0.00%
Increased extreme heat	58.33%	37.50%	4.17%	0.00%
Increased drought	54.17%	37.50%	4.17%	4.17%
Increase in heavy precipitation	50.00%	45.83%	4.17%	0.00%
Changing seasonal temperatures	45.83%	50.00%	4.17%	0.00%
Increase in winter storms	41.67%	50.00%	8.33%	0.00%
Increased windstorms	39.13%	47.83%	13.04%	0.00%
Reduced snowfall and accumulation	39.13%	43.48%	13.04%	4.35%
Increase of wildfires	34.78%	34.78%	26.09%	4.35%
Increased flooding	27.27%	50.00%	9.09%	13.64%
Sea-level rise	4.17%	12.50%	33.33%	50.00%

Figure 33. Community Assets Important to Protect from the Impacts of Extreme Weather Events and Climate Hazards

Community Assets	Very Important	Somewhat Important	Not Very Important	Not Important
People (loss of life, health, injuries)	90.48%	9.52%	0.00%	0.00%
Agricultural (damage or loss of farms, supply chain disruption, food security)	90.48%	4.76%	0.00%	4.76%
Environment (damage or loss to forest, waterways, air quality, etc.)	85.71%	9.52%	4.76%	0.00%
Economy (business interruptions/closures, job losses, energy disruptions, etc.)	66.67%	33.33%	0.00%	0.00%
Culture (ability to maintain traditions, social networks, and support systems)	66.67%	28.57%	4.76%	0.00%
Infrastructure (damage or loss of libraries, museums, historic properties, etc.)	57.14%	42.86%	0.00%	0.00%
Governance (maintain order and/or provide public amenities and services)	52.38%	47.62%	0.00%	0.00%

Figure 34. How Vulnerable are Risk Categories to the Impacts of Extreme Weather and Climate Hazards

Vulnerable Risk	Very Vulnerable	Somewhat Vulnerable	Not Very Vulnerable	Not Vulnerable
Farms and agriculture	88.89%	5.56%	5.56%	0.00%
Utilities (electric infrastructure, renewable energy, water/sewer)	72.22%	22.22%	5.56%	0.00%
Private property	55.56%	38.89%	5.56%	0.00%
Natural assets and open spaces (streams, wetlands, beaches, etc.)	55.56%	27.78%	16.67%	0.00%
Historic and cultural landmarks	52.94%	35.29%	11.76%	0.00%
Public health and healthcare	50.00%	38.89%	11.11%	0.00%
Employment and childcare	44.44%	44.44%	11.11%	0.00%
Critical facilities (transportation, communications, shelters, etc.)	41.18%	52.94%	5.88%	0.00%
Community services (food pantries, libraries, public agencies)	41.18%	52.94%	5.88%	0.00%
Emergency services (police, fire, etc.)	27.78%	66.67%	5.56%	0.00%

Figure 35. How Important Impacts Are to Your Community

Potential Impacts	Very Important	Somewhat Important	Not Very Important	Not Important
Decreased drinking water availability and quality	78.57%	14.29%	0.00%	7.14%
Loss of natural resources	76.92%	15.38%	7.69%	0.00%
Decreased waterway and surface water quality	71.43%	28.57%	0.00%	0.00%
Decreased air quality	71.43%	21.43%	7.14%	0.00%
Decreased food security	71.43%	21.43%	0.00%	7.14%
Loss of plant and animal habitat and biodiversity	71.43%	21.43%	7.14%	0.00%
Increased invasive species presence	64.29%	35.71%	0.00%	0.00%

Write-in Responses

Below are summaries of the seven open-ended questions from the Community Story of Place and Vulnerability Survey.

1. *Please describe extreme weather events or climate hazards you have experienced. Where are the high-risk areas?*

   The survey responses reveal a spectrum of climate-related challenges faced by respondents. Increased rainfall and flooding pose significant threats to low-lying areas, with basements flooding multiple times a year. Extreme weather events, including heavy snowfall, nor'easters, and prolonged heat waves, lead to infrastructure damage, power outages, and road washouts. Respondents noted the increase in severe weather and tornado warnings in recent years. Residents report driveway erosion, tornado warnings, and concerns about shallow wells during extended periods of rain or drought. Algal blooms were also noted as a more frequent occurrence. Flooding occurrences were noted along Route 11/Martindale Rd. . Overall, the survey underscores the diverse and substantial challenges posed by extreme weather events and climate hazards across the town.

   Top Word Cloud Occurrences: high, storm, drought, wind, extreme, flood, tree

2. *What is unique about your community?*

   The surveyed community is a more densely populated village center surrounded woodlands and rural areas. The community is unique in providing municipal sewer and water to residents. Respondents noted a high population, potentially 50%, of renters within the village as well as a higher population of affordable housing compared to the rest of the county. The community is close-knit and residents have a 'can-do' attitude. Philmont is noted for its vibrant downtown businesses and the close access to nature with Summit Lake (reservoir) being in the center of the village.

