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# Rising Waters: Local Implications and Actions

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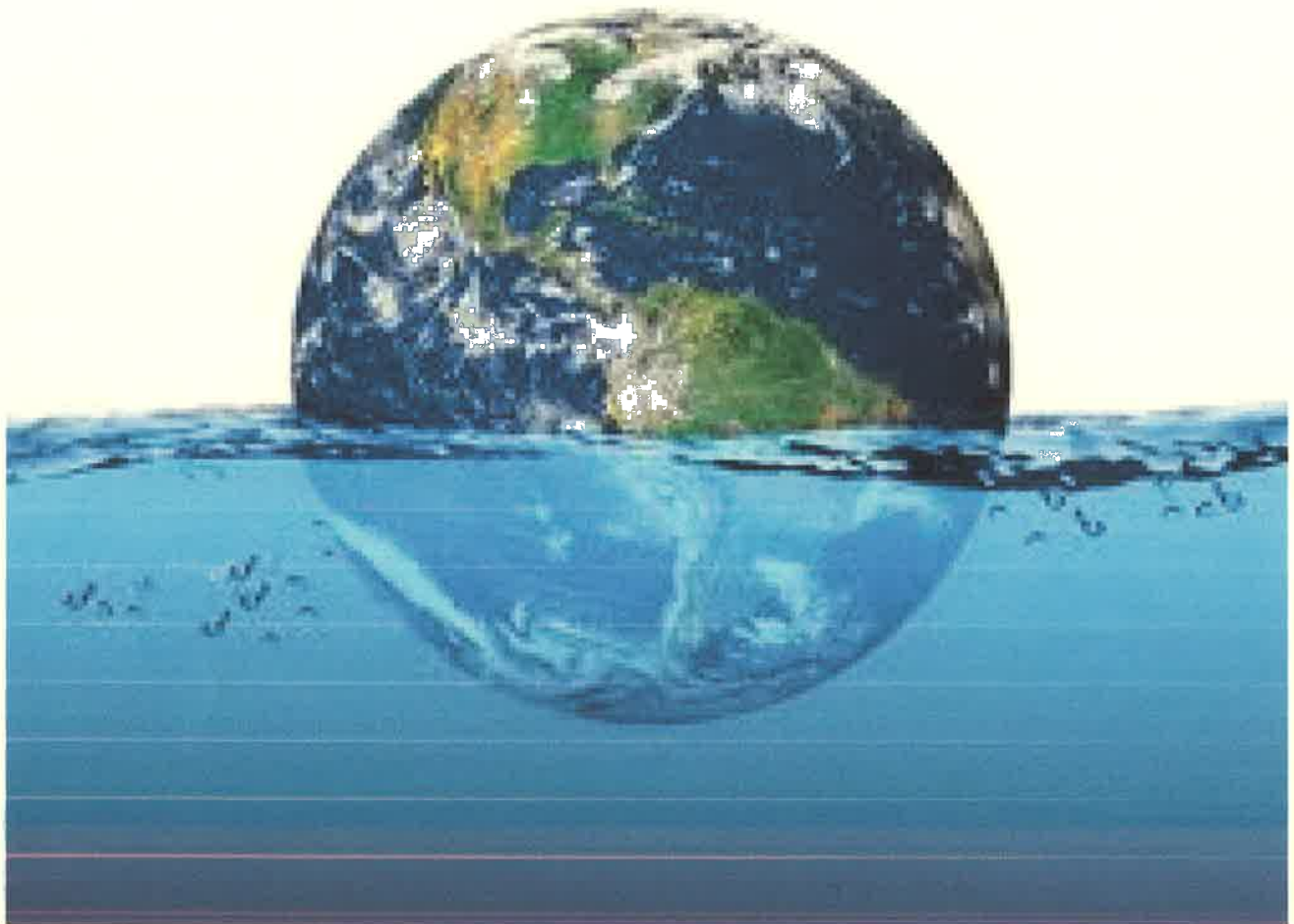
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# **Rising Waters: Local Implications and Actions**



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Undergraduate Research

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Rising Waters: Local Implications and Actions

“Rising Waters: Local Implications and Actions” is a research project investigating the threat of rising waters in the lower New York region and the plans in motion to protect the coastline communities of Westchester County and New York City. As climate change increases the melting of glaciers and produces higher intensity storms, and therefore becomes a more serious threat to our planet, we felt it was important to look at one of the most severe issues facing the coast of New York. According to Mark Lowry, Climate Policy Analyst for the NY State Department of Conservation, more powerful storms are generated by climate change influencing warmer water, which causes the oceans to take up more space and as a result increases the percentage of water vapor in the atmosphere. Given this information, it is important that the dangers associated with rising waters and what is being done, or should be done, is well known. During the course of our project, we have not only conducted extensive research on preparations being made to defend the coast, but we have also successfully reached out to many municipalities in the lower New York region in hopes of determining any and all plans being proposed to help protect against rising waters. The goal of our research was to determine how 16 Westchester County municipalities that have part of their shoreline on either the Hudson River, or Long Island Sound are addressing the impact of rising waters

resulting from climate change. In addition, we have researched numerous plans that NY City has with regard to its various shorelines.

