COMPARISON ANALYSIS OF CLIMATE IMPACT AND ADAPTATION OPPORTUNITIES FOR URBAN CLUSTERS IN THE NORTHEAST UNITED STATES

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Executive Summary

This project has been in the making for over four years. I came to this program with an emphasis on National Security Studies and how global climate change would impact future national planning and acquisition decisions. The curriculum that I chose to undertake was a balance between scientific reasoning, innovation or renewable energy sources, energy policy and law, international organization & integration, and the ways and means that people can effectively improve their quality of life through awareness and understanding of the environment. I started with the belief that large organizations and significant government influence would alter the outcome of the climate change dilemma. I no longer fully believe this. The greatest emphasis upon change certainly resides with global leadership, but ultimately the success resides with individual decisions and community organizations at the grass root levels. Changing minds about climate change risks and vulnerabilities must begin and end at the local level. This is also true across developed, developing, and less developing nations. Of assistance are Non-Governmental Organizations (NGO’s), Associations and Clubs, and independent watch-dog organizations. What inspired me to conduct a comparison of two urban clusters in the United States was to better understand how small governments organize, prioritize requirements, and view the uncertain future. The findings here could be replicated and identified globally, and in most cases the solutions are often the same. I entered this program believing that large well financed governments would have to react to the negative externalities of a changing climate, but I now believe that the best solution is to affect incremental change at the lowest level of government – the urban clusters.
Tables of Contents

Executive Summary ii
Table of Contents iii
List of Figures iv
List of Appendixes v
Introduction 1

Methods

Phase 1: Comparison of two urban clusters .................................. 5
Phase 2: Assess climate model predictions for Northeast U.S. ........ 5
Phase 3: Compare New York and Vermont climate action plans ....... 6

Results

Analysis of North Elba, New York ................................................. 7
Analysis of Hartford, Vermont ....................................................... 10
Climate Change drivers, vulnerabilities & risk in the Northeast U.S.... 14
State of New York State Climate Action Plans, Policy, and Laws .... 15
State of Vermont Climate Action Plans, Policy, and Laws ............. 18

Discussion 20
Conclusion 25
Acknowledgements 27
References 28
List of Figures

1. Independent and Dependent variables
2. Interview Questions
3. Geographical depiction of the Northeast on a map
4. Urban Cluster Town / City Comparison Data
List of Appendixes

A. Independent and Dependent variables
B. Interview Questions
C. Geographical depiction of the Northeast on a map
D. Urban Cluster Town / City Comparison Data
Introduction

**Statement of Purpose:** The purpose of this analysis is to compare and assess urban clusters in similar geographic and demographic areas with similar impacts of climate change to identify factors that may be different in developing, preparing, and implementing climate mitigation and adaptation plans.

**Objectives:** Climate policy and action in respect to climate change will have impacts across urban regions, urban cluster regions, and to rural regions. The states used for this study, New York and Vermont have extensive Climate Action Plans. To what extent these State plans are being used by urban clusters is unknown. This capstone project seeks to determine the factors that similar urban clusters share that can inform other like clusters in developing, preparing, and implementing climate change plans. This research project has the following sub-objectives:

1. Seeks to understand the need for climate mitigation and adaptation plans across urban clusters in similar geographic and demographic areas.

2. Seeks to understand the common climate change vulnerabilities that urban clusters in similar geographic and demographic areas may experience.

3. Seeks to understand the similarities in an urban cluster’s ability to conduct assessments to develop climate change adaptation plans.

4. Seeks to understand the similar successes, failures, issues, and concerns that urban clusters experience.

5. Seeks to understand urban cluster policies (or current action planning) aligned to state climate action plans.

**Hypothesis:** (see appendix A: Independent and Dependent variable table)

H1: Urban clusters are affected by climate change: There is compelling data that suggests with a great amount of certainty that climate change will impact urban clusters. Such as increased
temperatures, shorter winters, longer summers, and heavy precipitation. What is uncertain is how fast the negative ramifications will occur (Wuebbles, D., D. W. Fahey, and K. A. Hibbard, 2017).

**Expected Finding:** Urban clusters will experience some level of negative impacts due to climate change but are less concerning than urban regions of populations above 50000.

**H2:** State Climate Action Plans have similarities but are different in scope and depth, organization, goals, and policies to achieve goals.

**Expected Findings:** That urban clusters in this study have little, or no policy (strategy or approaches) aimed at adapting to climate change, which results in an inability to identify requirements, establish community interest, or to garner funding.

**H3:** Climate change planning in urban clusters has limitations for various reasons; size and authority of local government, funding (priorities), expertise on the topic of climate change, or in denial that climate change will have little impact.

**Expected Findings:** That these communities share common data and governmental frameworks. I also believe that there will be differences that will or can inform other communities.

**H4:** Urban clusters often rely on only a few economic revenue sources, i.e., tourism, farming, small manufacturing.

**Expected Findings:** Economic comparisons across rural communities will highlight critical and essential vulnerabilities. How resilient the economic source is to climate change impacts is unknown.

**H5:** Understanding the common characteristics shared by urban clusters that are impacted by climate change can be used to inform the development climate change strategies and approaches to increase climate change resiliency.

**Expected Findings:** That adaptive planning for urban clusters requires a different approach
**Why is this project Important:** Urban cluster regions represent 30-million people of the overall population of the United States. Urban clusters are often made up of multiple villages, either incorporated or not incorporated (United States Census Bureau. 2020a.) This research project can potentially inform urban cluster governance, town management, mandated or non-mandated committees, budget development, common / best practices to identify current and future climate change adaptation / mitigation planning, and policy development and implementation. If the hypotheses are correct, urban clusters will have smaller government activities that rely heavily on volunteers, external organizations such as associations and foundations, and smaller budgets prone to economic fluctuation. This project is also important to state officials and planners responsible for mandating climate change goals and objectives. Understanding urban cluster governance and processes can shape tools used to incentivize and carry out climate change actions plans. Likewise, identifying similarities among urban cluster regions can streamline integration and potentially garner common goals and objectives.