   Top Word Cloud Occurrences: community, village, resident, economic, agriculture, low

3. *What are the most important/influential institutions, organizations, or businesses in your community?*

   Respondents noted institutions such as the village government, including the Village Hall, holds a central position, managing essential services and supporting residents. Volunteer fire departments, first responders, and local businesses contribute to community well-being. Philmont has several options for local food such as McNann's Deli Local 111, and the Pub as well as local food options provided by the Co-Op. The community center is a meeting space that has offered shelter form families in need in the past.

4. *Which infrastructure, facilities, and services in your community are exposed to climate hazards and extreme weather? How is it vulnerable? (e.g. location, age, building codes, type of building)?*

   Survey respondents agreed that various infrastructure, facilities, and services face exposure to climate hazards and extreme weather. Many local buildings and homes were noted as in potential flood zones. The dam at Summit Lake was noted as potentially vulnerable in severe storms and heavy precipitation events. Philmont offers municipal sewer and water services that could also be impacted by climate hazards. Overall, the town is aware of potential vulnerabilities but expresses confidence in handling the challenges posed by climate hazards and extreme weather events.

5. *What populations are living in high-risk areas (e.g. demographics, income level, special needs, languages spoken)?*

   Populations residing in high-risk areas include low-income individuals and seniors as well as those in homes currently within flood zones. There are concerns about the risks faced by seniors and the intellectually and developmentally disabled (ID/DD) population, especially those with limited resources and needs not addressed by the town. Mentioned throughout the survey was the high population of renters within the Village. Overall, the community identifies various demographic groups facing higher risks based on factors such as age, income level, and specific needs.

6. *Which natural resources are exposed to climate hazards and what effects have they had?*

   Survey respondents identified the specific natural areas of Summit Lake and High Falls Conservation area as important to the town. Both are at risk of flooding during major storm events. Summit Lake is contained by dam. Summit Lake was also noted to be vulnerable to warming temperatures with respondents noting an increase in invasive plant species growing in the water and an increase in frequency of algal blooms.

7. *What are the prominent geographic features of your community?*

   The most prominent geographic feature mentioned was Summit Lake located almost in the center of the Village. Also noted was High Falls Conservation Area, managed by the Columbia Land Conservancy on the outskirts of the Village. Residents noted other geographic features such as the rolling hills and ridge. Waterways noted were Agawamuck Creek and Claverack Creek.

   Top Word Cloud Occurrences: hill, summit, lake, falls, high

Vulnerability Assessment Results and Matrix

Vulnerability Assessment Workshop

The Vulnerability Assessment Workshop was the first in a two-part series of facilitated workshops that engaged stakeholders from municipalities participating in the Columbia County CARP. Both workshops were facilitated by CCE and consisted of a large group session and smaller group exercises. The participating 17 municipalities were initially separated into two distinct cohorts (North and South, see fig. 36) based on geographic location, previous municipal partnerships, and local input. Each cohort participated in the workshop series together along with representatives from the County. The North and South cohorts were each additionally divided into four smaller breakout groups consisting of one to three municipalities each (see lists below). These were based on geographic location, past and current municipal collaborations, municipal input, and number of workshop participants. One CCE facilitator and one scribe were in attendance per breakout group to help guide the process and record notes.

Municipality Breakout Groups

Northern Cohort Breakout Groups

Group: Austerlitz (town); Ghent (town)

Group: Chatham (town)

Group: New Lebanon (town); Canaan (town)

Group: Kinderhook (town); Kinderhook (village); Valatie (village)

Southern Cohort Breakout Groups

Group: Ancram (town); Gallatin (town)

Group: Claverack (town); Philmont (village); Taghkanic (town)

Group: Copake (town); Hillsdale (town)

Group: Germantown (town); Hudson (city)

