A Decrepit New York: Synthesizing New York’s Infrastructure Problems

Connor Farrell

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Synthesizing New York’s Infrastructure Problems

By, Connor Farrell
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Professor John van Buren
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Abstract:

Coastal living has become a very popular, often fantasized, way of life. This lifestyle is easy, relaxing, and, above all, it soothes the stress. However, mankind’s innate desire to live near America’s oceans, rivers, and other bodies of water have allowed its population to become vulnerable to super storms. Super storms, such as Hurricane Sandy, have become more prevalent over recent years, and America needs to take into account the massive population whom call the East coast home. Focusing in on the New York area, I will be able to show how our thoughtless designs and locations of towns/cities have put our country’s population at risk. This risk could, however, be alleviated by thoughtful, caring designs. Using ecology as its base, the New York area could rebuild itself, structuring itself against pending ten-year storms. Some of the issues I will discuss include: ecological design, city planning, super storms, and population patterns.

Approaching this topic, I will talk about three differing views of environmental policy, History, politics/economics, and design. First, I will discuss the history of coastal living and design. Touching on areas such as Long Island and New York City, I will focus on the history of their city planning, the areas’ natural ecology, and the areas’ population history. Second, I will discuss the politics and economics of the area, what is being done to protect this state and how economical and political savvy can help reinterpret the idea of climate change to New York’s population. Finally, I would like to discuss the design, its mandates, and what other cities/areas are doing to prevent destruction from storms such as Hurricane Sandy (I will bring in a case study, and exhibit put on by the MOMA). If there are not many examples, I will use books, and various
ecological design philosophies, to discuss possible solutions to the problem. Thus, I will show the benefits of ecological building on coastal development.
Introduction:

The concept of global climate change is nothing new, but its effects continue to frequently transpire. Affecting the globe’s coastlines, climate change’s progression has not altered most communities’ ideologies and building manner. In fact, building codes have not been updated since the concept of global climate change came to fruition. This is the problem. Today’s infrastructure is designed to withstand what is known as the “Ten-year Storm.” However, this concept has become antiquated—a proper update would be entitled “the-yearly storm.” In this thesis I will utilize this concept, global climate change, and today’s crippling infrastructure, specifically New York’s coastline, to shed light upon today’s improper infrastructure along coastlines.

Residing along the eastern seaboard of North America, New York’s Long Island and New York City sit tall and proud along the Atlantic Ocean and Long Island Sound. Since the Mayflower arrived, communities along this coastline have flourished, thanks to an over abundance of watersheds, rivers, and natural ports throughout New York’s coastline. In the first chapter, I will utilize the interdisciplinary topic of environmental history in order to delineate the historical development of New York’s Coastline. This outline will deliver insights to how the
problem started, why New York’s coastline developed the way it did, and how it has led to the current infrastructure problem.

Leading into section two, this chapter will feature an in depth look into the science behind the history, highlighting New York’s abundant natural features, how its landscape works scientifically, and how New York developed its energy consumptive patterns. Approaching this problem scientifically can also provide a crack into the larger sidewalk that is this problem. Mainly, allowing us to see how certain events, chemically or organically, are affecting New York, its environment and coastline.

Following these scientific highlights, Chapter three will talk in great depth about concepts of Environmental design, and which designs could reimagine New York’s coastline. This concept modernizes the idea of New York’s infrastructure, bringing its design into the 21st century both visually and environmentally. Highlighting the current housing codes gaps, these designs showcase what New York’s infrastructure could look like. Since the city’s inception it has changed with the ‘rising tides.’

The Final environmental interdisciplinary section will highlight, in depth, the concepts of politics and economics. This section will move past the current New York focus and expand to include the tri-state and New England areas. The economics of this region greatly influences New York’s attitudes, and progression. Deciding how to approach the expanding, voluminous population by creating room for it and utilizing the historical discipline will shed even more light on the problem.
These interdisciplinary sections: history, environmental science, environmental designs, and politics and economics highlight the inadequacies of the current infrastructure in New York State. Shedding light on the problem is only the first step, and in the end I will offer a few tidbits that illustrate possible solution to this problem. While each section does offer its own answer, and these answers are innovative, a solution that combines all four of these facets must be realized to change this problem.

Comprehending these four facets and how they magnify New York’s problem is just the beginning. Today’s climate is no longer receiving a large-scale storm, “the ten-year storm” concept, every ten years; instead, the storms are more frequent. We as a population need to understand that to fix this problem we also need to acknowledge the concept of climate change. After recent phenomenon’s Hurricane Irene, Hurricane Sandy, Winter Storm Nemo and the winter of 2014, New York’s infrastructure no longer can rely on its current cracked foundation. It will crumble.
Chapter 1:

Sprouting New York:
A historical synthesis of New York’s Development
A majority of New York State’s land resides sandwiched between Vermont and the two great lakes, Lake Ontario and Lake Erie. Rich in natural gas, New York’s historical presence developed along the shores of the Hudson and St. Lawrence rivers. These rivers developed as major trade routes, cementing New York as a global trade hub for centuries. This allowed New York State access into Canada, Michigan, Vermont, and Pennsylvania. Granting access to a majority of the early colonies marked New York as important, and New York City, then known as New Amsterdam, as highly influential.

New York as a colony flourished, and with it New York City grew, accepting a wide range of people, welcoming millions of immigrants from Europe, Asia, and South America. As New York’s population grew so did its demand for infrastructure. Developed in the early 20th century, the skyscraper dotted New York’s skyline. These engineering marvels permitted New York to smartly utilize its rather limited space. Growing up instead of out, the island of Manhattan became an urban jungle. Instead of forests of native trees, shrubs, and animals, Manhattan become a city of scurrying people, enormous metal towers, concrete slabs, and little to no greenery. However, this development destroyed all of New York’s natural carbon buffers (“New York.com”).

An insight into Manhattan’s past is visible in the project environmentalists and New York City developers know as, “The Mannahatta Project.” Un-covering the original ecology of the island of Manhattan, the Wildlife Conservation Society’s Mannahatta Project previews a once pristine and topographically diverse island. Taking it one step further, WCS decided that the project should encompass all of
New York City -- This is known as the Welikia Project. Together these projects provide a glimpse into New York City's past. The Wildlife Conservation Society learned that the city was biologically diverse, covered in natural landscapes of hills, valleys, forests, fields, freshwater wetlands, springs, ponds, which supported a wide range of wildlife — all before the Europeans arrived in 1609 (“Welikia”).

