



December 28, 2015

Submitted via email to [climatechange@dec.ny.gov](mailto:climatechange@dec.ny.gov)

Mark Lowery  
New York State Department of Environmental Conservation  
Office of Climate Change  
625 Broadway  
Albany, NY 12233-1030

Re: NRDC Comments on Proposed Part 490 of the Community Risk and Resiliency Act

Dear Mr. Lowery:

The Natural Resources Defense Council (NRDC) submits to the New York State Department of Environmental Conservation (NYSDEC) our comments concerning proposed regulation, 6 NYCRR Part 490 – Projected Sea Level Rise. NRDC is an international environmental advocacy organization, which on behalf of our more than 2.3 million members and online activists uses law and science to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things.

NRDC applauds the State's commitment to enacting science-based sea level rise projections for planning and design purposes to mitigate the effects of climate change.<sup>1</sup> Sea level rise will have profound negative economic and social implications in New York, unless actions are taken to lessen its effects. As described in the *New York State Sea Level Rise Task Force Report to the Legislature*, sea level rise and coastal flooding from storm surge are already

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<sup>1</sup> Community Risk and Resiliency Act, 2013 New York Assembly Bill No. A6558B, New York Two Hundred Thirty-Seventh Legislative Session (Attach. A06558 Memo).

affecting and will increasingly affect New York's entire coastline.<sup>2</sup> Thus, we support adoption of the proposed range of sea level rise projections, which includes a projection of roughly 6 feet by 2100.

Adaptation and sustainable planning are needed to minimize the impacts of climate change, including sea level rise. As the State's climate preparedness planning efforts move forward, providing clear guidance on how state agencies must address likely sea level rise in their financing and permitting decisions is crucial. The Community Risk and Resiliency Act was enacted to encourage advanced planning for the effects of climate change.<sup>3</sup> Thus, once the proposed sea level rise projections are adopted, the actions and responsibilities specific state agencies will take to address climate risks must be clearly articulated.

## **I. Two to Six Feet of Sea Level Rise Will Occur By 2100 and the State Must Plan Accordingly.**

### *Future Global Sea Level Rise*

Anthropogenic emissions of carbon are the primary driver of climate change and result in sea levels rising over time.<sup>4</sup> Due to the long atmospheric half-life for carbon to persist in the atmosphere, the climate will continue to change over the of course many centuries.<sup>5</sup> However, the extent to which the climate will change depends on the amount of global carbon emissions already released into the

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<sup>2</sup> New York State Sea Level Task Force, Report to Legislature 5 (2010).

<sup>3</sup> 2013 New York Assembly Bill No. A6558B, (Attach. A06558 Memo).

<sup>4</sup> U.S. Global Change Research Program, Climate Change Impacts in the United State: The Third National Climate Assessment 21-22 (Jerry Melillo, Terese Richmond, & Gary Yohe eds., 2014).

<sup>5</sup> See Benjamin H. Strauss, Scott Kulp, & Anders Levermann, Carbon Choices Determine US Cities Committed to Futures Below Sea Level, 112.44 PNAS 13508 (2015) (explaining how carbon emissions may persist in the atmosphere for several centuries).

atmosphere and those yet to be emitted in the future. To maintain a chance of limiting warming to 3.6°F above the planet’s pre-industrial levels — the maximum amount of warming recently agreed to in the United Nation’s COP21 meeting in Paris — total cumulative carbon emissions must be limited to 1 trillion tons.<sup>6</sup> According to the Intergovernmental Panel on Climate Change (IPCC), society has already emitted more than half of its carbon budget.<sup>7</sup> A large-scale global effort to reduce carbon emissions must be achieved if the target is to be met. Otherwise, 7.2°Fahrenheit, roughly the warming predicted if no action is taken to curb emissions, will occur.<sup>8</sup>

In the United States, average temperatures have increased by roughly 1.6°F over the last 100 years, with the most recent decade the warmest on record.<sup>9</sup> Sea level rise is directly correlated to this increase in global temperature. Our oceans are absorbing over 90 percent of the increased atmospheric heat associated with carbon emissions from human activity.<sup>10</sup> Thermal expansion, coupled with the melting of land-based ice, is causing sea levels to rise at an increasing rate.