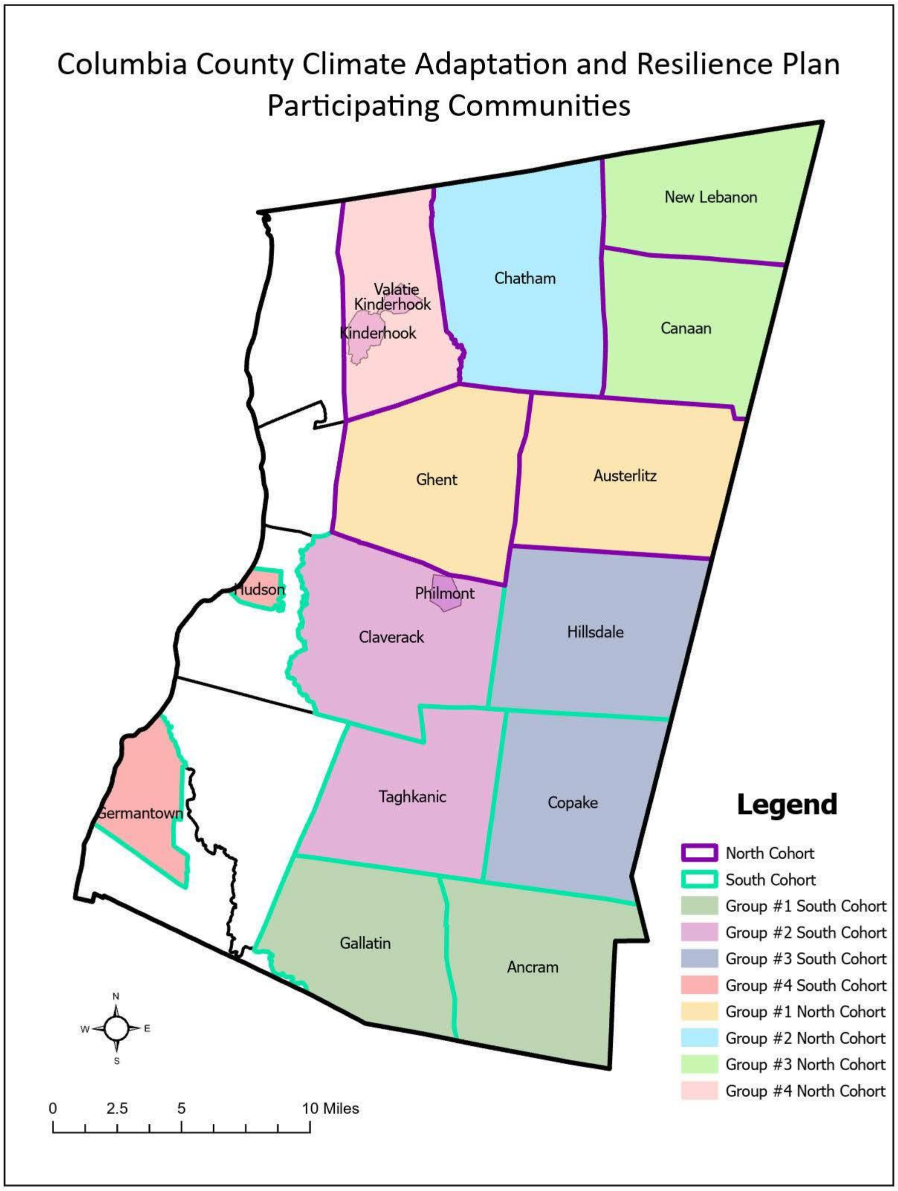

Figure 36. Cohort and Breakout Group Map (Created by Audrey Kropp, CCE Columbia-Greene)

The leadership team and stakeholders of the Village of Philmont convened with communities in the Southern Cohort on September 26th, 2023 for the first workshop designed to identify the infrastructural, societal, and environmental strengths and vulnerabilities in relation to climate hazards. A presentation highlighting climate change trends and impacts was shared with the larger cohort group. Stakeholders were then divided into the smaller breakout groups for a participatory table-top exercise where they completed vulnerability matrices for infrastructure, societal, and environmental categories. Participants were asked to consider the top climate hazards identified in the stakeholder meeting (Climate Smart Resilient Policy Analysis) and Community Story of Place and Vulnerability Survey as they populated the matrices. Reference materials from the stakeholder meeting (summaries of strengths, opportunities, and experiences) and distinctive survey results in the form of large format charts and graphs were provided (see Appendix). A representative from each municipality marked hazard-prone areas on a provided map (see Appendix) and a staff appointed scribe wrote down details from group discussions. The populated matrices can be found further into this section.

During this exercise, workshop facilitators posed the following questions to stakeholders:

Infrastructure

- What infrastructure/facilities are exposed to current and future hazards?
- What makes this infrastructure vulnerable?
- What are the consequences of this infrastructure being vulnerable?

Societal

- What are the population characteristics of the people living in high-risk areas?
- What are the strengths and vulnerabilities of people in your community?
- How can hazards intensify these characteristics?
- Where are areas for improvement in the community?

Environmental

- What natural resources are important to your community?
- What benefits do these natural resources provide?
- Which natural resources are exposed to current and future hazards?
- What have been the effects of these hazards on these natural resources?
- Where are the high-risk areas and what vulnerabilities exist for the environment?

At the end of the mapping and matrix exercise, each municipality was asked to vote for two of the top three identified hazards that they deemed most affected their municipality. These two hazards were then used in the Exploratory Scenario Planning Exercise in the following workshop.