Unequivocally, Europeans understood the importance of the biologically diverse nature of the island, utilizing it of all its natural resources. Through the years of development, and exchanges of ownership, New York City found its filthy streets in the hands of the English. After the American Revolution, New York City prospered. Rapidly developing, on April 11th, 1811, a legalized act, which endorsed the creation of Manhattan's well-known rectangular street grid, came to fruition. Starting down at 14th Street and rising up towards Harlem, this grid established New York as a commercial city, a hub one might say (“City Life”). According to the New York Times,

“the rigid 90-degree grid that spurred unprecedented development, gave birth to vehicular gridlock and defiant jaywalking, and spawned a new breed of entrepreneurs who would exponentially raise the value of Manhattan’s real estate” (Roberts).

This grid mapped out 11 major avenues and 155 crosstown streets which unprecedentedly transformed New York City’s future as a commercial metropolis. Fostering flat and easily buildable sites, New York City’s grid transformed the hills, rivers, and natural landscapes, which a plethora of species called home, into a relatively flat, constructible, metallic landscape (Roberts).
This modern landscape had one limitation: space. While sizeable, the island of Manhattan is no Hawaii. Answering this problem, Architects ushered in the era of the Skyscraper—a result of the birth of steel and technological advancements. Employing newly developed technology, George A. Fuller, the inventor of the modern skyscraper, solved the problem of the “load bearing capacities” of tall buildings (“New York.com”). This formula helped Fuller develop Manhattan’s first Skyscraper, the Flat Iron building. Located on Broadway and West 23rd, the Flat Iron building foreshadowed New York’s future skyline. Developing along New York City’s shoreline, skyscrapers solved the City’s issue of space, but created another one, the need for power, storage, energy and water (Soll).

Energizing the city, especially one that has developed just as quickly as New York City has, is tricky. Unfortunately, it is rather difficult getting enough energy into the city to support these newly developed skyscrapers; and as these skyscrapers developed, New York City’s population skyrocketed. Supporting such a sizeable population, New York City made use of the recent development of electricity, employing its first use on September 4th, 1882. Experimenting with Edison’s invention paid off, and within in the last few months of 1882 the New York Times building was lit up. This illumination convinced New Yorkers, and within months Edison’s company signed up 203 new customers (“City Life”). However, this causation between the development and the City’s population derailed any or all of the environmental consciousness (“City Life”).

Sustaining an exploding population meant exploiting technological advancements, but finding enough space for housing projects became rather
problematic; and New York City’s demand on its natural resources tripled. Keeping up with this expansion proved to be a daunting task, yet the City proved it was up to assignment. In the mid-1800s New York City heavily relied upon spot wells, which filled various reservoirs located all over the city, but these efforts proved to be futile. As the City’s population exploded, so do its water requirements. Drastically increasing its use of public waters, New York City’s water supply became polluted and insufficient ("New York Environmental Protection"). Finding a sufficient alternative proved rather difficult, but a solution deemed worthy was found north of Manhattan, in what is now known as Westchester. Utilizing the Croton River watershed, New York City was able to eliminate any problems experienced with the previous system, and the City could provide upwards of 90 million gallons per day. While this solution proved fruitful, it did not last. Towards the beginning of the 20th century, New York City began exploring the Catskill mountain region, with possibility of constructing a third aqueduct system ("New York Environmental Protection").

Developing a third system would allow New York to support its growing population in the City and Long island. The latter, an island jettisoning off the coast of Manhattan, maintains a population of the New York City’s working class and tycoons. Previously known as the Gold Coast, Long Island played to the rhythm of the rich and powerful. As staged perfectly in F. Scott Fitzgerald’s The Great Gatsby, Long island’s fragile ecosystems became host to elaborate homes, towns, and developments. However, unlike the City’s ability to obtain water via aqueducts, Long island retrieved its water supply from underground aquifers. Aquifers refer to groundwater freshwater supplies, which are constantly
replenished from snow and rainfall (“History of New York’s Water Supply System”).

Developing at a fast rate, Long Island quickly became a suburban jungle. This concept “Suburban Sprawl,” is the uncontrollable urban and suburban development into areas residing close to or next to large urban centers. A clear example of this concept can be seen in the west coast’s development – specifically Los Angeles. The key to this development was a man, “obsessed with an engineering challenge of epic proportions,” and his name was William Mulholland (“William MulHolland”). Mulholland started his career rather inauspiciously, as a ditch-cleaner for the Los Angeles private water company. Eventually, the city took full control of the company, naming Mulholland head of the Department of Water and Power – a position he would retain until the late 1920s (“William Mullholland”). As Los Angeles boomed, Mulholland offered a piece of advice to the greater city of Los Angeles, in order to continue this “endless prosperity” the city will need more water to sustain its growth (“William Mulholland”). Sustaining a growing population seemed impossible; California is an arid state, but Mulholland searched far and wide for a solution. This solution was found 200 miles northeast of the city of Los Angeles, in Owens River Valley (“William Mulholland”).

Sourcing the water from the Owens River Valley meant engineering a system, which could transport millions of gallons of water to customers throughout the greater Los Angeles area. However, the folks residing in the Valley wanted to use the water for a newly developed irrigation system. Putting this development to rest, Mulholland and the Los Angeles Government, acquired
enough land to stop this project. By 1913, the Los Angeles aqueduct was conceived. This achievement allowed the city to double its population, and develop as the car-centric metropolis it is known as today.

This development did not win all over. In order to reward all the financial backers, Mulholland utilized the excess water from the valley to fuel the growth of the San Fernando Valley. Utilizing the remainder of Owens River Valley’s water left the area dry, arid, and decrepit. Once biologically diverse, Owens River Valley is located centrally, in the “rain shadow of the Sierra Nevada,” with its natural community types ranging from “high elevation sub-alpine forests, to low elevation Mojave Desert scrub” ("USA Department of the Interior"). In addition, the Valley harbors a plethora of distinct northern and southern affinities, a number of which are endemic to the area. This destruction devastated the towns in and around the Owens River Valley. Decimating their local economy, most individuals took matters into their own hands, by destroying the aqueduct.