**Relevant Information:** Understanding the landscape of the United States – Rural and Urban areas. How the U.S. defines and classifies rural and urban areas is complicated and has changed over the past 3-decades. In 1910, the rural population of the U.S., identified only as *any population, housing, or territory not in an urban area*, was approximately 60.4% of the population (United States Census Bureau. 2020a). By the 2010 census, the rural population shrank to less than 19% of the population. The 2000 census included substantial conceptual and methodological changes made to the way urban areas were classified. The term “Urban” would remain as any agglomeration of 50000 or more people. Areas with a population between 2500-50000 would be termed as “Urban Clusters” (Ratcliffe, Michael. 2010). During the 2010 census there were 487 urban areas and 3087 urban cluster areas classified, representing 81% of the...
total population of the U.S. (United States Census Bureau. 2020b). The 30-million people that fall into the urban cluster classification are represented by governing organizations that vary in composition.

**Literature Review:** Reviewed United States Climate Action planning – primary source is the EPA. Reviewed the US Climate Assessment 4th Edition. Reviewed climate action plans for larger US cities, Norfolk VA, Atlanta, New York City. Reviewed (2) specific documents; one from the Canadian government- a climate change framework designed specifically for small communities; and second, from the US government designed for small communities, but only in support of natural disasters. Research on government at the state, city, town, and village across Vermont, New Hampshire, and New York.
Methods

Plans for Analysis:

**Phase 1** - *Conduct case study / comparison analysis of two similar geographic and demographic urban clusters in the Northeast United States*: The data for much of this section will be derived from the United States Census Bureau with emphasis on data in the following areas: geography, people, and business (economics). Additional data will be compiled directly through the urban cluster (city/town) records, such as: government composition, committees, budgets, departments, plans and strategies. Data research will seek to understand the priorities across the following sectors: transportation, energy, medical & health, city services (law enforcement and first responders), agriculture, forests, ecosystems, commercial & residential infrastructure, and water sources.

**Relative Information:**

1. Although not formally stated, governments without climate action plans may be developing climate change resiliency through the budget planning process. For urban clusters, this may be a means to establish awareness and the interconnected actions of government, as well show similarities and concerns across similar towns / cities.

2. Interviews were conducted with town leaders with a focus on elected officials and city managers. The cities of North Elba, New York and Hartford, Vermont were engaged and available for follow-on questions. See appendix B for questions used to guide interviews for this research project.

**Phase 2** - *Assess climate model predictions for Northeast United States*: This section will assess and determine the extent of climate change impacts that will affect the geographical area used for this research. Primary source for this data will be the most recent United States Climate

<table>
<thead>
<tr>
<th>City/Town</th>
<th>Location</th>
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<tr>
<td>North Elba</td>
<td>New York</td>
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<tr>
<td>Hartford</td>
<td>Vermont</td>
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*Table 1: Selected Urban Clusters*
Assessment (4th edition), and other scholarly documents used by New York and Vermont to formulate their climate action plans.

**Phase 3 - Climate Change Policy and Planning Comparison between New York and Vermont:**

**Phase 4 - Analyze the comparative data:** This analysis will identify commonalities the communities share, and what sectors would be impacted by climate change. This analysis will also seek to address areas within each community that can be prioritized to inform framework development.
Results

This section will state the findings without opinion, biases, or interpretation. Analysis of results and findings will be stated in the discussion section. Most of the data is based on 2010 census reports - some data indicated has been updated annually.

**Phase 1 - Conduct case study / comparison analysis of two similar geographic and demographic urban clusters in the Northeast United States:**

The two urban clusters selected for this research study are in New York and Vermont. The distance between North Elba, New York and Hartford, Vermont is 90-miles (see appendix C).

The proximity of the towns was by design to ensure similar climate change variables, such as increased temperature, heavy precipitation events, longer summers, and shorter winters.

**North Elba, New York:** Data derived from (United States Census Bureau, 2021a)

**Geography:** North Elba’s land area is 151.65 square miles.

The land is heavy forest in a region known as the Adirondacks High Peaks in the Northeast United States. The Town of North Elba encompasses the Village of Lake Placid, which is the main town center. Parts of Saranac Lake also fall into North Elba’s boundaries. The population density per square mile is 59.1 people, below the national average of 87.4 per square mile (see appendix D).

**People:** **Population** – North Elba currently has 8066 inhabitants, of which 82% consider themselves white and 23% minority. **Housing** – there are 2629 households of which 57.4% are owner occupied. Median value of owner-occupied residencies is $218,200 with a medium monthly mortgage of $1504. Medium gross rent for those that do not own a home is $968 per month. Both home and rent costs are within the range of the national average. **Education** - for
residences over the age of 25, 90.4% have at least a high school education and 31.4% have a bachelor’s degree or higher. **Health** – for residences under age 65, 4.9% have a designated disability, and across this same group 5.3% do not have medical insurance. **Economy / Income / Poverty** – of those residences over age 16, 48.3% are in the work force. Medium household income is $59544 and per-capita income are $27095. Of all North Elba residences, 13% live in poverty.

**Economy**: **Businesses** – There are 289 registered “firms” in North Elba (2012 data). Of these firms, 124 are owned by men, 141 by women and 27 by minorities. North Elba is a service industry economy that directly supports four-season recreation and tourism. Winter sports, hiking, biking, outdoor activities, vacation property management, construction, and Food / drink industries are all critical components of a recreation and tourism economy.

**Government**: Most of the information and data for government was found at the Town of North Elba’s official webpage and through interviews conducted with Town leadership (Town of North Elba, New York, 2021). **Governance** - North Elba has an elected town manager (2-year) and four elected board members (4-years). All town business is conducted through monthly board meetings, workshops, and committee meetings. Committees are chaired by board members. Day-to-day operations are overseen and approved by the town manager and board member team. Each have one vote of equal weight. **Budget** - A paid finance director manages budget preparation and presents the budget to the town manager and board members. Budget development is done through coordination of board members with committees and department heads. The process requires budget submission and discussion with a designated budget review board. Projects approved by the board are entered into the budget proposal. Town hearings are conducted, and the budget is voted upon for approval (Town of North Elba, New York, 2020). This is done through a special town meeting that culminates in a vote. The 2021 budget
was approved at $12,872,096. **Departments** – North Elba has the basic departments that run day-to-day operation; Sewer and water, highway / transportation, electric energy, and town management. They do not have a police department. Lake Placid Police are integrated inside the village boundaries. Boundaries that fall outside Lake Placid fall under the jurisdiction of the state police. A development director has recently been hired to consider external initiatives to include committee goals and directives. **Committees** – are established on a need’s basis. There are no permanent standing committees. Committee leadership falls to elected board members and can be filled with North Elba employees or volunteers.