Climate change and rising sea level may be one of the most severe environmental issues our planet faces in the near future. Therefore, it is important that we acknowledge the threat it poses to our local communities and prepare for what's ahead. According to the Department of Environmental Conservation, "Conservative projections expect the seas will rise by 7 to 23 inches by 2100". These projections may not appear significant, however they are and pose a great threat. When considering New York City, which lies at sea level, 23 inches can cause severe problems. In addition these projections do not account for "rapid melt of land-based ice" and when taking this into account, studies project a rise in sea level by three or more feet.

This is a very serious concern for the Coastline of NY City and Westchester County given the area's economic importance and high population. It is crucial that strict and well thought-out measures be taken. The impacts of rising waters are likely to produce increased flooding and storm damage, beach erosion, risk of sewage and septic system flooding, and low lying areas may experience saltwater infiltration in surface waters and aquifers. For an intensely populated area with most of its utility infrastructure underground, there should be a strong cause for concern.

For our research focused on Westchester County, we decided it would be most beneficial to reach out to coastline municipalities directly and see what their plans are, if they have any, and also if collaborations were formed between the

individual municipalities. In Westchester County, there were sixteen coastline municipalities that we reached out to. Although we found it difficult to obtain responses back in a timely manner from all sixteen of these municipalities, we did receive ten helpful replies. Of the sixteen towns involved, five did not respond to our survey. Of the remaining eleven, one town was not directly affected and two others, Hastings-on-Hudson and Tarrytown did not have any proactive plans prepared to take action against the threat of rising waters. Hastings claimed to incorporate an assumption of sea level rise into their long-range planning for development of the waterfront and Tarrytown was simply a member of the Historic Hudson River Towns board, which has made minimal efforts to develop such plans.

The remaining eight included Briarcliff Manor, Cortlandt, Croton-on-Hudson, New Rochelle, Ossining, Sleepy Hollow, Rye and Yonkers. Briarcliff Manor and Cortlandt both have plans to place rip-rap/boulders along the affected shorelines of their communities to prevent wave erosion. Cortlandt however incorporates an ongoing shoreline protection program and is also involved with the Westchester County Flood Reconnaissance program. Croton-on-Hudson along with New Rochelle both have plans to design and build bulkheads, while New Rochelle is also designing seawalls, docks and sun deck rebuilds. New Rochelle is additionally working with FEMA stabilization and emergency programs along with other neighboring communities on storm water management and flood mitigation measures. Croton-on-Hudson is planning to plant areas with greenery such as resilient grasses that can withstand brackish or salty water during flooding. Moving structures to a higher elevation is also in the works for the town of Croton-on-Hudson. In addition to

Croton, the City of Yonkers has implemented a Green Building Policy for new construction and renovation of city-owned buildings, prohibiting them from being built in areas with an elevation at or below the 100-year floodplain. As for Sleepy Hollow, plans have been implemented for two new development sites on the Hudson River, where both projects will be built above the newly proposed guidelines for a 100-year flood as well. The Town of Ossining currently has a flood law and various zoning regulations for riverfront setbacks. In addition, Ossining is a participant in the Westchester County Hazard Mitigation Plan. Lastly, the Town of Rye has no other plans in place except to help hold back waters and reduce flooding of the Blind Brook stream that flows into the Long Island Sound.

Given the amount of feedback we have received from Westchester municipalities, we have provided a brief overview of what each municipality is planning. A complete reference to the responses we have received from this research is in Appendix A. In addition to Westchester County, we conducted research regarding the tactics being exercised by NY City. While researching the plans for NY City when waters begin to rise, Professor Angelo Spillo and I discovered a \$19.5 billion multi-decade plan that was proposed by former Mayor Bloomberg. The nearly \$20 billion plan was proposed to defend New York City against rising seas and severe storms. According to Bloomberg, storm tides may be carried on a sea that is two feet higher than today within the next 30-40 years and therefore high tides will engulf the waterfront on a regular basis. Included in this massive plan are new floodwalls and storm barriers to allow for upgrades in telecommunication and power infrastructures. Additionally, the plan recommends

that beaches are built up and the use of natural buffers such as sand dunes and plantings are permitted. One of the most important aspects of the plan includes ways to protect the subway, transit, sewer, water, healthcare, energy, and food distribution systems into the far future. Currently, the plan is still in action, however it is in the hands of newly elected Mayor, Bill de Blasio. We do not anticipate that the plan will be abandoned; yet we do not know the eventual path it will take.