Since 1880, global sea level rose roughly eight inches,<sup>11</sup> and the rate at which it is occurring has nearly doubled.<sup>12</sup> From 1993 to 2008, global rate of sea level rise was more than two-thirds higher than the twentieth century average.<sup>13</sup>

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<sup>6</sup> Myles R. Allen et al., Warming Caused by Cumulative Carbon Emissions Towards the Trillionth Tonne, 428 *Nature* 1163: 1164 (2009)

<sup>7</sup> See Radley Horton et al., *Climate Change in New York State: Updating the 2011 ClimAid Climate Risk Information 2* (2014) (reporting on the findings of IPCC 5<sup>th</sup> Assessment).

<sup>8</sup> See Benjamin H. Strauss, Scott Kulp, & Anders Levermann, *Mapping Choices: Carbon, Climate, and Rising Seas - Our Global Legacy 1* (2015).

<sup>9</sup> U.S. Global Change Research Program, supra 4, at 19.

<sup>10</sup> Id.

<sup>11</sup> Erika Spanger-Siegfried, Melanie Fitzpatrick. And Kristina Dahl, Encroaching Tides: How Sea Level Rise and Tidal Flooding Threaten U.S. East and Gulf Coast Communities over the Next 30 Years 1 (2014).

<sup>12</sup> Id.

<sup>13</sup> Id.

Within the next century the rate of rise is projected to increase exponentially. By 2100, sea levels may increase between two to six feet, depending on which carbon emissions scenario ultimately occurs.<sup>14</sup> Six feet of sea-level rise would inundate the homes of 5 million people in the United States alone.<sup>15</sup>

Unfortunately, sea level rise will continue to occur beyond 2100. Human generated carbon-emissions have essentially locked-in long-term sea level rise for several centuries due to the slow-response of Earth system's and the instability of the West Antarctic Ice Sheet, which has already begun to melt.<sup>16</sup> If carbon emissions continue unabated until the year 2100, it would commit to an eventual global sea level rise of fourteen feet or higher in the coming centuries.<sup>17</sup>

#### *Sea Live Rise in New York*

Sea level rise will have serious consequences for New York. Due to the State's low-lying coastal areas and the fact that sea level rise will actually be higher in the Northeast than in comparison to the global average,<sup>18</sup> sea level rise will increasingly affect New York's entire coastline. More than 60 percent of New Yorkers, 11.85 million people, live in homes on or near the coast,<sup>19</sup> which means sea level rise will be particularly damaging.

Since 1895, sea level at the Battery in New York City has risen by more than 17 inches.<sup>20</sup> Rates of sea level rise along New York's shores have averaged 1.2 inches per decade over the past century.<sup>21</sup> The regional sea level has risen more rapidly in the past roughly 100 years than during the last 1,000 years due to

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<sup>14</sup> Surging Seas, Climate Central, <http://sealevel.climatecentral.org/> (last visited Dec. 15, 2015).

<sup>15</sup> Id.

<sup>16</sup> Benjamin H. Strauss, supra 5, at 13508 - 509.

<sup>17</sup> Id.

<sup>18</sup> New York State Sea Level Task Force, supra 2, at 9, 12.

<sup>19</sup> Id. at 12

<sup>20</sup> Erika Spanger-Siegfried, supra 11, at 11.

<sup>21</sup> Radley Horton, supra 7, at 2.

increasing global temperatures.<sup>22</sup> A trend that will continue even if warming is limited to 3.6°F (2°C).

The implications of rising sea levels for New York City are illustrative of the impacts faced by the broader region. As previously mentioned, the average global temperature is likely to increase 7.2°F by 2100. If such an event occurs, New York City can expect 7.9 feet of sea level rise by the end of the century.<sup>23</sup> At that rate, the homes of roughly 23 percent of the current population, 2.99 million people, would be below median sea-level.<sup>24</sup> Under a 3.6°F warming scenario, New York City will still be impacted by 4.6 feet of sea level rise by 2100 and 13 percent of the current population, 1.69 million people, would be below the median sea level.<sup>25</sup>

Additionally, sea level will exacerbate the problem of tidal flooding in New York as high tides will be able to reach farther inland. According the Union of Concerned Scientists, long-term trends show that tidal flooding in the United States went from occurring every one to five years in the 1950s to occurring once every three months by 2012.<sup>26</sup> This trend is accelerating, and by 2045, numerous communities along the East and Gulf Coasts may see tidal flooding occurring many times a year. For Kings and Bergen Points, tidal flooding events will likely occur over 130 times a year by 2045.<sup>27</sup>

As climate change increases the number of intense rain events, “the intensity, frequency, and duration” of coastal flooding will be compounded.<sup>28</sup> According to Climate Central, the likelihood of 100-year floods occurring annually by 2030

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<sup>22</sup> New York State Sea Level Task Force, *supra* 2, at 17.