**Associations / Clubs:** North Elba leadership must consider established association’s when making town decisions. The following are just a few of state and regional associations that are all focused on conservation; Ausable River Association (Ausable River Association, 2021); Adirondack Mountain Club (Adirondack Mountain Club, 2021); Mirror Lake Watershed Association (Mirror Lake Watershed Association, 2021.) These organizations have mission statements and goals to protect much of the land and major water sheds within North Elba’s boundaries.

**Climate Change Adaptation and Resiliency:** North Elba does not have climate change or environmental committees, direct policy addressing climate change impacts, or mandated goals and objectives to address climate change. A recently hired development director is looking at initiatives to address climate change with emphasis on climate resiliency (Interview, 2021d.) The Village of Lake Placid inside the boundaries of the Town of North Elba does participate in the State of New York’s Climate Smart Communities (CSC) Program (New York, Department of Environment Conservation, 2021.) The Village of Lake Placid has established a “Climate Smart Community Task Force”, organized by community volunteers, that was officially registered in 2018. Registered participants with certification are eligible for CSC grants.
**Long-Term Strategy:** North Elba in conjunction with Lake Placid developed a comprehensive plan in 2014 (Village of Lake Placid / Town of North Elba, 2014). The plan does not directly address climate change but does recommend initiatives that are congruent and aligned to climate change adaptation planning. The following are ongoing programs that are underway that spawned from the 2014 comprehensive plan 2014 (Village of Lake Placid / Town of North Elba, 2014).

- **Affordable Housing** - in preparation for the International University Sports Federation (FISU) World University Winter Games for 2023, North Elba has sponsored and are constructing (4) affordable housing units to house FISU participants. After the games, the units will be maintained and converted into affordable housing for lower income families that cannot afford to live and work in North Elba.

- **Lake Placid Main Street Renovation** – this ongoing project replaces antiquated sewer, water, and electrical systems along the approximate half-mile stretch of the main street corridor. The project expands the street, adds bicycle and public transportation lanes. The program also increases green areas to absorb water runoff that now runs directly into Mirror Lake.

- **New snow removal technologies** – increased salt has destroyed various fauna and wildlife across the lakes and watersheds within North Elba’s boundaries. New salt laws have gone into effect, and new equipment and training is required.

**Hartford, Vermont:** Data derived from (United States Census Bureau. 2021b)

**Geography:** Hartford’s land area is 45 square miles. The land is forested in a region of rolling hills and is adjacent the Connecticut River. The Town of Hartford encompasses the Village of White River Junction, West Hartford, Wilder, and Quechee. The population density per square mile is 221.2 people, above the national average of 87.4 per square mile (see appendix D).
**People:**  *Population* – Hartford currently has 9556 inhabitants, of which 92.6% consider themselves white and 3.4% minority.  *Housing* – there are 4643 households of which 70.6% are owner occupied. Median value of owner-occupied residencies is $238,000 with a medium monthly mortgage of $1663. Medium gross rent for those that do not own a home is $994 per month. Both home and rent costs are within the range of the national average.  *Education* - for residences over the age of 25, 95.1% have at least a high school education and 48% have a bachelor’s degree or higher.  *Health* – for residences under age 65, 12% have a designated disability, and across this same group 7.8% do not have medical insurance.  *Economy / Income / Poverty* – of those residences over age 16, 64.5% are in the work force. Medium household income is $64493 and per-capita income are $41472. Of all Hartford residences, 6.0% live in poverty.

**Economics:**  *Businesses* – There are 1181 registered “firms” in Hartford (2012 data). Of these firms, 601 are owned by men, 365 by women and 28 by minorities. Hartford has a broad economic base; Education (Dartmouth University), U.S. government (Veterans Administration), Innovation (High Technology), and various headquarters for fortune 500 businesses. The Hartford Planning and Coordinating Director for the Town Manager described the economy as, “A creative economy built around a foundation for sustainable living” (interview, 2021a).

**Government:** Most of the information and data for government was at Hartford’s official website and through interviews conducted with Town leadership (Town of Hartford, Vermont. 2021).  *Governance* - Hartford has a hired / paid town manager, an elected 7-member Select Board (3-years), and a staff director for planning and coordination across departments and committees. All town business is conducted through monthly board meetings, workshops, and committee meetings. Committees are chaired by volunteers. Day-to-day operations are overseen and approved by the town manager / staff director, and the elected Select Board. The
town manager receives guidance and direction from the select board. **Budget** - A paid finance director manages budget preparation and presents the budget to the town manager and Select Board members. Final budget development is done through coordination of the Select Board members, committees, and department heads. The process requires budget submission and discussion with a designated budget review board. Projects approved by the board are entered into the budget proposal. Town hearings are conducted, and the budget is voted upon for approval (Town of Hartford, Vermont, 2020c). The 2021 budget was approved at $14,853,369.

**Departments** – Hartford has 10 departments that run day-to-day operations: administration, emergency communications, finance, fire, police, assessor, planning & development, parks and recreation public works and town clerk. **Committees / Commissions / Boards** – are established by the select board. Hartford has (8) standing committees all chaired by volunteers; (5) commissions with set parameters and duration; and (5) working boards. Hartford government relies on volunteer service to sit on committees, commissions, and boards (Interview, 2021a).