Just as Los Angeles developed, thanks to newly erected aqueducts, New York City developed; and it is because of the City’s development that Long Island grew. Growing erratically, Long island sprouted like a giant weed. Fueled by the need for suburban areas, Long Island bloomed. Like Los Angeles, Long Island has an inadequate public transportation system because it developed along with the creation of the interstate and the car. This development method has lead to a multitude of environmental problems.

At first Long Island thrived upon the back of the wealthy elite –hence the nickname “The Gold Coast.” The first few residents built homes on Long Island’s north Shore, or the locations of today’s Glen Cove, Locust Valley, and Bayville –
towns that still elicit an air of wealth and arrogance. These elites controlled a large portion of the then prominent corporations of the early 20th century. As these corporations grew, and technology advanced, it became feasible, economically, for workers to live on Long Island commute via train. Transforming Long Island's landscape, the train, as well as the automobile, reinvented Long island’s infrastructure. Changing from a rural, farm-based island, Long Island grew into a complex, and unique suburban gig-saw puzzle. Popping up, Long island’s landscape became dotted with highways, and eventually expressways (Golub).

Long Island’s first expressway, cleverly entitled the LIE, or the Long Island Expressway, “was built with the idea of easing traffic flow throughout the borough of Queens, and connecting New York City to Nassau County and the rest of Long Island more effectively” (“Long Island Expressway”). This expressway was the brainchild of Robert Moses, the then head of the Triborough Bridge and Tunnel Authority. Carving out an 8.5-mile stretch of expressway, Moses was an instrumental figure in constructing Long Island’s infrastructure. This infrastructure includes the Verrazano-Narrows Bridge, the Triborough Bridge, and 416 miles of highways and bridges. Interconnecting Long island’s two major counties with New York City, upstate New York, and New Jersey (“Long Island Expressway”).
Connecting these major areas allowed Long Island to thrive (Figure 1), but without Robert Moses, none of Long Island’s landscape would exist today. After 1953’s proposed six lane central motor expressway, which would run from Manhattan to the eastern end of Long Island, Moses planned on using the newly conceived highway to improve traffic, and the public’s ability to reach every corner of Long Island (“Long Island Expressway”). A specific area Robert Moses wanted to reach was a barrier island, today known as Fire Island. After Major Thomas Jones built a whaling station on the island, others, mainly Moses, became interested in connecting and further utilizing Long Island’s abundance of natural resources (“History”). By the mid 1920s, Moses began construction on the then Jones Beach Causeway, now known as the Wantagh Parkway. In its initial sectional development, “the Wantagh State Parkway was constructed on hydraulic fill across the islands of Great South Bay and marshes on lands donated to the state” (Golub). Destroying the local wetlands, marshes, and natural resources, the parkway connected Long Island to its barrier island.
This Island became a hotspot for New Yorkers, tourists, and Long Islanders. In its first full year of operations over a million and a half people visited the state park ("History"). However, by the mid 1930s, the Jones Beach Causeway became overcrowded, and the highway commission created the Jones Beach State Park Authority. This authority built and maintained all of the causeways, which connected Jones Beach to Long Island; and in 1938, the Northern and Southern state parkways, that run east and west, were officially connected to the Wantagh Parkway. Joining these parkways to the Wantagh State Parkway eased access for Americans to get from the North Shore, South Shore or any central Long Island location to Fire Island (Golub).

As these parkways were built, Long island grew. As the Island developed, its need to alleviate the “winter blues”, and ice riddled parkways, became prevalent. Most highways on Long Island, like the rest of the country, utilize deicers, otherwise known as rock salts (Howard). Salting roads works by “altering the freezing point of water (Howard). Water with a higher salt content has a lower freezing point” (Tuthill). Thus, by utilizing this concept, Departments of transportation can create a safe travel route for commuters.

![Diagram of salt usage](image)
Salt’s first use on national, federal, and local roads in the United States was in New Hampshire, in 1938 (Kelly). Forgoing previous methods, the State government of New Hampshire employed granular sodium chloride, and by 1942 a total of 5,000 tons of salt was spread on highways nationwide – “between 10 and 20 million tons of salt are used today” (Kelly). However, this massive increase of sodium chloride has “caused an alarming increase in the salinity of our water” (Kelly). According to the Cary institute, this massive use of salt is cause for concern not just because of its impact on the natural environment, but also its impact on our drinking water (Kelly).

Earlier in the chapter, I mentioned that Long Island’s drinking water, unlike New York City’s, is obtained via underground aquifers. These aquifers are greatly affected by our actions, and as the Long Island Department of Transportation dumps millions of gallons of salt onto our roads, the drinking water supply’s salinity levels have increased. This problem has been growing for years, and it is cause for concern.

This concern only grows worse when one thinks about the enormous population that these aquifers must be able to sustain. Aforementioned, Long Island’s population and popularity flourished as access to each crevice came online; towns, small cities, and commuter developments rose up from the ground. A shining example is known as Levittown, New York. Known as the first pre-planned commuted in North America, Levittown took its name on behalf of its creator, William Levitt (“Entrepreneurs”). Levit is known as “the father of modern American suburbia,” a real estate developer who took advantage of the
need for cheap, affordable, and planned communities after World War two (“Entrepreneurs”). After World War two, Levitt, along with his sons, built Levittown, a planned community of houses that were built in the way of an assembly line (“Entrepreneurs”). Above is an aerial image of Levittown (Figure 3), circa 1959 (wiki).

In 1947, people began to settle into this development and because of Levitt’s smart business decisions these people only paid between $8,000-$12,000 – resulting in monthly payments that were as cheap as $57 (“Entrepreneurs”). However, Levittown was more than just a bunch of houses. As America’s leading influential housing development of its time, “it became a postwar poster child for everything right (affordability, better standard of living) and wrong (architectural monotony, poor planning, racism) with suburbia” (Gorman).

Levittown was famous. It was featured on magazine covers, full-column stories in New York newspapers, and was even featured in Fortune magazine (Gorman). The town was so popular, that after the initial 2,000 homes were rented, Levitt & Sons planned on adding 4,000 new homes to their roster.
Eventually the town had its own zip code, postal system, streetlights, and in the future, connections to Long Island’s highways (“Levittown Historical Society”). This connection allowed Levittowners to settle into well-paying city jobs and spawn large families. Expanding beyond the basic population, Levitt models and the surrounding community were modified to accommodate these larger families. By 1950, ranches began to spring up like weeds, and soon Long Island’s landscapes became dotted with suburban homes, parks, towns and shopping centers (“Levittown Historical Society”). Like Manhattan, Long Island’s resources have become strained, and it is these constraints that keep it vulnerable to these large storms.
Chapter 2:

Environmental Science and New York
In the previous chapter, I talked about Long Island and New York City’s historical development, and how their fast-paced growth directly lead towards their faulty coastal building codes. In this chapter I am going to take the history a step further, and talk about the science behind Long Island and New York City’s developmental problems.