Top Hazards

The Climate Smart Resiliency Planning Tool and Story of Place and Vulnerability Public Survey (see Appendix for both documents) took place prior to the South Cohort's Vulnerability Assessment Workshop. Referencing these results, workshop participants confirmed the municipality's top natural climate hazards as the following:

1. Extreme Storms (wind, snow, ice)
2. Flooding and Heavy Precipitation
3. Extreme Heat and Drought

Key Assets and Areas of Concern

During the Vulnerability Assessment Workshop, a diverse mix of stakeholders were asked to reference their municipality's Community Story of Place and Vulnerability Survey results; identify environmental, infrastructural, and social assets in their communities that are affected by the top hazards; locate them on a provided map of their municipality; identify ownership of located features; determine if they are a strength, vulnerability or both; and choose whether they are a high, medium, or low priority. The following sections and matrices summarize the results of this process. Maps can be viewed in the Appendix.

There were four major areas of concerns related to **Infrastructure**:

- Maintaining passable **roads** in the event of severe weather.
- The **Dam at Summit Lake**. The lake is located on a hill about town. Maintaining the dam is essential to protecting homes and habitats downstream.
- The **Sewage Treatment Plant** providing service to residents in Philmont, located in the Town of Claverack. Concerns were expressed about the limited capacity of the plant and the need to continue to update the facility.
- **Power outages** occurring during extreme weather events.

There were two major areas of concerns related to **Environment**:

- **Open space** and **wetland protection,** specifically around Summit Lake. Invasive species have increased in the lake over the past decade and protecting the watershed is key to maintaining the healthy body of water.
- The **Deer population** was also listed as a top concern. The rise in the deer population has contributed to an decrease in plant life.

There were four major areas of concerns related to **Society**:

- **Senior Housing Developments** at Terrace Apartments and Richardson Hall.
- **Migrating Populations** due to climate change could impact the town as real estate becomes more valuable and people look to open space to build new housing.
- The **Cost of resilient infrastructure** was noted as an obstacle to achieving the goal of building resiliency in the face of changing climate.
- **Lack of knowledge/education on issues** was cited as a challenge as the Village looks to build resiliency.

Figure 37. Infrastructure Matrix (Source: Adapted from https://www.communityresiliencebuilding.com/)

Infrastructure								
H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing) **V** = Vulnerability **S** = Strength				***Extreme Storms (Wind, Snow, Ice)***	***Flooding and Heavy Precipitation***	***Extreme Heat and Drought***	**Priority**	**Notes**
Features: Rural	**Location**	**Ownership**	**V or S**				**H - M - L**	
Main Roads passable		Philmont	S	✓	✓		H	
Roads (not all are passable to emergency vehicles)		Philmont	V	✓	✓		H	
Dam on Summit Lake		Philmont	V	Water quality impacts from precipitation or drought; severe storms could impact integrity of dam			M	Summit Dam is included in a current LWRP Watershed Management Plan as an inter-municipal project. Village of Philmont is lead agency in a project partnership with the Towns of Claverack, Ghent, Hillsdale, & Austerlitz.

Power Outages (service is from NiMo, National Grid, NYSEG, &Central Hudson		Philmont	V	✓	✓		H		
Cell phone coverage/Wifi		Philmont	V	✓	✓	✓	H		
Decommissioned bridges = closed roads		Philmont	V	✓	✓		L		

Figure 38. Environmental Matrix (Source: Adapted from https://www.communityresiliencebuilding.com/)

Environmental								
H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing) **V** = Vulnerability **S** = Strength				***Extreme Storms (Wind, Snow, Ice)***	***Flooding and Heavy Precipitation***	***Extreme Heat and Drought***	**Priority**	**Notes**
Features	**Location**	**Ownership**	**V or S**				**H - M - L**	
Open Space (large amount of wetlands, help mitigate flooding)		Philmont	S	✓	✓	✓		
Deer Population		Philmont	V	✓	✓		H	
Slope to Summit Lake wetlands	11	Philmont	V	✓	✓			

Figure 39. Societal Matrix (Source: Adapted from https://www.communityresiliencebuilding.com/)

Societal								
H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing) **V** = Vulnerability **S** = Strength				***Extreme Storms (Wind, Snow, Ice)***	***Flooding and Heavy Precipitation***	***Extreme Heat and Drought***	**Priority**	**Notes**
Features	**Location**	**Ownership**	**V or S**				**H - M - L**	
Senior Housing Development (terrace apartments, Richardson Hall)		Philmont	V	✓	✓	✓	H	
Cell phone coverage/Wifi		Philmont	V	✓	✓	✓		
Migrating populations (human)		Philmont	V	✓	✓	✓		
Lack of knowledge/education on issues		Philmont	V	✓	✓	✓		

Cost of resilient construction for vulnerable populations (accessibility to heat pumps)		Philmont	V	✓	✓	✓	H	

Community Visions

Visioning Process

Adaptation and Vision Workshop

The Adaptation and Vision Workshop was the second facilitated stakeholder workshop conducted as part of the Columbia County CARP process. The leadership team and stakeholders of the Village of Philmont convened with communities in the Southern Cohort on October 27th, 2023 for the four-hour workshop. The goals of this workshop were to build a Climate Resilience Vision, complete an Exploratory Scenario Planning Exercise using hazards that were identified in the Vulnerability Assessment Workshop, and identify adaptative strategies that fall in line with Philmont's community's vision and capacity. During the second stakeholder workshop the cohorts were divided into the same four breakout groups as they were in the first stakeholder workshop. One staff facilitator and one scribe were in attendance per breakout group to help guide the process and record notes.