In addition to Bloomberg's plan, there are several other projects underway that address the issue of rising waters. Resilient Neighborhoods is a project where the Department of City Planning works with communities to help them withstand and recover from future storms and climate events. The 2014 Hazard Mitigation Plan identifies and assesses risks from disasters and provides strategies to reduce their impacts. Sustainable Communities Climate Resilience Studies has provided ways to help NYC and other urban waterfront communities improve their resilience to coastal flood risks and promote livable, sustainable neighborhoods. In addition to these three projects, also active are the Flood Resilience Zoning Text Amendment, The NYC Comprehensive Waterfront Plan, The Waterfront Revitalization Program, and the DCP Green Initiatives.

According to our research and feedback from Westchester municipalities, the information we have collected indicates that while many areas along the shoreline are taking action to prepare for rising waters, it is still evident that many areas have not taken this issue into serious consideration. Because we lack information from the non-responsive Westchester municipalities, it is difficult to make a clear



judgment on whether they are preparing well or not. A few communities admitted to not having any plans underway, and most of the communities that did have plans were still in the proposal stage. Nonetheless, we were actually quite pleased to hear the efforts that are being made throughout the lower New York region. Many of the Westchester Municipalities and New York City are very serious about this issue and are doing all they can within their budgets to protect the various coastlines. For NY City in particular, rising waters is a very serious concern especially if it is going to affect the City and its underground infrastructure.

The outcome of our research has been extremely rewarding. We were able to obtain a successful list of plans being pursued in the coastal New York region from online research and direct sources. This has enabled us to put together a report that we can now share with everyone we have reached out to. In addition to asking Westchester municipalities what their plans are in our survey, we also asked if they would be interested in receiving a report addressing the various plans taking place over the whole region and every respondent was interested. Our plan to spread the information we have gathered is important because coastline communities that will be affected by rising waters must know what their neighboring communities are doing. As a result, communities will begin to collaborate and create stronger protection plans and communities that have no plans will be encouraged to follow the same route as their neighbors.

Throughout this research, I have learned more than I could have hoped for. Working with Professor Spillo was an extremely experience as we both communicate and visualize our ideas in a very similar manner. We both understand

the importance of the environment and what it provides. This is why we were so eager to begin this research project. We were both determined from beginning to end to take on research that would help address a serious issue. Rising waters is a serious threat to the lower New York coastline and it is important that people are aware of that and are taking precautions against it. Our ultimate goal is to help encourage coastline communities to take this issue seriously by providing them with information on what other municipalities are taking part in. Given our efforts and the feedback we have received, I have learned that accomplishing the goal of a research project is entirely possible, however making a true difference requires the sharing of that research.

Not only did I learn about the severity of our research topic to the highest extent, but also I was able to have an experience that I can take with me even after I graduate from Pace University. Being a part of this undergraduate research has taught me more than any regular class could have. Working on my own time on something so important was a task I enjoyed and it is also something I perceive will help me in the future. I plan to begin a career in something I enjoy and participating in this research has given me a taste of what real world tasks and accomplishments entail. Lastly, I couldn't have asked for a better mentor. Accomplishing success is so much more than just hard work and dedication, but is also the collaborative ideas of all parties involved in the task at hand. We accomplished this as a team.

Appendix A.