Over the past couple of years, the “Ten-Year Storm,” has transformed into the “three-year storm.” I say this because since the early 2000s, large storms crossing paths with New York City have become more frequent. Since the mid-1990s, numerous Hurricanes: Felix, Bertha, Edouard, Floyd, Irene, and Sandy, have hit New York City’s shores; but the city also was hit with a plethora of winter storms in 1996, 2006, 2010, and 2013-2014 (Nyc Hazards, Winter Storm History”). Breaking this information down, one can see that since the early 2000s the City, as well as Long Island, has been hit by five major storms –in a span of 14 years, that equates to slightly less than three years between each storm. Standing out, Hurricane Sandy, 2012, wreaked havoc across New York City (“NYC Hazards, NYC Hurricanes History”).

This storm destroyed lower Manhattan, and is known as the second costliest Hurricane here in the United States (Otis). As Hurricane Sandy formed,
caught in a brew of cold fronts, high tides, and hot thunderstorms, it careened through the east coast, making its way up to New York City. Spinning towards New York and New Jersey, planners raced around readying the city for its impending doom. Eventually, all planes and trains were grounded, the tunnels in-and-out of the city were closed, and the subway system was suspended, all after the city’s then mayor, Bloomberg, ordered the evacuation of more than 375,000 residents (Otis). Upon its arrival, Sandy brought with it waves peaking at 32.5 feet, plowing past the protective seawall located in Battery Park City. Sending storm surges of around 14 feet into the tunnels, subways, and the city’s buildings. The latter, including personal homes, offices, and important infrastructure, were “cracked apart amid the water’s incredible force” (Otis).

Escaping the waters powerful grip seemed rather unfathomable, and many had perished in the hands of Hurricane Sandy.

This storm, as well as this year’s powerful string of winter storms, shines a light on the problem with New York City’s infrastructure. This infrastructure was incapable of maintaining its rigidity while withstanding large-scale storms such as Sandy, Irene, and Winter Storm Nemo. Old, wooden homes lining places like Breezy Point caught fire, “a loose electrical wire caught fire and sparked a massive blaze that threatened the beachfront community’s 2,800 homes” (Otis). Even with the rain and flooding, Sandy’s winds spread the flames across the beachfront community destroying home after home (Otis). This problem lends itself to the question: what hope is there for New York City’s low-lying areas, and there futures? Well, if New York City’s building codes do not change, then not much.
The main problem, evident from Sandy’s wrath, is the science behind climate change, and rising tides. In the book, *A World Without Ice*, by Henry Pollock, one of the chapters highlights the historic reconstruction of Earth’s climate, which is a result of humanity’s advantageous securements to this planet during a stable period in its climatic history (Pollock, 97-151). According to Pollock, an important discovery over the past hundreds of years has been the creation of the Thermometer. Utilizing this creation’s ability to measure temperature, Climatologists have determined “that the Earth’s surface has on average warmed about 1.8 Fahrenheit degrees” (Pollock, 103). While this trend has not been an unbroken climb (check figure 1 to the right for verification), not a soul can deny the picture that the graph depicts, which is from 1880 to 2005, indicating a warming trend (Pollock, 103). This warming does not only affect the Earth’s temperature, but also the Earth’s ocean water, below the surface, and the rocks beneath the surface of the continents. Now flowers, which take their growth and hibernation cycles from the warming and the cooling of the seasons, are now blooming earlier and dying later (Pollock, 110).
This change indicates a blip in Earth’s climate and atmosphere, a result from this accelerated melting cycle. The fastening of the ice loss-pace, from places like Greenland and Antarctica, has changed the oceanic balance –but not for the better. Two factors are at play here. First is the increased melting of glaciers, or ice, and its subsequent melt-water’s return to the ocean. The second cause is “the volumetric expansion of seawater as the oceans warm” (Pollock, 126). To expand, as the temperature of the water increases so does its volume – this is a fundamental principal of today’s thermometers (Pollock, 126-127). Combine this horizontal volumetric expansion with the ocean’s vertical expansion and the world has a major problem. If the sea levels rise just eight inches it could swallow a gently-sloping beach, pushing its shoreline up forty feet inland (Pollock, 127).

Increasing global sea levels is because of human activity “nine chances out of ten that we humans, through our burning of fossil fuels, have been the dominant factor in the warming of the last half century” (Pollock, 151). Placing fault on the shoulders of humans is nothing new, yet the public continues to question the science behind climate change. The American public has been unable to correlate their daily activities with the effects of climate change (Pollock, 152). Connecting a solitary drive from the Hamptons to New York City to climatic change is an abstraction –mostly for the average American. While it is the concept that renders most befuddled, it’s the actual power of nature that intimidates mankind.

Unfortunately most of humanity lives along the coast, and in large, clustered cities. A common virtue of modern cities is that they can accommodate
large quantities of residents, resources, and services in close proximity of each other. Yet these coastal cities accomplish these tasks by replacing common ecosystem services with concrete and metal infrastructures. This hodgepodge of buildings and concrete has eliminated the enriched and diverse river deltas and forests of Manhattan. Thus, these relatively inflexible infrastructures make coastal cities vulnerable to large, powerful storms (Bergdoll, 34).

Showing off this power, nature has thrown hurricanes, typhoons, tsunamis, and tornadoes at humanity’s coastal cities. However, like I stated earlier in the chapter, the frequency of these storms has dramatically increased, resulting in dramatic destruction across the globe. Sandy is just one example. Another clear example is Japan’s 2011 Tsunami/Earthquake.

On March 11th, 2011, a magnitude 8.9 Earthquake shook Japan’s northeastern islands; and the resulting tremors sent a large tsunami barreling towards Japan’s eastern coast (Fackler). This devastating tsunami sent coastal waters directly towards large seaside Japanese cities. Thousands of homes, buildings, and basic roads were destroyed. This damage, while severe and heartbreaking, should pry open the public’s eyes. Yes, something this severe does seem rare, but storms like this are becoming commonplace (not to reiterate myself); and to survive nature’s wrath, coastal cities must improve their environmental and safety regulations (Oskin).