The workshop began with a presentation about climate adaptation with examples and case studies of climate adaptation strategies. The presentation was followed by four main exercises: a County Level Vision Exercise, an Exploratory Scenario Planning Exercise, a community level Climate Resilience Vision exercise, and an Adaptation Actions and Strategies exercise.

County Level Vision Exercise

A County Level Vision Exercise was completed with the larger cohort. Questions were posed to elicit group responses towards aspirations and values as they relate to adapting to climate change and building local resilience. Participants were invited to call out answers while responses were captured by two scribes on two public facing easels. Responses were categorized as either "Principles/Values/Themes" or "Goals/Pathways/Actions." Participants then voted on which three answers were the most important to them. This exercise was used to help inspire participants during the workshop and stakeholders referenced a list of the following questions for guidance:

- Why are you compelled to lead on climate as a local leader? What made you decide to make a commitment to prepare for and help reduce the impacts of climate change?
- How do you see your community thriving in the face of climate change?
- What overarching climate adaptation goals do you hope to achieve as a local leader? What pathways do you think your community could take to achieve these goals?
- What does a climate resilient [your municipality here] look like?

Participants voted on their top choices from these two lists and the results are seen below from each cohort.

Principles, Values, Themes

North Cohort

- Historic Character
- Public Safety
- Equity of Resources

South Cohort

- Ecosystem Protection
- Water Quality Protection
- Protection of Vulnerable Populations

Goals, Pathways, Actions

North Cohort

- Emergency Management Planning and Preparedness
- Community Outreach and Education
- Protect Physical Assets – Infrastructure
- Community Preservation Fund

South Cohort

- Good Communication Development within the Community
- Incorporate Climate Adaptation in Community Plans, Policies, Procedures
- Collaboration between Municipalities and Indigenous Communities
- Partnership between Different Conservation Groups (hunting & fishing): Look for intersection of values between "groups" and break down classism.

Vision for Resilient Philmont

Participants were asked to reflect on the County Level Vision Exercise, the Exploratory Scenario Planning Exercise, and provided word clouds (results from the Community Story of Place and Vulnerability Survey write-in questions) to help them create a Climate Resilience Vision statement. This is an inspirational statement and/or bulleted list (per municipality) that investigates the future and creates a mental image of the ideal state that a community wants to achieve. Example vision statements from other Hudson Valley County municipalities were provided as guidance and a worksheet (see Appendix) was developed to help participants organize their ideas under environmental, socioeconomic, and infrastructure themes during open discussions. The purpose of a community vision is to unify the community, guide community climate adaptation actions, and to remain viable under various possible future climate change conditions. Communities were instructed to take this draft vision back to other stakeholders, in particular underserved and underrepresented populations, to continue crafting it. After working through ideas during the workshop and taking a draft version to their municipal members for feedback and input, the following vision was developed.

Village of Philmont Climate Resilience Vision

Climate Adaptation and Resilience Plan (CARP)

The Village of Philmont envisions a community that invests in resilient infrastructure and renewable energy. A resilient Philmont means a community that supports residents by fostering an engaged community and strives to protect natural resources and conserve open spaces. The village seeks to better prepare for future climate hazards while fostering economic growth and providing stability and support for local businesses. The following principles, developed with public input in mind, serve to conserve, promote, and enhance resilience in the community.

- *Become socially resilient*
- *Improve community engagement including supported housing*
- *Encourage alternative transportation*
- *Maintain scenic views*
- *Mitigate and adapt to climate change*

Adaptation Strategies and Implementation

Community Adaptation and Vision Survey Results

County Level Survey Results

For each of the four matrix table survey questions, a four-range scale was provided extending from "high priority" to "not a priority/not applicable." The following is a summary of these results, where percentages equate to the number of participants who weighed the action as a high priority against other options in the scale.

The top **Emergency Communication and Management Actions** identified as "high priority" to survey participants were: implement and promote an emergency communication and warning system (61.57%); review, revise, or create an emergency plan or evacuation plan (50.22%); and organize neighborhood networks for emergency preparedness, planning, and training (42.36%).

When asked which of the following **Public Outreach and Social Resilience Actions** were most important, the top actions identified as a high priority were: post info on the municipal website and social media accounts at 56.83%, collaborate with other municipalities at 55.95%; and create a Flood Guide for residents and businesses at 45.18%.