**RESPONSE TABLE FOR "RISING WATERS" SURVEYS As of April 24, 2014**

<b>Municipality</b>	<b>Contact Person Title/Name</b>	<b>Results/Defense</b>
<b>Briarcliff Manor</b>	Mayor- William J. Vescio	<ul style="list-style-type: none"> <li>Placing Riprap along the northern shore to stop erosion from wave action.</li> </ul>
<b>Buchanan</b>	Mayor- Sean Murray	No Response
<b>Cortlandt (Verplanck)</b>	Town Supervisor-Linda Puglisi	<ul style="list-style-type: none"> <li>Involvement with Westchester County Flood Reconnaissance program.</li> <li>Ongoing shoreline protection program</li> <li>Requesting proposals from Contractors to provide, place and spread medium to large rip rap/boulders along sections of the shoreline.</li> </ul>
<b>Croton on Hudson</b>	Mayor: Leo Wiegman	<ul style="list-style-type: none"> <li>Developing options to move public works garage to higher ground.</li> <li>For other locations such as our waterfront parks, boat launches and beaches, we are adopting a "STAY" approach with an eye toward plantings and structures that can withstand the occasional flooding by brackish water (i.e. grasses that can withstand brackish water).</li> <li>"Storm hardening" is the adaptation strategy for our built infrastructure. We are entirely rebuilding the bulkhead this year that secures the shoreline for the parcel we lease to the Croton Yacht Club. The new bulkhead is taller and thicker than the old one by some measure.</li> </ul>
<b>Dobbs Ferry</b>	Mayor: Hartley Connett	No Response
<b>Harrison</b>	Mayor- Ron Belmont	Not Relevant
<b>Hastings</b>	Mayor: Peter Swiderski	<ul style="list-style-type: none"> <li>Incorporating an assumption of sea level rise of 2-3 feet into our long-range planning for development of our waterfront.</li> </ul>
<b>Irvington</b>	Mayor: Brian Smith	No Response

<p><b>New Rochelle</b></p>	<p>Mayor: Noam Bramson</p>	<ul style="list-style-type: none"> <li>• Working with structural engineering firm to design FEMA approved sea walls, bulkheads, docks and sun deck re-builds that will sustain future extreme tidal shifts and storm surges</li> <li>• Phase One FEMA stabilization and emergency repair projects have been completed. Phase Two approved project re-build will commence post summer season around November 2013.</li> <li>• Working with neighboring communities on storm water management and flood mitigation measures.</li> <li>• All newly designed athletic fields have a specialized storm detention drainage systems reducing downstream flooding and our marina has nationally recognized clean water designation for operational sustainability.</li> </ul>
<p><b>Ossining</b></p>	<p>Mayor: William R. Hanauer</p>	<ul style="list-style-type: none"> <li>• Participating in the Westchester County Hazard Mitigation Plan (other municipalities are involved with as well).</li> <li>• Have a flood law and some zoning regulations for Riverfront setbacks.</li> <li>• Plans will be implemented with next couple years.</li> </ul>
<p><b>Peekskill</b></p>	<p>Mayor-Mary Foster</p>	<p>No Response</p>
<p><b>Port Chester</b></p>	<p>Constance Phillips – Secretary Planning Commission</p>	<p>No Response</p>

<p><b>Sleepy Hollow</b></p>	<p>Mayor: Kenneth G. Wray</p>	<ul style="list-style-type: none"> <li>• Incorporated these concerns into the planning and approval process for two new development projects at two sites on the Hudson River</li> <li>• Both projects will be built at levels above the newly proposed guidelines for a 100 year flood</li> <li>• One project – redevelopment of the former Castle Oil terminal into a residential building – is already underway. We recently approved an amendment to the Special Permit allowing the developer to go higher (while actually reducing the total height of the building itself) by raising the ground level by a few feet.</li> <li>• The other development – turning the 99 acres of the former GM factory site into mixed use residential – was approved with a base level that puts it above the new flood level.</li> <li>• No plans to work with other municipalities</li> <li>• Castle Oil site is already underway. Development of the GM site awaits final settlement of litigation brought by our neighboring village of Tarrytown.</li> </ul>
<p><b>Rye</b></p>	<p>Bill Lawyer and Carol Cunningham</p>	<ul style="list-style-type: none"> <li>• Actions to reduce flooding of the stream (Blind Brook) that runs through Rye on its way to LIS. Sluice gates have recently been installed upstream in Rye Brook to help hold back waters and reduce flooding downstream</li> <li>• Dealing with applications to replace and elevate seawalls since "Sandy".</li> </ul>
<p><b>Tarrytown</b></p>	<p>Mayor: Drew Fixell</p>	<ul style="list-style-type: none"> <li>• We are part of HHRT (Historic Hudson River Towns), which has begun to participate in efforts to develop such plans, but the efforts are very nascent</li> </ul>
<p><b>Yonkers</b></p>	<p>Mayor: Mike Spano</p>	<ul style="list-style-type: none"> <li>• Has implemented a Green Building Policy for the new construction and major renovation of city-owned buildings that prohibits locating buildings, built structures, roads, or other parking areas on portions of sites with elevation at or below the 100 year floodplain. Certain private developments are required to submit a green development checklist that to indicate the same.</li> <li>• Working with the Mid-Hudson Regional Sustainability Plan.</li> <li>• Plans will be implemented within the next few years depending on state funding.</li> </ul>