In 2010, The Metropolitan Museum of Art, or MOMA for short, exhibited “Rising Currents: Project for New York City’s Waterfront” (Bergdoll). Addressing this urgent tidal situation, this exhibition concentrated on select areas of New York City that are highly susceptible to increased tidal heights.
“Though the national debate on infrastructure is currently focused on ‘shovel-ready’ projects that will stimulate the economy, we now have an important opportunity to foster new research thinking about the use of New York City’s Harbor and coastline” (Bergdoll).

By focusing on new innovations, which improves New York City’s chances of surviving higher sea levels, the City will benefit from an improved economic standing, a better jobs report, and lower carbon emissions. Highlighting these innovations are four key areas, and each of the four strategic points feature a groundbreaking solution to this particular problem. The sections include: zone 0, Lower Manhattan; zone 1, Northwest Palisade Bay/Hudson River Area in NJ; zone 2, Southwest Palisade Bay/Kill van Kull; zone 3, South Palisade Bay/Verrazano Narrows area; and zone 4, Northwest Palisade Bay/Buttermilk Channel and Gowanus Canal Area including Governors island. Inset above is the exhibition map of all four key areas (Bergdoll). These four areas represent a plethora of ‘green’ innovations; but the main ideas were to reconstruct New York City’s former ecosystem (Bergdoll).

Reconstructing Manhattan’s former ecosystem seems like a daunting task; yet, like I mentioned in chapter one, the Wildlife Conservation Society’s
Mannahatta Project can help the City with this tremendous task. Outlining New York City’s former shape, the Mannahatta Project allows us to dive into the depths of Manhattan’s ecological past. Utilizing this tool, these four sections, and the innovations brought to life by various architecture firms, we can reconstruct this past form to help defend New York against these rising tides (“Welikia”). For example, zone 0, and its team, conceived a landscape of absorptive material that would extend into a “comprehensive rethinking of the texture of the coastline and the urban street (Bergdoll). This concept, the new urban ground, would transform the coastline through new wetlands, filtering both tidal change and street runoff after storms (Bergdoll). As a backup measure, the team offers up the idea of “greened” streets, which surfaces the street in absorptive, open-mesh concrete tiles and a layered filtering system. This proposal takes Lower Manhattan’s former look and brings it back, and better than ever.

However, even the most forward-looking design can only restructure, but not fully solve, these coastal cities problems. This problem is rather vague; unfortunately, it would be tough to predict future storms that could affect coastal cities. Implementing any form of policy that transforms the look of our coastal cities would not meet global challenges fast enough.
Chapter 3:

Designing an Urban Oasis:
An Understanding of Green Infrastructure
Countries like England, France, and Italy partake in what is known as the Kyoto Protocol. This protocol “is an international agreement linked to the United Nations Framework Convention on climate change, which commits its parties by setting internationally binding emission reduction targets” (ufccc). Recognizing that developed nations, rather than developing nations, are principally responsible for the current high levels of carbon, cfcs, and other greenhouse gases in the Earth’s atmosphere, this Protocol was considered environmentally advanced. Developed in Kyoto, Japan, in 1997 it became law in February 2005. During its first commitment period, “37 industrialized countries and the European Community committed to reduce GHG emissions to an average of five present against 1990 levels (ufccc). However, the United States of America withdrew from the Kyoto Protocol in 2001 (Bergdoll). Instead, the United States created its own emission standards responding to the nation’s need to reduce its carbon discharge.

To combat increased carbon emissions several architects’ theorized futuristic urban and suburban centers that rethought the idea of the city planning. These ideas used fewer resources and created barriers to resist the impending tidal change. In the following chapter, I will take the previous chapter’s scientific data, and ideas, and apply them to the concept of environmental design.

In their book, Sustainable Communities: A New Design Synthesis for Cities, Suburbs and Towns, Sim Van der Ryn and Peter Calthorpe present a new fundamental premise for cities and towns. Suggesting that the context of design should include: a design that makes people its priority, local self-reliance, and
biology. According to these two architects, these concepts combine to create a better, more efficient town, and or city.

Firstly, when designing a city, the duo suggest that “in terms of design as if people mattered” (Ryn). A designer must question, whom we are designing for, because today’s nuclear family is completely different than of decades prior. Yet, designers are still producing homes for the old-school nuclear family concept (Ryn, 121). Designing for individual households is different than designing for either a couple’s household or a family’s household. Thus, Van der Ryn and Calthorpe suggest the concept of adaptable housing. Since a smaller percentage of Americans can afford new housing, the need is for cheaper, more flexible, complex suburbs and cities that are to a human scale (Ryn, 125). The most striking examples are ones that combine a psychological, social, and aesthetic importance of communal outdoor space. However, this ideal space must have solar access, which the general population will benefit from, mostly because of the environment’s stress-cleansing powers. Fashioning cities and suburbs into smaller clusters that utilize the most out of the public space, and the public’s need for fresh air, will be crucial for their development in this climatically changing world (Ryn).

While this idea does not seem to be too environmentally forward, it’s better than completely taking nature out of design, which results in a flawed outcome. While our resources have yet to become constrained, designers must produce products that rely on local resources instead of cheaper, nonrenewable energy sources (Ryn, 131). Calthorpe and Van der Ryn believe that the next piece
to the puzzle is local self-reliance. In reference, the institute for Local Reliance’s mission statement,

“The Institute’s mission is to provide innovative strategies, working models and timely information to support environmentally sound and equitable community development. To this end, ILSR works with citizens, activists, policymakers and entrepreneurs to design systems, policies and enterprises that meet local or regional needs; to maximize human, material, natural and financial resources; and to ensure that the benefits of these systems and resources accrue to all local citizens” (“About the Institute of Local Reliance”).

The institute for Local-Reliance’s mission illuminates Calthorpe’s and Van der Ryn’s concept of relying on local resources rather than nonrenewable sources obtained elsewhere in the world. Relying on local policies, resources, and environmental needs allows both the area’s population and its environment to thrive. Creating this success is an ingenious symbiotic relationship between nature and man, as well as man’s development. However, to achieve this lofty goal, “local government will become increasingly central to any integrated planning” (Calthorpe, 136). An example of this notion of local government becoming highly involved with environmental and urban planning is New York City’s government, and its former mayor, Mike Bloomberg.