<sup>23</sup> Benjamin H. Strauss, *supra* 8, at 36.

<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> Erika Spanger-Siegfried, *supra* 11, at 53

<sup>27</sup> *Id.*

<sup>28</sup> Radley Horton, *supra* 7, at 14.

may double over widespread areas of the United States. For New York, storm events smaller than Hurricane Sandy will be capable of inflicting a similar impact because storm surge will be able to travel farther inland, expanding the geographic extent of vulnerable areas and the damage inflicted.<sup>29</sup> This threat will only grow as sea levels continue to rise.

## **II. Communities Must Account for Sea Level Rise in the Planning and Design Process.**

Proactive planning is needed to minimize the impacts of sea level rise. The resiliency of local communities must be strengthened by safeguarding the public infrastructure - such as the bridges, roads, and wastewater treatment plants - on which they depend. Accounting for sea level rise in the planning and design process can help reduce future infrastructure loss.

Successful adaptation requires a holistic approach that goes well beyond the typical ad hoc approach of shoreline fortification to lessen the impacts of sea level rise. In many instances, armoring of coastal areas can actually exacerbate shoreline retreat, degrade coastal ecosystems, and disrupt sediment transport.<sup>30</sup> This will be especially true in the face of rising seas; protection of communities using only hard infrastructure would require extensive armoring along the entire coast that avoids directing the increased water level to other areas.<sup>31</sup>

In the alternative, coastal communities must consider approaches that accommodate sea level rise and the increased risk of tidal flooding, including elevating structures, using natural and green infrastructure, and non-structural

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<sup>29</sup> New York State Sea Level Task, supra 2, at 19.

<sup>30</sup> See generally Orrin H. Pilkey and Andrew G. Cooper, The Last Beach 1 (2014) (describing the negative consequences of shoreline fortification).

<sup>31</sup> Erika Spanger-Siegfried, supra 10, at 42.

approaches like stricter land-use regulations.<sup>32</sup> Natural infrastructure approaches, such as restoration of coastal wetlands, oyster reefs, and dunes, provide flood protection and environmental and economic co-benefits. These approaches serve to stabilize shorelines by reducing erosion and absorbing storm surge and floodwaters. Additionally, they provide ecosystem services, such as habitat for fish and other aquatic species, filtering of pollution, and preservation of public access to the shoreline. Further, they serve to “maintain connections between land and water ecosystems to enhance resilience.”<sup>33</sup>

However, in some particularly vulnerable areas, it may be more appropriate to relocate structures as sea levels rise. For economic and geographic reasons (i.e., the land will be inundated), relocation may be the only option to ensure publically funded or permitted infrastructure are no longer in harm’s way. This is especially true of critical infrastructure, such as wastewater and hazardous waste treatment facilities. As such, siting decisions should consider where the shoreline will be located over the lifetime of the structure and the implications of coastal flooding. Limiting development in the highest risk areas and adopting policies that promote relocation should be considered.<sup>34</sup>

### **III. New York Must Adopt the proposed sea level rise projections, which predict up to 6 feet of sea level rise by the end of the century.**

*Six feet of rise must accounted for in SLR projections*

NRDC recommends implementing the proposed projections of sea level rise as currently outlined in section 490.4(a)-(c) of the Community Risk and Resiliency

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<sup>32</sup> Id.

<sup>33</sup> NOAA Office for Coastal Management, Natural and Structural Measures for Shoreline Stabilization 2 (2015).

<sup>34</sup> Carolyn Kousky, Managing Shoreline Retreat: A US Perspective, 124 *Climatic Change* 9 (2014).

Act. As noted above, 6 feet or more of sea level rise by 2100 is within the likely range of possibilities for New York given the current trajectory for global carbon emissions. The precautionary principle is often employed in environmental decision-making when analyzing highly-complex systems that are characterized by a substantial degree of uncertainty.<sup>35</sup> In the context of sea level rise, we know the oceans will rise but the rate will be affected by current and future emissions. Despite the recent success of the Paris Climate talks, actual attainment of the 3.6°F target is not guaranteed. As such, any range of projections for sea level rise by 2100 must include close to 72 inches of rise under the high projection scenario. Adopting such a projection is prudent given the potential economic and social ramifications from assuming a lower level of sea level rise.