**Climate Change Adaptation and Resiliency**: Issues related to climate change, environment, and conservation are a significant part of Hartford government. Hartford currently has a *climate change advisor commission*, *community resiliency organization* focused on climate change, a *conservation commission*, and an *energy commission* (Town of Hartford, Vermont. 2021). Hartford has standing policy focused on climate change, such as a joint resolution in 2019 declaring a climate emergency (Town or Hartford, Vermont, 2019a) to reach carbon neutrality by 2027, or a request for proposals to develop a *Hartford Climate Action Plan* currently ongoing (Town of Hartford, Vermont. 2020b). The climate action plan is being conducted by a consulting firm with oversight by the Climate Advisory Committee. The concerted effort of these committees is to advise government, inform the population regarding climate change impacts, develop climate change policy, and to mandate goals and objectives (Interview, 2021a).
**Climate Change Integration**: Hartford participates in a Regional Planning Commission mandated by the State of Vermont to integrate 12-regions across Vermont to share information and best practices across area engaged in conservation (State of Vermont, 2021). Additionally, Hartford participates in Vermont’s Energy & Climate Action Network (VECAN), a nonprofit organization committed to linking communities together to share information, ideas, and to achieve common outcomes (Vermont Energy & Climate Action Network, 2021). VECAN conducts an annual climate change adaptation conference that brings together 300 community leaders to share strategies to develop climate resiliency.

**Long-Term Strategy**: The Town of Hartford developed and approved a comprehensive town plan in 2019 (Town of Hartford, Vermont, 2019b). The plan was approved by the select board and planning commission. This document is both complex and all inclusive, to include acknowledgement and responsibility for developing climate resilience, adaptation planning, and mitigation strategies (Interview, 2021a). Chapter 9 of the Town Plan “Natural Resources” addresses water quality, habitat protections, conservation measures, forest management, and climate change. The document provides an overview on climate change projections, and some of the immediate and long-term impacts of climate change. Chapter 10 “Energy” addresses goals to shift energy production from high emitting fuels to lower emitting fuels to include renewable energy sources. Chapter 11 “Flooding” addresses the most prominent negative impact of climate change. The Connecticut River flows through the city and many tributary streams run through the boundaries of Hartford. Replacing aging sewer systems, the lack of controlling water flow at alternative locations, are a few examples of building climate change resiliency. The Town Plan reads like a roadmap. The plan prescribes action, makes recommendations taking budget constraints into account, and aligns committees, boards, and commissions to goals and objectives.
Phase 2 - Assess climate change impacts / predictions for Northeast United States:

The Northeast is the most forested and densely populated region in the United States (USGCRP, 2018.) The region experiences a distinct change in seasons. Colorful foliage in the fall. Cold winters with robust snow. Long spring periods with an easy transition into mild summers. Because of this, four-season recreation activities contribute significantly to the economy. North Elba and Hartford are inland by hundreds of miles, in temperate areas, and close in proximity. Both towns will experience climate change at the same time and likely in the same manner. Flooding will be of concern, but not at the degree of communities residing on or near coastlines. According to the (USGCRP, 2016) The Impacts of Climate Change on Human Health in the United States, the primary climate change drivers in the Northeast are temperature change, heavy/increased precipitation, extreme weather events, and sea rise. According to the 4th National Climate Assessment (4NCA), the Northeast will be generally impacted by climate drivers in the following areas: declining snow and ice, increased periods between precipitation events compounding drought conditions, more days above 90F, shorter winters, reduced snow-melt periods, and longer summers (USGCRP, 2018.) These projected changes will negatively impact tourism, ecosystems, human health, energy systems, infrastructure, and social services. Additionally, (USGCRP, 2018) identifies “urban clusters” in “rural like” regions in the Northeast as having limited economic resilience and limited ability to cope with climate change impacts. Projections from chapter 2 of the 4th National Climate Assessment (4NCA), increased temperature is the most significant climate driver for the Towns of North Elba and Hartford. By 2035, based on RCP 4.5 and RCP 8.5, the Northeast will experience a 3.6F temperature increase above the pre-industrial era temperatures. Additionally, worst case projections predict an increase between 4.5F and 10F by 2080. A more moderate projection places increased temperature between 3F and 6F by 2080 (USGCRP, 2018). In either scenario, the outlook is
foreboding. The impacts of increased temperatures in North Elba and Hartford will be manifested by extreme precipitation. Between 1901 and 2016, heavy precipitation has increased by 38%. Increases in the frequency of heavy precipitation are risk factors for floods, increased erosion, damage to water retention for human and agriculture use, increase rain runoff in areas that cannot absorb water, and impacts planting dates and crop selection in the agriculture industry (USGCRP. 2021). Building resiliency and adapting to increased precipitation will impact the build environment. Dams, Reservoirs, and culverts will have to be funded and constructed. Retaining walls, river, and stream berm improvements will be required. Finally, antiquated sewers to manage water runoff in towns and villages will have to be replaced or improved. In North Elba increased precipitation in the winter will mean increased snow for winter recreation. However, this snow will come later in the season and will melt sooner and faster. The increased snow melt runoff will exacerbate the problem. Furthermore, North Elba’s summer hiking seasons are already stressed with increased rain. Trails are widening and are often muddy, and ultimately impacts the ecosystem. Determining an accurate timeline on how climate change will unfold is uncertain. What is certain is that climate change is happening and is projected to increase into the 21st century.

Phase 3 - Climate Change Policy and Planning Comparison of New York and Vermont:

To address climate change planning, it is important to analyze current state climate change policies and actions through the lens of climate change resiliency and adaptation responses of both North Elba and Hartford. Primary sources are the Georgetown University Law – Climate
New York: In 2009 the Governor in New York stood up the New York State Climate Action Council (NYSCAC) to assess and write a climate action plan for the State of New York. One year later the NYSCAC released a 428-page report on ways to mitigate and adapt (prepare) for climate change. Since the initial actions of 2009, New York has issued seven key legislative climate action law and policy documents (Georgetown Climate Center, 2021a) listed here:

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Resource Type</th>
<th>Date</th>
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<tr>
<td>New York State Climate Leadership and Community Protection Act</td>
<td>Law &amp; Governance</td>
<td>July 18, 19</td>
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<tr>
<td>New York Regulation – Part 490 – Sea Level Rise</td>
<td>Law &amp; Governance</td>
<td>February 17</td>
</tr>
<tr>
<td>New York State Water Infrastructure Improvement Act</td>
<td>Law &amp; Governance</td>
<td>March 31, 15</td>
</tr>
<tr>
<td>New York Risk and Resiliency Act</td>
<td>Law &amp; Governance</td>
<td>Sept 22, 14</td>
</tr>
<tr>
<td>New York Risk and Resiliency Act: Application to Transportation Infrastructure Projects</td>
<td>Law &amp; Governance</td>
<td>Sept 22, 14</td>
</tr>
<tr>
<td>New York Smart Growth Public Infrastructure Act</td>
<td>Law &amp; Governance</td>
<td>Sept 29, 10</td>
</tr>
<tr>
<td>New York Executive Order 24: Establishing a Goal to Reduce GHG Emissions 80% by 2050 and Prepare a Climate Action Plan</td>
<td>Law &amp; Governance</td>
<td>Aug 6, 09</td>
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New York has also released eight state agency plans, 13 local and regional plans, and 17 featured resources (Georgetown Climate Center, 2021a.) Of these documents, 14 are related to climate change resiliency and adaptation. Of the seven legislative documents, two are most prominent regarding guidance for conducting Climate Change Planning for both mitigation and adaptation, the New York State Leadership and Community Protection Act, and the New York Community Risk and Resiliency Act. These documents are aimed as tools to help community leadership (North Elba) prepare and respond to climate action planning (State of New York, 2021.)

**New York Community Risk and Resiliency Act (CRRA):** The CRRA mandates climate impact assessment be conducted as an essential element of the planning, permitting, and funding processes across the entire state – not just coastal regions that are more exposed to climate...
impacts. To date, New York is the only State in the union where such legislation covers the entire State (Georgetown Climate Center, 2021a). The CRRC has (5) provisions; Projection of sea level rise along coastlines; Consideration for implications of future climate risks (this leads into assessment criteria and requirements); Smart Growth Public Infrastructure Policy Act Criteria; Guidance on Natural Resilience Measures, and Model Local Laws Concerning Climate Risk (State of New York, 2021.) The last three provisions are the nucleus of New York’s “Climate Smart Communities Program.” This program is the bulwark of an effort to establish a whole of government climate action response that pulls along the entire State. North Elba’s primary node of support into New York’s climate action plan is through the Climate Smart Communities Program. This is an incentive program. Communities are not required to register and participate. However, financial support through Grants for climate action planning can only be awarded through the program (New York, Department of Environment Conservation, 2021.) As to whether an incentive program can work is determined on the number of communities that register and can achieve certification. To date, 330 communities have registered and 65 have certification status. These 330 registered communities represent 9,308,459 people in a State of 19,453,561 indicating that 48% of New Yorkers are living in a certified community.

New York State Climate Leadership and Community Protection Act (CLCPA): The CLCPA does not negate the CRRC, but instead broadens and enhances climate change actions. The most significant aspect of the CLCPA is the establishment of a Climate Justice Working Group (CJWG). The CJWG will consider climate action plans and priorities with emphasis on environmental justice, to ensure the low income and struggling communities are factored into planning. The CJWG will report to the Climate Action Council on how the state can meet CLCPA goals (Georgetown Climate Center, 2021a.)
The State of New York’s 22-person Climate Change Council is currently overseeing and working to implement the following goals and objectives: **85% Reduction in GHG Emissions by 2050; 100% Zero-emission Electricity by 2040; 70% Renewable Energy by 2030; 9,000 MW of Offshore Wind by 2035; 3,000 MW of Energy Storage by 2030; and 6,000 MW of Solar by 2025 that will achieve a 22 Million Tons of Carbon Reduction through Energy Efficiency and Electrification** (State of New York, 2021).

**Vermont**: In 2011 the State of Vermont established a Climate Cabinet with the task to reduce GHG emissions and to adapt to climate change. Another task was to partner with local communities, regions, and specified organizations to address climate change at the local level (Georgetown Climate Center, 2021b.) Vermont has released only two legislative documents related to climate change, listed below:

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<tr>
<th>Resource Name</th>
<th>Resource Type</th>
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<tr>
<td>Vermont Global Warming Solutions Act</td>
<td>Law &amp; Governance</td>
<td>Sept, 20</td>
</tr>
<tr>
<td>Vermont Governor’s Climate Cabinet &amp; State Agency Climate Action Plan: (Executive Order 15-12)</td>
<td>Law &amp; Governance</td>
<td>Dec 18, 2012</td>
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*Table 3: State of Vermont Climate Action Plan website (State of Vermont, 2021a)*

Vermont has also released six state agency plans, one local and regional plan, and 10 featured resources (Georgetown Climate Center, 2021b.) Of these documents, 10 are related to climate change resiliency and adaptation. The most prominent documents regarding guidance for conducting Climate Change Planning for both mitigation and adaptation, are the Vermont Global Warming Solutions Act which is law and governance document, and Vermont’s Road Map for Resiliency, which is a featured resource document.

**Vermont Global Warming Solutions Act**: The (VGWSA) is an improvement over the initial 2012 Climate Cabinet and State Agency Act. The VGWSA established a legal framework that communities must adhere to and consider for climate change planning. Any infrastructure improvements, ecological plans, or community development must be informed by climate action plans at the community level. The provision also allows for residents to take legal action...
when a community fails to address an agreed upon climate action impact and risk. In essence, this Act forces all communities and regions in Vermont to establish Climate Change Action Plans with an eye towards climate resiliency (Interview, 2021a.) Hartford, Vermont is engaged in completing a Climate Change Resiliency/Adaptation Plan and are key supporters of a regional environment group (see Phase 1 of this paper - Hartford Climate Integration.) Vermont has affectively mandated climate change preparations across mitigation, adaptation, and resiliency. Another key component of the VGWSA is State Legislative acknowledgement that climate change disproportionately impacts urban cluster communities (State of Vermont, 2021a.)