While Bloomberg’s political prowess will be discussed in finer detail in the following chapter, his advanced ideas for utilizing and eliminating New York City’s waste byproducts (and creating a green building program) brings Calthorpe’s and Van der Ryn’s idea, local self-reliance, to life. Bloomberg’s plan, cleverly entitled PlaNYC. Challenging New York City’s growth, planYC achieved
the cleanest air levels the City has seen in the past 50 years. This accomplishment is a result of pushing more New Yorkers to recycle rigid plastic, take alternative methods of transportation to work, and planting more than 750,000 new trees throughout the five boroughs (Bloomberg). This plan changed the face of New York City, and city, politics. Eliminating carbon emissions, and introducing more parks, and less landfill, allows the city, and its local population to thrive (“Planyc – the plan”).

Calthorpe and Van der Ryn suggest that as the world moves forward into the 21st century, we will move toward “an economy based on the principles of local self-reliance, we may see a significant reduction in the trade of products or raw materials” (Ryn, 137). In these materials place is the concept of ecology, “ecology has a multifaceted lens that allows us to discover the patterns that connect” (Ryn, 140). This sensibility adds a new dimension to the current thought of urban and suburban design. Utilizing ecology as a new dimension of design, allows us to mimic Earth’s ability to organize chemical conditions that are necessary for Earth’s survival. Like Earth’s survival, design as a science provides an excellent framework for the globe’s suburban and urban areas. Buildings and homes would become organisms, and cities and suburban areas would cultivate around these organisms. Growing around these organisms, these cities would integrate manufacturing, housing, commerce, schools, and agriculture into internal and environmentally efficient society (Ryn).

There is a concept similar to Calthorpe’s and Van der Ryn’s architecture and biology concept. This concept is known as Biomimicry. Biomimicry is a “new discipline that studies nature’s best ideas and then imitates these designs and
processes to solve human problems (“The Biomimicry Institute”). The Biomimicry institute suggests studying a leaf to invent a better solar cell as an example. Basically, this idea concentrates on the idea of nature, and how it self-regenerates, solving its own problems –instantaneously at some points. Studying this problem-solving genius allows humans to greatly benefit from nature’s abilities. However, we must follow three key rules; one, look at nature as a model, two, nature as a standardized measure, and three, nature as a mentor.

First off, nature is quite clever when it comes to designing and building itself. Building itself in unique ways, nature designs structures utilizing creative design solutions, and things like beehives, shells, cacti, a bird’s beak and wingspan, amongst others, have inspired today’s architecture. Copying nature, and exploiting nature’s evolutionary diary, architecture can use nature as a measure, capturing its principles. Yet, we must look to nature as a mentor, a mentor whom innovates and does not destroy (“The Biomimicry Institute”).

Thus, a great idea for cities, and urban centers is the vertical farm concept. According to the Vertical Farm Project, “by the year 2050, nearly 80% of the Earth’s population will reside in urban centers” (“The Vertical Farm Project”). On top of this percentage, and applying conservative estimates, Earth’s population
will increase by an additional three billion by 2050. To fulfill this populations needs we will need to find something the size of Brazil, or something slightly bigger, to grow the food needed for them (“The Vertical Farm Project”). While current practices are sufficient, an increase in population will require a change to current farming applications. Avoiding this problem, urban centers need to employ a new approach to indoor farming, which utilizes new technologies. In comes the ‘Vertical Farm’ concept, which could fulfill our urban centers needs for sustainable, safe and varied food supply. This concept is advantageous for urban centers. First off, it can provide year-round production, no matter the location of the city since the production would not be affected by weather-related crop failures. Secondly, all the food can be grown organically, using local waste byproducts, and the farms can utilize local grey, and black water (Grey and black water refer to its previous use, example: grey water can be water after it is used to wash a person’s body). Finally, a vertical farm can reduce the carbon emissions of any urban center, which can dramatically decreasing water-waste (“The Vertical Farm Project”).

Dramatizing its positives, allows designers to sell the public on the idea of vertical, and or terrace farming. This idea, where skyscraper’s floors are filled, top to bottom, with crops, allows a reduction of water, food, and soil waste. In an article by The Economist, a professor of public and environmental health at Columbia University says, “it just makes sense, to move farms closer to where everyone will be living” (“Does it Really Stack Up?”). While some may argue that pushing crop production into city centers will only introduce a plethora of pesticides, herbicides and fungicides, this professor suggests that these chemicals
would be kept to a bare minimum. By growing plants indoors, or in controlled environments, the farms would regulate erosion and run-off.

Integrating the vertical farm concept into New York City, or even in suburban areas like on Long Island, would be ideal. Ideal because it can continue Bloomberg’s path of a sustainable New York City, but also because it can dramatically decrease the City’s reliance on outside food sources to feed its population. The best part is that the City can provide its population with organic, sustainably grown crops even during times of duress –like events such as Sandy, Nemo, Irene, and etc. Like Stuart Cowen and Sim Van der Ryn say in their book, Ecological Design, “designs that work in partnership with nature articulate an implicit hope that we might do the same” (Cowen, 186). Basically, design should follow nature’s form and function, becoming “a pattern that connects” (Cowen, 187). Unmasking nature’s prowess, and integrating it into our urban centers can promote sustainable thoughts, actions, and designs.
Chapter 4:

Politicizing and Economizing New York’s Infrastructure and its Development
Designing urban and suburban centers come at a price and a limit; and limiting these designs are the government’s political and economical commitments. Committing themselves to creating the best country, economically and politically, governments create stringent laws that hinder new development. Old laws and developmental-thought has prevented any change in coastal rehabilitation. Revitalizing coastal, and just basic, infrastructure has been a rather slow process. In the following chapter, I will talk about the politics and economics of today’s developed and developing infrastructure in New York City and on Long Island.

Before understanding both Long Island and New York City’s environmental structure, one must understand how environmental politics works in general. Influencing environmental policy/politics are three key components: science, economics, and politics. Science is the systematic understanding of the natural world; and what affects the conditions of the natural world (Cohen). While science is a major player in the political infrastructure, unfortunately it is not the major player when it comes to influencing decisions. Then there’s economics, which focuses on the production, consumption and allocation of scarce food and resources. Driving these decisions are both firms and markets – harvesting renewable energy may be ideal, yet is it as cheap as obtaining fossil fuels? Finally, there’s politics, which concentrates on the governing of societies and implementing, making and enforcing government decisions. These three combine to create today’s environmental policies, but like everything else in the political world, governments need to contend to various groups with differing
agendas. Changing the definition of something as simple as “going green,” can prove to be rather difficult (Layzer).