Work with local utilities, in particular electric, gas, water, sewer, and telecommunications to improve resilience (66.96%); consider applying for annual NYS grants (63.56%); and reduce municipal greenhouse gas emissions and contributions to sea-level rise with a Climate Action Plan (56.89%) were the highest priorities for **Municipal Planning and Operations Actions**.

When asked about **Zoning and Coding Actions,** the top three identified as "high priority" were: ensure opportunities exist for open space and recreation over the long term (61.36%); require green infrastructure for stormwater management (50.45%); and require proposals for new development in the Flood Hazard Overlay District to take flood risk into account (49.28%).

Adaptation Strategy Selection

The closing portion of the workshop was the Adaptation Strategy Selection exercise. Each breakout group was presented with large format maps of their municipality's disadvantaged community area(s) (see Appendix), a copy of all vulnerability matrices created during the Vulnerability Assessment Workshop (See Section IV), and a list of adaptation strategy examples (see Appendix) for reference. Municipalities then went through each matrix (infrastructure, environmental, and societal) from their Vulnerability Assessment Workshop and identified adaptative strategies that fall in line with their vision and capacity to address them. Using time as a positive constraint, high priority vulnerabilities were addressed first. Facilitators organically assessed maladaptive strategies during group discussion and aided participants in identifying best practices, promising practices, and nature-based solutions for ecosystem-based adaptations using the provided strategy example list. Funding sources and partnerships were identified where possible.

Maladaptation is an often well-intentioned but not well-thought-out adaptation practice, initiative or project that does not actually increase community or ecosystem resilience or adaptive capacity or, even worse, can make some people or assets even less resilient or more vulnerable to climate change. Potential maladaptations were considered during the facilitated dialog as part of the strategy selection process. Facilitators guided these considerations as strategies that could be maladaptive were brought forth. The incorporation of this guidance into this component of the workshop helped ensure the strategies identified were not maladaptive.

Facilitators referenced the following questions for maladaptive strategies:

- How might action increase emissions of greenhouse gases?
- How might action transfer vulnerabilities to other communities?
- How might action increase vulnerabilities among vulnerable populations or disadvantaged communities?
- How might action be a short-term coping mechanism that undermines long-term resilience or lock in vulnerability trajectories?
- How might action decrease biodiversity and ecosystem resilience or degrade ecosystem services?
- How might action transfer vulnerabilities to future generations?
- How might actions be undermined by future uncertainties?

Recommended Adaptation Actions

The assets that were identified during the Vulnerability Assessment Workshop were again discussed at the municipal level during the Adaptation and Vision Workshop with the goal being to define strategies and address them through the lens of adaptation and resilience. Notes and specifically recognized strategies were captured by scribes and results summarized below for each of the three categories: infrastructure, societal, and environmental. Although the assets were divided into different categories, the types of strategies identified to address them can and do overlap categories, for example an environmental strategy could be used to address an infrastructure category. Reference Section IV. Vulnerability Assessment Results and Matrix section for more detailed information about any of the specific areas and features.

Strategy Implementation Leadership (table)

This table serves as a strategic blueprint, outlining key vulnerabilities identified in the workshops, adaptive strategies to address each vulnerability, potential departments and boards that can assist with projects, prioritization status, timelines, potential funding mechanisms, and alignment with the NYS Climate Smart Communities (CSC) program.

Vulnerabilities Identified:

The vulnerabilities identified can be separated into the following categories: infrastructure, environmental, and societal. Each table addresses the top vulnerabilities identified from the stakeholder workshops and matrices review. It is important to note that the vulnerabilities identified in the table are simplified phrases; more information about what the vulnerability is referencing can be found in the descriptors below.

Adaptive Strategy:

To address each vulnerability, an adaptive strategy is proposed. This strategy includes measures such as the development of green infrastructure to manage stormwater, the promotion of sustainable agriculture practices, the enhancement of emergency response plans, and the integration of climate considerations into land use planning. It should be noted that these strategies are recommendations and have been recommended to encourage further discussions and the development of planning processes.

Potential Departments and Boards:

The successful implementation of these adaptive strategies requires collaboration across various departments and boards within the municipal government. This column identifies potential municipal departments and boards that may have valuable input and capacity in projects that arise from the adaptive strategies listed.

Priority:

Prioritization is crucial to ensure efficient allocation of resources. Actions have been prioritized based on previous conversations with attendees at the stakeholder workshops.

Projected Timeframe:

The projected timeframe for implementation varies depending on the complexity and urgency of each action. Short-term actions, such as updating building codes, can be implemented in < 1 year, while long-term initiatives, like relocating vulnerable infrastructure, may span < 3-5 years. Ongoing projects may refer to actions that already have progress or will require continuing work over an extended period of time.

Potential Funding and Assistance:

Funding for climate adaptation efforts can come from various sources, including federal grants, state grants or regional grants. Assistance may also be sought from non-profit organizations, academic institutions, and technical experts to provide expertise and resources for implementation. Funding sources may vary from year to year, therefore, the funding information in this table should be further researched to verify opportunities.