**Vermont’s Road Map for Resiliency:** Rather than being a step-by-step plan on how to assess, develop, and institute community resilience, this document shares best practices with ideas and solutions that have been employed across other agencies and by senior leaders. Initially established to prepare for natural disasters, the roadmap guides a user through community integration and regional support ideas, such as ways to integrate emergency management, make sustainable infrastructure investments, and to organize and share information (Interview, 2021b.) Hartford Vermont is organized and employing ideas that come from this type of document.
Discussion

Discussions on the Methodology

**Phase 1 – Tail of Two Cities:** A great deal of the interpretation of data during phase 1 was done through interviews with town leaders; Town Managers for both North Elba (*Interview, 2021c*) and Hartford (*Interview, 2021b*), to include separate interviews with North Elba’s Director of Planning (*Interview, 2021d*), and Hartford Senior Staff Coordinator (*Interview, 2021a*.) Without interviews to put numbers into context, it would be hard to accurately analyze a finding in this type of comparison. North Elba and Hartford share many similar demographic characteristics (appendix D.) There are a few characteristics that need to be discussed and put into context (see table 4, significant findings.)

*Business:* North Elba and Hartford share little regarding business characteristics. With populations of around 10000 inhabitants, the number of registered firms are skewed; North Elba has 289 and Hartford has 1181, or a 4:1 ratio. North Elba is predominately a tourism and recreation economy, and the work force is almost exclusively service industry. Per-capita income is much lower, although medium household income is almost identical. Hartford is what the town manager calls a creative economy. It probably is not fair to say that North Elba is less economic resilient than Hartford, but considering climate change they may very well be. For both town managers that were interviewed, the priority of government is to establish a resilient economy. Without a resilient economy, it is exceedingly difficult to do achieve any other priority.

*Owner Occupied Housing:* North Elba is 15 percentage points behind Hartford and 9 points behind the national average. This is indicative of the service industry lower per-capita pay-scale, and the high cost of home ownership. Most workers live outside North Elba’s boundaries. Their commute to work is longer, and overall quality of life is impacted. Affordable
housing for a rental market is important to North Elba.

**Town Government:** Both towns share many of the same characteristics; town managers, boards, committees, public hearings, equal size budgets, and community services. Both town budgets are extremely tight, there is little room for long-range planning such as infrastructure recapitalization.

**Climate Change and Resiliency:** Neither town has a climate change adaptation or resiliency plan, but both towns understand the need for climate resiliency. Hartford is currently producing a climate action plan. North Elba is entering into the State of New York’s Climate Smart Community Program. Town Managers agree that current budgets are developed with climate change and building climate resiliency considerations. Of note, Hartford has permanent committees for climate change, and they are involved at the State level in information sharing.

**External organizations:** North Elba is in the middle of New York States Adirondack State Park, and home to the second largest Winter Olympic complex in the U.S. Many organized associations are involved in North Elba, and most are centered on sports and conservation. This is exceptionally good, but it does impact town decision-makers. If 4 separate conservation organizations are pushing different climate change resiliency efforts, who makes the final decision on what to pursue. Organization is everything.

**Phase 2 – Discussion on Climate Change Impacts and Predictions:** The most certain part of this research project was the modelling and predictions that are occurring and expected to occur in the Northeast. What is uncertain is just how fast the changes will occur. North Elba is already aware that the snow skiing season is shorter. Hartford is currently dealing with flooding and upstream water management. As stated by the 4th NCA, in rural clusters away from the coastline, temperature change will be the greatest climate change driver.

**Phase 3 – Climate Change Policy and Planning Comparison of New York and Vermont:** Both
States are taking climate change seriously. Goals and objectives to mitigate and adapt to climate change are the most stringent in the U.S. Both States have recently shifted policy from almost all mitigation to a balance with adaptation and resiliency. A clear finding in this study is that the States of New York and Vermont are not leaving urban clusters behind.

### Table 4: Provided by the author – Significant findings

<table>
<thead>
<tr>
<th>Similar</th>
<th>Not Similar (Significant Findings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Education,</td>
<td>North Elba and Hartford share little regarding business characteristics. With populations of around 10000 inhabitants, the number of registered firms are skewed; North Elba has 289 and Hartford has 1181, or a 4:1 ratio.</td>
</tr>
<tr>
<td>- health care,</td>
<td>- North Elba is predominately a tourism and recreation economy</td>
</tr>
<tr>
<td>- cost of living – per capita household income, housing costs,</td>
<td>- Per-capita income is much lower, although medium household income is almost identical</td>
</tr>
<tr>
<td>unemployment rates</td>
<td>- Priority of government is to establish a resilient economy</td>
</tr>
<tr>
<td>- Both towns share many of the same characteristics; town managers,</td>
<td>- Hartford’s creative economy demonstrates economic resiliency with numerous economic opportunities.</td>
</tr>
<tr>
<td>boards, committees, public hearings, equal size budgets, and community</td>
<td></td>
</tr>
<tr>
<td>services.</td>
<td>Owner Occupied Housing. North Elba is 15 percentage points behind Hartford and 9 points behind the national average. This is indicative of the service industry lower per-capita pay-scale, and the high cost of home ownership. Most workers live outside North Elba’s boundaries. Their commute to work is longer, and overall quality of life is impacted.</td>
</tr>
<tr>
<td>- Both towns lack additional funding for long-range planning such as</td>
<td>Climate Change Policy and Planning Comparison of New York and Vermont: Both States are taking climate change seriously. Goals and objectives to mitigate and adapt to climate change are the most stringent in the U.S. A clear finding in this study is that the States of New York and Vermont are not leaving urban clusters behind.</td>
</tr>
<tr>
<td>infrastructure recapitalization.</td>
<td>- Vermont’s program is mandated into law. All governments in Vermont are required to establish climate action plans. As for negative reinforcement, if a community does not adopt and pursue climate resiliency, they could be sued.</td>
</tr>
<tr>
<td></td>
<td>- New York is taking a positive reinforcement approach. If a community registers for the New York Climate Smart Community program, they are then eligible to receive grants and other incentives. It is yet to be seen which approach works, but Vermont has 100% attention!</td>
</tr>
</tbody>
</table>

However, for the purpose of understanding approaches, the States could not be more different. Vermont is making all governments in Vermont establish climate action plans. As an incentive, if a community does not adopt and pursue climate resiliency, they could be sued. In comparison, New York is taking a positive reinforcement approach. If you register for the New York Climate Smart Community program, you could receive grants and other incentives. It is yet to be seen which approach works, but Vermont has 100% attention! When asked about these approaches, both city managers made it clear that either works, but what they really do not want is for State leaders to tell them how to do the planning.