Challenging the political biases of cities are different streams, including but not limited to the courts, activist groups, all political parties and its participants. Each of these streams will never become coherently aligned, as differing political ideologies, and morals, poignantly derive their decisions from their political bias. Take, for instance, an earlier chapter’s topic of global climate change, in an online article in the Wall Street Journal it opens with, “are you a Global Warming skeptic? There are plenty of good reasons why you might be” (Muller). First off, this article is recent, 2013 in fact, and it shows that there are people out there that still do not believe, or understand, the concept of Global Climate Change. The article goes on suggesting that there are a multitude of reasons to reject the climate change premise; but the clearest reason is the incredulous results obtained by temperature-stations. Whereas in an article in The Guardian believes the evidence for the existence of Climate Change to be irrefutable,

“Regardless of the... (erroneous) claim that global warming has already stopped, evidence is that once well-known impacts from El Niño, volcanic aerosols and solar variability are removed from the observations, the warming trend of the ocean-atmosphere system is unbroken; and that it will continue unless serious mitigation action is taken” (Kirby).

This quote suggests that climate change is occurring, and its dramatic intensification of our ocean-atmosphere system is to be unattested. Yet, in opposition, the Wall Street Journal’s article suggests that 70% of these
temperature-stations, used to analyze global temperatures, are inefficient (Muller). These two differing perspectives create a jarring effect on today’s political outcomes. Acting as two different streams, these two standpoints have push climate mitigation reform to a standstill – at least that is what’s happening here in the United States (Kirby).

Unlike most U.S. cities, New York City, thanks to a brilliant reform by Mayor Bloomberg, has seen a dramatic restructuring of New York’s environmental politics. Like stated in the science chapter, Bloomberg influenced New York’s environmental politics by introducing new legislation and bans, which dramatically decreased the cities carbon footprint while drastically increasing its chances against tidal surges. Transforming the cities infrastructure, Planyc introduced a green infrastructure plan in 2010. This plan would improve current building zones, and introduce greener designs that integrate roof gardens, active and passive solar design, rain gardens and innovative materials (Lloyd). Beyond that, this plan targeted down-trotted areas, cleaning up brown-fields, built and renovated parks, and introduced new estuaries into the Hudson River and the Palisade bay. According to the DEP’s 2013 report, by summer 2014 new Stormwater green-streets and Right of Way Bioswales will either be in early stages of development or under construction. These technologies are being established in the Gowanus Canal, Flushing Bay, Jamaica Bay, and Newtown Creek (“Green Infrastructure Plan and Annual Reports”).

Highlighting a positive aspect of modern politics, the DEP or the Department of Environmental Protection is a unique program. It is a department, one that is commonplace to each state government, which is responsible for each states
water supply, sewer systems, water conservation and sanitary waste (Lloyd). Utilizing this powerful New York City political tour-de-force, the city’s green infrastructure has grown ten-fold. Tracking the City’s green infrastructure, the DEP reviews and analyzes all green infrastructures being built, installed, or being planned over the course of the structures lifetime (Lloyd). Since the DEP tracks, implements and generates this green information, it has the ability to sway the public’s mindset on going “green.” This ability is due to the DEP approaching New York City’s environmental needs in their own way. Determining their own path, The Department of Environmental Protection developed their own procedures on how to operate and solve global climate change (Layzer).

A clear example of a department, or agency, taking full liberty in interpreting law would be the Spotted Owl case of the Pacific Northwest. In this case, the Spotted Owl’s natural habitat was under duress. Hacked up by local lumber companies, environmentalists, under the Endangered Species Act, argued that this area should be protected, preserving the Spotted Owl species. While, on the other hand, lumber companies claimed that protecting this region would threaten the local economy, erasing millions of jobs and destroying the area’s economic prosperity (Layzer, 174-176). After careful consideration, the agency in charge, The Fish and Wildlife Service reinterpreted the Endangered
Species Act; deciding that, biologically, the forest must be persevered, for the Owl’s sake (Layzer)

Like the Fish and Wildlife Service, the Department of Environmental Protection can interpret federal and EPA related acts—when it comes to making the best decision for that particular state/city. In New York City’s case, its mayor, its participants, and the courts agreed it was time to alter the city’s infrastructure. However, agreeing to the C40 Cities Climate Leadership Group, and adjusting carbon emissions in the city will not be enough to abate future problems when it comes to large coastal storms (“Philanthropist”). Yet, by taking steps, like constructing bioswales, green-streets, and integrating rooftop and rain gardens the City is moving into the right direction. Now, they just need to change the definition further, influencing the various streams, and developing new zonal laws that follow ideas presented by Calthorpe, and the Moma’s Rising Currents exhibit.

While political influence is a major component to environmental change, one should also take into account the economics of the situation, and how it may ascertain an outcome. When it comes to outcomes, there is always an opportunity cost. According to Investopedia, opportunity cost is “the cost of an alternative that must be forgone in order to pursue a certain action” (Investopedia). In layman’s terms, it is what you give up to do something else. If New York City wants to eradicate its current infrastructure, and in its place construct a prodigious structured system, it needs to weigh what the opportunity cost might be. In this case, it might be the actual cost; the cost of materials, the cost of
implementing a whole new system, and the increase cost compared to the relative cheapness that is the current system (Cohen).

Yet, this current system does not take into effect its externalities. In fact, this system could be pricier than this newly proposed and environmentally friendly one. Take, for example, in most cities coal is a predominant source for electricity, heat and production; yet, the price of this coal does not reflect its externalities. Namely, it does not include the cost of the carbon emitted from transport of the coal, the cost of the sulfurous and nitrous it emits during production, and the cost of acid rain. All of the above are some of the externalities of coal production, but they are not included in its final price. While some suggest taxes in order to prevent this lack of inclusion, instead “economists consistently urged the use of ‘market-based’ or ‘economic incentive’ instruments” (Stavins). While tax-based impositions on fossil fuel based products have been introduced, they have been used for revenue, ironically enough it's for infrastructure needs (Stavins). The better solution is the market-based resolution, something George Bush Senior utilized for the Acid Rain case back in the early 1990s.