Relevant NYS Climate Smart Communities Action:

The implementation of various actions throughout these tables align closely with the goals and objectives of the NYS Climate Smart Communities program. By integrating climate adaptation into local planning and decision-making processes, communities can enhance their resilience, reduce greenhouse gas emissions, and safeguard the well-being of residents and ecosystems. Actions that correlate with the adaptation strategies identified in the table have been listed. It should be noted that the actions do not directly align with the pledge element actions.

Infrastructure Key Strategies

There were four major areas of concerns related to Infrastructure:

- Maintaining passable **roads** in the event of severe weather.
- The **Dam at Summit Lake**. The lake is located on a hill about town. Maintaining the dam is essential to protecting homes and habitats downstream.
- The **Sewage Treatment Plant** providing service to residents in Philmont, located in the Town of Claverack. Concerns were expressed about the limited capacity of the plant and the need to continue to update the facility.
- **Power outages** occurring during extreme weather events.

Table 40. Infrastructure Strategies and Implementation (some strategy descriptions may be adapted from Orange County Climate Resilience Plan, 2023)

Vulnerabilities Identified	Adaptive Strategy	Potential Departments & Boards	Priority	Projected Timeframe	Funding and Assistance	Relevant CSC Action
Maintaining passable roads during extreme weather events	ensure culverts have been assessed and right-sized	Village Board, Highway Dept	High	Mid Term (<1-3 yr)		PE7: Culverts & Dams
Maintaining passable roads during extreme weather events	Participate in your County's Multi-Hazard Mitigation Plan updates to include climate risks and resiliency projects	Village Board	High	Mid Term (<1-3 yr)		PE7: Climate-Resilient Hazard Mitigation Plan
Maintaining passable roads during extreme weather events	maintain a tree pruning schedule	Dept of Public Works, Highway Dept	High	Ongoing		
Maintaining passable roads during extreme weather events	complete/maintain existing a local natural resources inventory	CAC, CSC Task Force, Village Board	High	Mid Term (<1-3 yr)		PE6: Natural Resources Inventory
Maintaining passable roads during extreme weather events	Review, revise or create an emergency plan or evacuation plan	CAC, CSC Task Force, Village Board	High	Mid Term (<1-3 yr)		

Summit Lake Reservoir Dam	monitor dam	Village Board, Planning Board, Highway Dept	Medium	Ongoing		PE7: Culverts & Dams
Wastewater treatment plant	regulate new construction so as not to overload capacity	Village Board, Planning Board, Dept of Public Works	Medium	Long Term (<3-5 yr)		
Wastewater treatment plant	continue to maintain and fund updates to facility	Village Board, Planning Board, Dept of Public Works	Medium	Ongoing		
Wastewater treatment plant	continue to assess structure for flood resiliency and adopt necessary flood mitigation measures	Village Board, Planning Board, Dept of Public Works	Medium	Ongoing		
Cell phone/Wifi coverage	increase access for residents	Village Board, Planning Board	Medium	Mid Term (<1-3 yr)		
Cell phone/Wifi coverage	promote hotspots available at public library	CAC, CSC Task Force, Village Board	Medium	Early Win (<6 mo.)		

Environmental Key Strategies

There were two major areas of concerns related to **Environment**:

- **Open space** and **wetland protection,** specifically around Summit Lake. Invasive species have increased in the lake over the past decade and protecting the watershed is key to maintaining the healthy body of water.
- The **Deer population** was also listed as a top concern. The rise in the deer population has contributed to an decrease in plant life.

Table 41. Environmental Strategies and Implementation (some strategy descriptions may be adapted from Orange County Climate Resilience Plan, 2023)

Vulnerabilities Identified	Adaptive Strategy	Potential Departments & Boards	Priority	Projected Timeframe	Funding and Assistance	Relevant CSC Action
Lack of wetland protection	adopt an ordinance protection wetlands smaller than the state directed 12.4 acres	Village Board, CAC, CSC Task Force	High	Mid Term (<1-3 yr)		PE 7: Riparian Buffers
Overpopulation of deer	promote reforestation	CAC, CSC Task Force, Village Board	High	Long Term (<3-5 yr)		PE 7: Conserve Natural Areas
Overpopulation of deer	promote population control measures	CAC, CSC Task Force, Village Board	High	Ongoing		
Summit Lake-invasive species	dredge during high growth periods	Village Board, Planning Board, Dept of Public Works	High	Ongoing		
Summit Lake-riparian buffer protection	riparian buffer planting	Village Board, Planning Board, Dept of Public Works	Medium	Mid Term (<1-3 yr)		PE 7: Riparian Buffers
Summit Lake-riparian buffer protection	require proposals for new development in the Flood Hazard Overlay District take flood risk into account	Village Board, Planning Board, Dept of Public Works	Medium	Long Term (<3-5 yr)		PE 7: Riparian Buffers
Summit Lake-riparian buffer protection	zoning for riparian buffer protection	Village Board, Planning Board, Dept of Public Works	Medium	Long Term (<3-5 yr)		PE 7: Riparian Buffers
Steep slopes encouraging runoff in Village	ensure culverts have been assessed and right-sized	Village Board, Planning Board, Dept of Public Works	High	Long Term (<3-5 yr)		PE7: Culverts & Dams