Thus, NRDC supports basing the State's proposed sea level rise projections on the conclusions of the 2014 and 2011 ClimAid Reports, which provide the most accurate estimates of future sea level rise for the New York region. According to the 2014 ClimAid report, sea level is projected to rise along the New York State coastline and in the tidal Hudson River by roughly 72 inches under the High Estimate or 90<sup>th</sup> Percentile projection. The proposed 90<sup>th</sup> percentile projections should be utilized by the state agencies, and applicants for relevant permits and approvals in the context of programs specified in the Community Risk and Resiliency Act for critical infrastructure planning purposes.

Therefore, we oppose the proposed alternatives, which include basing the projections in Part 490 on scientific reports other than the ClimAid report, as the alternative reports mentioned in the Regulatory Impact Statement fail to account for 6 feet of sea level rise. For example, the New York State Resilience Institute for Storms and Emergencies report, *Sea-Level Rise in New York in the 21<sup>st</sup> Century: Projection and Methodology*, is not an acceptable alternative to the

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<sup>35</sup> David Kriebel, The Precautionary Principle in Environmental Science, 109(9) Env't. Health Perspectives 871 (2001).



ClimAid studies.<sup>36</sup> The report not only fails to account for the tidal Hudson's rate of sea level rise, but also underestimates New York's upper bound of the sea level rise by 2100 by over 30 inches.<sup>37</sup> Failing to account for 6 feet of sea level rise would be a grave oversight in the adaptation and sustainable planning for the effects of climate change required of state agencies.

While we commend NYSDEC for proposing sea level rise projections that account for 6 feet of sea level rise, we recommend the definitions of the projections (i.e. low, low-medium, medium, etc.) be simplified. The definitions should more clearly articulate the likelihood of that rate of sea level rise occurring. A clearer description of the likelihood of a certain projection occurring will better assist agencies and applicants to account for the effects of climate change in their design and planning processes.

*Need for clear guidance post-adoption of the SLR projections*

Establishing a uniform set of sea level rise estimates that err on the side of caution is an important first step for addressing the effects of climate change and sea level rise. As described in the Community Risk and Resiliency Act, certain agencies and applicants to New York State programs are required to demonstrate that they have accounted for future physical climate risks caused by storm surges, sea-level rise or flooding. (Please see the Appendix for a list of programs and policies for which the impacts of sea level rise must be considered as required by the Community Risk and Resiliency Act). Hence, NYSDEC must develop guidance on how to best integrate sea level rise risks into planning, permitting, siting, and design processes for projects and activities occurring along the coast and the tidal Hudson Estuary. By doing so, New York can ensure

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<sup>36</sup> Minghua Zhang, Sea-Level Rise in the 21<sup>st</sup> Century: Projection and Methodology, NYS RISE Technical Report TR-0-15-01, 1 (2014).

<sup>37</sup> Id. at 24.

that public funding is not provided to projects or programs that fail to consider climate change risks like sea level rise – failure to consider such risks has direct negative implications for the long-term success of any project. Additionally, the proposed sea level rise projections must also be integrated into updates to regulations, maps, and other decision-support tools. Incorporating sea level rise into these areas will help to ensure consistency and provide support for state, regional, and local decision-makers.<sup>38</sup>

#### **IV. New York Must Include Consideration of Climate Risks in Permitting and Funding Decisions**

Sea level rise presents serious consequences for the State of New York. As noted in the Community Risk and Resiliency Act memorandum, “it is appropriate and necessary for climate risk to be an eligible component of funding and permitting.”<sup>39</sup> We commend the State for taking steps to mitigate the impacts of climate change by developing sea level rise projections, and we look forward to helping the State develop a comprehensive document that guides State agencies on how best to utilize these projections. Thank you for the opportunity to comment on this matter. If you should have any questions, please do not hesitate to contact me.

Sincerely,



Joel Scata  
Policy Advocate, Water Program

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<sup>38</sup> Radley Horton, *supra* 7, at 10.

<sup>39</sup> 2013 New York Assembly Bill No. A6558B, (Attach. A06558 Memo).