**Discussion on the Hypothesis**

There are four significant findings that where highlighted in this study that would serve to inform urban cluster communities in the development of climate action and resiliency planning:
1. Urban clusters need guidance and financial assistance from State leadership, but not a “cookie cutter” how to method.

2. Economic success is the top priority for local government. Tying economic resiliency to the vulnerabilities of climate change is important.

3. State plans are similar but approaches to assist urban clusters vary greatly. Mandated law verse positive incentives are debatable, but Hartford demonstrates enthusiasm to assess and publish, and implement a climate change adaptation plan – **North Elba does not**.

4. Organization within the community is particularly important. Organization between multiple community's is as important. Vermont has 13 regions with multiple communities that participate – and they too are mandated! **They are sharing information & best practices.**

**H1:** *Urban clusters are affected by climate change:* **Expected Finding:** Urban clusters will experience some level of negative impacts due to climate change but are less concerning than urban regions of populations above 50000.

**Finding:** Data suggests that increased temperatures will negatively affect inland regions in the Northeast. Increased heavy precipitation, longer summers, and shorter winters will occur.

**H2:** *State Climate Action Plans have similarities but are different in scope and depth, organization, goals, and policies to achieve goals.* **Expected Findings:** That urban clusters in this study have little, or no policy (strategy or approaches) aimed at adapting to climate change, which results in an inability to identify requirements, establish community interest, or to garner funding.

**Finding:** Data and research indicates that the States of New York and Vermont have highly organized climate action plans, and that they inform and guide smaller communities. Also, that the Towns of North Elba and Hartford have efforts in place to development resilience to climate
change through the development of climate change adaptation planning and informed budgetary processes.

**H3:** Climate change planning in towns has limitations for various reasons; size and authority of local government, funding (priorities), expertise on the topic of climate change, or in denial that climate change will have little impact. **Expected Findings:** That these communities share common data and governmental frameworks. I also believe that there will be differences that will or can inform other communities.

**Finding:** Research and Interviews indicate that in various areas of government, that smaller communities lack capacity often found in larger municipalities, such as qualified volunteers for committees, and enough paid employee overhead to take on emerging issues.

**H4:** Small rural communities often rely on only a few economic revenue sources, i.e., tourism, farming, small manufacturing. **Expected Findings:** Economic comparisons across rural communities will highlight critical and essential vulnerabilities.

**Finding:** Data, research, and interviews for this study indicate that economic resiliency is important to smaller urban clusters, and to achieve this requires multiple industry sectors.

**H5:** Understanding the common characteristics shared by urban clusters that are impacted by climate change can be used to inform the development of climate change strategies and approaches to increase climate change resiliency. **Expected Findings:** That adaptive planning for urban clusters requires a different approach than urban regions over 50000.

**Finding:** Data, research, and interviews suggest that smaller communities that share data, such as in Vermont, are more likely to have climate action plans and active committees. Smaller communities are less likely to be successful if they try to go it alone.
Conclusion

Both North Elba and Hartford have identified and prioritized sectors within the community that are central to increasing climate change resiliency and building a climate change adaptation plan (see appendix E & F.) Both communities understand the climate drivers and the risks posed by climate change and the management options and management implementation plans to build a more informed and resilient community.
## Acknowledgements

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Position</th>
<th>Engagement</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>
Reference


United States Census Bureau. 2021c. “Quick Facts for the State of Vermont.” Website can be retrieved here https://www.census.gov/quickfacts/VT


## Appendix A
### Independent and Dependent Variables

<table>
<thead>
<tr>
<th>Independent Variables (IV)</th>
<th>(IV) NOTES</th>
<th>Dependent Variables (DV) NOT just related to adjacent columns</th>
<th>Linked to Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Increase in temperature (climate)</td>
<td>Past 25 years (I may expand / decrease this)</td>
<td>Less or more precipitation</td>
<td>H1</td>
</tr>
<tr>
<td>2 Shift in Weather Patterns</td>
<td>Duration period indeterminate (contextual variables) = four season temperature trends; four season precipitation trends</td>
<td>Increased uncertainty in tourist activity; skiing, hiking, camping, i.e.</td>
<td>H1</td>
</tr>
<tr>
<td>3 Demographic Characteristics</td>
<td>Gender, education, income (per capita), race. Political affiliation, primary energy source, primary economic source</td>
<td>Greater dependance on external organizations (energy source), greater impact to community economic source (loss or degradation in income)</td>
<td>H2, H3</td>
</tr>
<tr>
<td>4 Climate Policy at regional and local municipalities</td>
<td>Level of current commitment</td>
<td>Ability or desire to fund climate resiliency to garner public support and adequately identify financial tools to fund resiliency efforts</td>
<td>H2, H4, H5</td>
</tr>
<tr>
<td>5 Community future development and infrastructure plans (type government)</td>
<td>External to climate change resiliency efforts: (zoned planned construction, i.e.</td>
<td>Secure public commitment</td>
<td>H2, H4, H5</td>
</tr>
</tbody>
</table>
Appendix B
Interview Questions

Participants for the Interview process will be limited to senior leadership positions across the three towns: Mayor or Town commissioner or City Manager. The intent is to speak directly to these leaders with the following guided questions:

1. Briefly describe the leadership organization of the Town, please include the selection process that determines the leadership and provide a broad range of responsibilities for each governing position.

2. Describe for me in some detail how the governing process works; how often does leadership meet, interact, make decisions, and integrate with the local populace?

3. From a broad perspective, describe to me how the budget is formulated, developed, and approved in the town. Follow on to this – How do you prioritize financial programs? And is the budget an annual process, or do you also have a long-term budget process that looks out 5, 10, or even 15 years or longer from now?

4. In your opinion, what are the economic resources most important to your town. What industry is the primary source of revenue for inhabitants?

5. How would you best describe the local populace awareness and understanding of climate change impacts; Very much aware, somewhat aware, unaware, or aware but not too interested or worried?

6. How would you best describe the towns leadership awareness and understanding of climate impacts? Is there common understanding and agreement among the town leadership on climate change impacts, or are there separate ideas, goals, or objectives across the government?