Steep slopes encouraging runoff in Village	Require green infrastructure for storm water management	Village Board, Planning Board, Dept of Public Works	Medium	Long Term (<3-5 yr)		

Socioeconomic Key Strategies

There were four major areas of concerns related to **Society**:

- **Senior Housing Developments** at Terrace Apartments and Richardson Hall.
- **Migrating Populations** due to climate change could impact the town as real estate becomes more valuable and people look to open space to build new housing.
- The **Cost of resilient infrastructure** was noted as an obstacle to achieving the goal of building resiliency in the face of changing climate.
- **Lack of knowledge/education on issues** was cited as a challenge as the Village looks to build resiliency.

Table 42. Societal Strategies and Implementation (some strategy descriptions may be adapted from Orange County Climate Resilience Plan, 2023)

Vulnerabilities Identified	Adaptive Strategy	Potential Departments & Boards	Priority	Projected Timeframe	Funding and Assistance	Relevant CSC Action
Senior Housing Development (terrace apartments, Richardson Hall)	Organize neighborhood networks for emergency preparedness, planning, and training	Village Board, CAC, CSC, County Office of Emergency Management	High	Mid Term (<1-3 yr)		PE9: Climate Change Education and Engagement
Senior Housing Development (terrace apartments, Richardson Hall)	Review, revise or create an emergency plan or evacuation plan	Village Board, CAC, CSC, County Office of Emergency Management	High	Mid Term (<1-3 yr)		PE9: Climate Change Education and Engagement
Senior Housing Development (terrace apartments, Richardson Hall)	Create a heat emergency plan	Town Board, CAC, CSC, County Office of Emergency Management	High	Mid Term (<1-3 yr)		PE7: Heat Emergency Plan
Cost of resilient construction	publicize available programs funding green energy upgrades for vulnerable populations	CAC, CSC Task Force, Village Board	Medium			PE9: Energy Reduction Campaign
Cell phone coverage/Wifi coverage	Work with local utilities, in particular electric, gas, water, sewer, and	Village Board, Planning Board	High			

	telecommunications, to improve resilience					
Migrating populations (human)	update zoning codes to allow for construction of affordable housing	Village Board	Medium	Long Term (<3-5 yr)		
Migrating populations (human)	Protect non-homeowning residents through rent stability regulations	Village Board	Medium	Mid Term (<1-3 yr)		
migrating populations (human)	Mitigate green gentrification by protecting existing families and renters	Village Board	Medium	Long Term (<3-5 yr)		
Lack of knowledge/education on climate change impacts	increase public awareness by hosting educational events and programs	CAC, CSC Task Force	Medium	Short Term (<1 yr)		PE9: Climate Change Education and Engagement

Monitoring, Evaluation and Updates

CARP should be reviewed and revisited frequently in future years. To maximize impact, the Village of Philmont will need to monitor, evaluate, and maintain this plan. Funding should be sought to implement high priority adaptation strategies (see Appendix for list). Municipal officials are encouraged to incorporate planning for climate related impacts into all new policies and procedures.

This CARP was developed as a pilot program using the cohort model, similar to the Multi-Jurisdictional Hazard Mitigation Plan. Updates to the county led Hazard Mitigation Plan occur approximately every 5 years and present a straightforward opportunity to revisit the CARP and integrate both plans. Climate hazards are a logical fit for consideration in hazard mitigation planning and offer an opportunity to incorporate climate change and adaptation strategies. The county hazard mitigation process is welcomed in most communities, ensuring a level of commitment and dedication of resources.

Responsibilities for monitoring, evaluating, and implementing strategies should be designated by the municipality. A clear implementation strategy would outline responsibilities and authorization for decision making, allocating resources, and ensuring strategy implementation. The Village of Philmont should consider using existing local municipal groups such as, but not limited to, the CAC or CSC task force. Participants in the creation of this CARP should be included as leaders in all climate adaptation planning within the community. Government agencies, local non-profit organizations, academic institutions, private consultants, and other relevant businesses that can offer valuable input to plan updates should be identified. Communities should take advantage of local expertise and knowledge whenever possible and capitalize on resources and technical support available through local and regional partnerships with Cornell Cooperative Extension and the Capital District Regional Planning Commission. Use an adaptive management approach with monitoring protocols and feedback loops to provide decision makers with the information needed to modify, enhance, intensify, or curtail implementation of climate adaptation and resilience practices.

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