Appendix – Application of Sea Level Rise Projections

Program/Policy	Description	Statutory Information
Smart Growth Public Infrastructure Policy Act	The purpose of the act is to reduce urban sprawl that would be facilitated by State funding of transportation, sewer and waste water treatment, water, education, housing and other publicly supported infrastructure. As implemented by the Community Risk and Resiliency Act, no state infrastructure agency shall approve, undertake, support or finance a public infrastructure project, including providing grants, awards, loans or assistance programs, unless it is consistent with the requirement to mitigate the effects of climate change, including sea level rise and flooding.	ECL Section 6-0197
Water Pollution Control Revolving Funds	The program provides low-interest rate	ECL Section 17-1909

	<p>financing to municipalities to construct water quality protection projects such as sewers and wastewater treatment facilities. A project must demonstrate that design and construction consider climate risks, including from sea level rise, storm surge, and flooding to be eligible for funding.</p>	
<p>Siting Industrial Hazardous Waste Treatment, Storage, and Disposal Facilities</p>	<p>Per ECL section 27-1103, the criteria for siting of hazardous waste facilities must “insure the maximum safety of the public from hazards associated with treatment, storage, and disposal of hazardous wastes.” As such, and as required by the CRRA, sea level rise, storm surge, and flooding must be considered when siting a hazardous waste facility.</p> <p>In this context, hazardous</p>	<p>ECL section 27-1103</p>

	<p>waste facilities should NOT be located in areas that will be susceptible to the impacts of six feet of sea level rise. Hazardous waste facilities are critical infrastructure and thus any guidance developed for how agencies are to implement the requirements of the CRRA must recommend that hazardous waste facilities utilize the 90<sup>th</sup> percentile projection for sea level rise.</p>	
<p>Hazardous Substances Bulk Storage Act</p>	<p>The act applies to all non-exempted hazardous substances storage facilities and requires the promulgation of minimum standards and schedules for design, construction, installation, operation, maintenance, repair, monitoring, testing and inspection of facilities. Per ECL section 40-0113, the</p>	<p>ECL section 40-0113</p>

	schedules shall be based on environmental factors that include sea level rise, storm surge, and flooding projections.	
State Land Acquisition Policy	<p>The purpose of the policy is to provide for the conservation, protection, and preservation of open space, natural, historic and cultural resources and the enhancement of recreational opportunities. As required by statute, the risks associated with sea level rise, storm surge, and flooding must be considered.</p> <p>This program represents a valuable opportunity for climate risk mitigation. Open space is important for flood attenuation, and as sea levels rise, and retreat becomes necessary, the State should consider the</p>	ECL section 49-0203

	benefits of acquiring properties to convert to open space.	
Open Space Land Conservation Projects	The program permits the commissioner of the office of parks, recreation and historic preservation to enter into agreements for the maintenance and operation of open-space land conservation projects, which demonstrate to the commissioner's satisfaction that the future physical climate risk due to sea level rise, storm surges, and flooding, based on available data predicting the likelihood future extreme weather events, are considered.	ECL section 54-0303
Non-hazardous municipal landfill closure projects	The program provides funding to assist in the closing of municipally-owned or operated landfills. As part of the requirements, the municipality must demonstrate that future	ECL section 54-0503

	climate risks, including sea level rise, storm surges, and flooding have been considered.	
Control of bulk storage petroleum, state storage standards	The Department is required to promulgate standards for existing and new petroleum bulk storage facilities which shall include, but not be limited to, design, equipment requirements, construction, installation and maintenance. In proposing such standards, the Department is required to consider climate risks, including sea level rise, storm surges, and flooding,	ECL section 17-1015
Waterfront Revitalization Plans	The program provides state assistance payments to municipalities toward the cost of any local waterfront revitalization program, including planning projects to mitigate future physical climate risks.	ECL section 54-1101



Coastal Rehabilitation Projects	The program provides state assistance payments to a municipality or a not-for-profit corporation toward the cost of any coastal rehabilitation project. The commissioner must consider future climate risks, including sea level rise, storm surges, and flooding when deciding whether to award an assistance payment.	ECL section 54-1105
Mineral Resources Act	Future climate risks due to sea level rise, storm surges, and flooding, must be considered when issuing a permit to drill, deepen, plug back or convert a well for production of oil or gas.	ECL section 23-0305
Major Permits issued under the Uniform Procedure Act	Applicants for major projects for the regulatory programs list under ECL Section 70-0107 must demonstrate that future physical risk due to sea level rise, storm surges, and flooding has been	ECL section 70-0117

	considered.	
Agricultural and Farmland Protection Programs	The programs provide financial and technical assistance for agricultural and farmland protection efforts. In considering funding applications, the commissioner shall consider whether future physical climate risk due to sea level rise, storm surge, and flooding has been considered.	AGM section 325
Drinking Water Revolving Fund	The fund provides financing for drinking water facilities. A priority ranking system exists for providing financial assistance to such projects. The priority ranking system must take into account climate risk, including sea level rise, storm surges and flooding.	PBH Section 1161