7. Are you aware of your state’s climate action plan?

8. Do you feel that your states climate action plan adequately encapsulates smaller towns such as yours? Is the plan helpful? Can it be improved upon?

9. Do you believe your town should understand the impacts of climate change?

10. Should your town understand how to increase climate change resiliency through assessing risk and then formulating adaptation and mitigation plans? If not, then why? If so, tell me how this town might go about starting the process? What concerns do you have regarding these actions?

11. Lastly, do you have any final thought on the topic of small towns and the impacts of climate change?

12. I have one final request; I would like to send out a small questionnaire to your towns governing membership. Their input will be anonymous, and the findings extracted from the questionnaires will be broadly discussed in the final research paper. Would you be willing to provide me with how to contact them, such as official government email accounts or phone numbers?

13. Thank you for everything!
Appendix C
Geographical Depiction on Map
Appendix D
Urban Cluster Town / City - Comparative data

<table>
<thead>
<tr>
<th>Geography</th>
<th>North Elba Town, New York</th>
<th>Hartford Town, Vermont</th>
<th>National Medium Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area in Square Miles</td>
<td>151.65</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Population in Square Miles</td>
<td>59.1</td>
<td>221.2</td>
<td>87.4</td>
</tr>
</tbody>
</table>

| People (Population) | | | |
|---------------------|---------------------------|------------------------|
| Populations Estimates (July 2019) | 8066 | 9556 | |
| Population Percent change (2010) | 9.9% | -3.9% | 6.3% |
| White Alone | 82% | 92.6% | 76.3% |
| Black, African American | 11.7% | 1% | 13.4% |
| Hispanic or Latino | 8.6% | 2.4% | 18.5% |

| People (Housing) | | | |
|------------------|---------------------------|------------------------|
| Households 2015-2019 | 2629 | 4643 | |
| Owner occupied housing unit rate | 57.4% | 70.6% | 64.0% |
| Median Value: Owner occupied 2015-2019 | $182,200 | $238,000 | $217,000 |
| Median monthly cost w/mortgage | $1504 | $1663 | $1595 |
| Median monthly cost w/o mortgage | $561 | $797 | |
| Medium Gross Rent 2015-2019 | $968 | $994 | $1062 |

| People (Education) | | | |
|--------------------|---------------------------|------------------------|
| High school Grad or Higher: 25 years+ 2015-2019 | 90.4% | 95.1% | 88.0% |
| Bachelor’s degree or higher: 25 years+ 2015-2019 | 31.4% | 48% | 32.1% |

| People (Health) | | | |
|-----------------|---------------------------|------------------------|
| Persons with a Disability under age 65 2015-2019 | 4.9% | 12% | 8.6% |
| Persons without health insurance; Under 65 2015-2019 | 5.3% | 7.8% | 9.5% |

| People (Economy / Income/ Poverty) | | | |
|------------------------------------|---------------------------|------------------------|
| In Civilian work force, total, 16+ 2015-2019 | 48.3% | 64.5% | 63.0% |
| Total Retail Sales per-capita | $6365 | $21271 | $13443 |
| Medium household income (2019 dollars) 2015-2019 | $59544 | $64493 | $62843 |
| Per-capita income (2019 dollars) 2015-2019 | $27095 | $41472 | $34103 |
| Persons in Poverty (in percent) | 13.0% | 6.0% | 10.5% |

| Businesses | | | |
|------------|---------------------------|------------------------|
| Total number of firms (2012 data) | 289 | 1181 | |
| Men owned firms | 124 | 601 | |
| Women owned firms | 141 | 365 | |
| Minority owned firms | 27 | 28 | |

| Budget | | | |
|--------|---------------------------|------------------------|
| **Total 2021 Annual Allocated and approved Budget ($) | ***$12,872,096 | $14,853,369 |


** Budget data pulled for certified board approved budgets for all two Urban Cluster communities. Budgets are long, detailed, and prepared from a position of exceptions, tax laws, and revenue in the form of city services and grants from state and federal organizations. Budgets can be difficult to read and understand.

*** The Town of North Elba resides over the Village of Lake Placid. Unlike Hartford, North Elba and Lake Placid have separate budgets, that are integrated across various services and in areas specific to Town and Village boundaries. The dollar figure listed is a combination of budgets.

North Elba Budget (Town of North Elba, New York, 2020) and (Village of Lake Placid, 2020)
Hartford Budget (Town of Hartford, Vermont, 2020c)
Appendix E

North Elba, New York

- Ecosystem / lakes / rivers
- Economy / Business /work force
- Infrastructure: Residential, sewer, roads, green standards

Actions in RED are either not started or completed

Register New York States Climate Smart Community program
- Complete (2) priority under CSC; mandate certification and conduct initial assessment
- Develop Climate Action Plans – adaptation and resiliency
- Hire full-time program director

Climate Change Drivers
- temperature change;
- heavy/increased precipitation;
- extreme weather events; and sea rise.

- Shorter periods for winter activity
- Heavy erosion along trial systems and increased run off into tributaries and lakes
- Increased stress on sewer systems
- Increase wilderness emergency response due to heat

1. Identify Critical Sectors

2. Assess Vulnerability to Climate Change

Monitor / Review / Revise

3. Identify Management Options

4. Implement Management Options

- Increase affordable housing
- Replace aging infrastructure
- Increase visibility on State and Federal climate action laws, policies, and plans
Appendix F

Hartford, Vermont

- Ecosystem / lakes / rivers
- Infrastructure: Residential, sewer, roads, green standards

Actions in RED are either not started or completed

- Maintain committee leadership across climate change adaptation and resiliency committees.
- Must Complete, through third party assessment, climate change adaptation plan

Climate Change Drivers
- temperature change;
- heavy/increased precipitation;
- extreme weather events; and sea rise.

- Heavy erosion during periods of heavy precipitation
- Increased heavy flooding events
- Increased stress on sewer systems
- Increased heat is aligned with increased hospitalization of the elderly

1. Identify Critical Sectors
2. Assess Vulnerability to Climate Change
3. Identify Management Options
4. Implement Management Options

Monitor / Review / Revise

- Replace aging infrastructure
- Develop long-term water retention and storage to manage heavy precipitation to mitigate flooding occurrences