Starting in the 1970s, the Environmental Protection Agency has offered the option of commissioning tradable permits, which helps to alleviate carbon emissions while giving companies the options of buying or selling permits, based on their pollution needs (Stavins). While this has helped lower carbon emissions, it has not done much to reduce carbon discharges from privately owned cars and homes (Passell, 1). According to economist Peter Passell, “31 counties in New York and Pennsylvania backed away from voluntary commitment to reduce smog by burning a more expensive blend of gasoline in privately owned cars” (Passell,
1). This is a message to all of American economists; Americans are not as willing to comply to environmental needs if it means increasing their monthly budget. It is well known that America’s Federal Government has spent decades basing its policy on the wisdom that Americans are willing to pay to fix the environment, but that is simply not true.

According to New York’s Department of Environmental Protection, for the past decade or so, they have

“Funded and implemented a comprehensive Long-term Watershed Protection Program which focuses on both protective and corrective initiatives to ensure that the source of water for nearly half of New York State’s population remains of extraordinary high quality for current consumers and future generations” (New York Environmental Protection Agency).

While this effort is extraordinary, it also begs the question, but at what cost? To protect and correct these watersheds (Figure 8), and the millions of acres that surround them, “the City must solicit owners of 355,000 acres in the Catskill/Delaware watershed over the next ten years” (Mertz). This commitment
will be rather costly, as it will set the City back $250 million, on top of $70 million in eventual upgrades (Mertz). While large, this cost is certainly cheaper than what a new water-treatment facility would cost—on top of the cost of piping the water to the plant and back to the city. Protecting and correcting these ecosystems, as well as systems like the hunts point sewershed, the Bronx river, and Manhattan’s ecosystem will go a long way to protect Manhattan from surging tides, and the “three-year storm.”

While protecting Manhattan from surging tides is important, some believe that the costs outweigh the prospects. In other words, people would rather not pay for the needs of the environment if those needs do not affect them either today, tomorrow or in their lifetime. New Yorker’s will not understand the need for change unless the cost of those externalities, the cost of the salinization, Long Island’s water system or the cost of the City’s grid design, are included in the cost of their water, power and oil.
Chapter 5:

Solutions
In the past few episodes, I have talked about New York’s infrastructure. This infrastructure is faltering, crumbling at the seams. It takes a multitude of viewpoints to understand the significance of this problem, and how it is in dire need of change. Highlighting this situation are these four interdisciplinary facets of environmental policy: history, science, design, and both politics and economics.

These four facets can open the public’s eyes to the crumbling infrastructure that is New York. Developing stations, and pipelines, which deliver water safely and sustainably, and reorganizing the City’s infrastructure is currently happening, but not fast enough. Historically, the city has rapidly developed without taking the environment into account, and its political structure has not gained enough environmental traction until about a decade ago.

A decade ago Mayor Bloomberg took control of New York City’s reigns, and thus, planyc was born. This birth brought forth clever, bright and sustainable plans that can retrofit New York’s infrastructure with stronger, more beneficial, pieces. However, some remain skeptical about the premise of climate change, its reality, and how its “effects,” like the “three-year storm,” are true or not. Economically, most people tend to forget about the externalities that arise from fossil fuel productions (“Planyc – the plan”).

Forgetting about the simple consequences that arise from the unassuming transportation of goods, such as oil, allows the public to believe that fossil fuels are cheaper than its sustainable alternatives. Therefore, what needs to change is the definition of the global climate change, and green infrastructure. Politically, nothing gets done unless the definition of the subject is altered; and changing the definition can be rather difficult. Yet, like the actors involved in the Spotted Owl case, the case
for environmental change, for greener infrastructure, needs a voice, like a policy, which can change the definition.

First things first, a new policy must be forged. This policy should recognize the need for change, which is highly evident; and by manifesting a new policy that allows cities to rectify their sour infrastructure, and interpret at their own whim, permits cities to protect themselves from rising tides. These rising tides are a large, impending threat, and the best way to solve it would have architects design this new policy. Abandoning the normal political path, and utilizing all of environmental policy’s facets, could forge a new path of steel on steel change.

Take for instance, the Rising Currents exhibit’s zone 3 project. This area proposes piers to be constructed, helping support new housing projects. These housing projects create what the proposal calls an “Aqueous City.” This city will utilize its piers as storm reducers, lessening the force brought on by storm’s waves, storms like Hurricane Sandy. Lessening the impact of the storm waves is possible due to the accreting sediment on the downside of the piers as low tide comes down from the Hudson River (Bergdoll).

Furthermore, these piers will provide docking points for a network of ferries that will run between each pier. The tips of each pier would maintain stops for the express ferry, pier tip to pier tip. In between each pier would be inlets that would hold the stops for the local ferries; and from the piers, people would be able to walk down and catch a tram to where they need to go (Bergdoll).

Besides the ferries and trams, I want to describe in further detail the housing projects the team designed. The idea behind the housing projects was to create houses with water being their front-yard and the rooftop garden being
their backyard. These houses would be completely different than your typical New York City residences because they are not built from the city level, and up. Instead, these residences are built from the roof down. In the beginning there would be a shared roof, and the houses would be suspended from the roof. The houses are suspended down from the roof, so the more risk you are willing to take, the closer you would hang your house to the water. The houses are built this way in case of storm surges or flooding. If there were to be category 3 hurricanes, the bottom floors would be flooded while the top floors would remain dry. Then there is the idea of how they would treat waste. The dry waste would be dealt with by the supports of the houses/piers. These piers/structure supports would house anaerobic digesters. The gas that would result from the processes of the anaerobic digesters would provide the gas needed for cooking in the homes. The wet waste would be treated through the floating wetlands in the water. Each level of the wetlands the water would become cleaner and cleaner. The odor would be enclosed, and cleaner water would be exposed to the wetlands (Bergdoll).

Around the piers, in the water, would be an archipelago of man-made islands. These islands are made of concrete elements with natural elements topping them, and they would be floated out into the bay and sunk. These islands will not only filter the storm waves, but will be programmed with specific functions to help accommodate any population need. Besides those two functions, the islands will encourage silt accumulation, which in turn will help create natural storm barriers for the “New Aqueous City.” By encouraging silt accumulation, over time these islands would become more of a natural setting (Bergdoll).
Furthermore, these islands would be connected to one another by floating, inflatable storm barriers. These storm barriers would be able to inflate in less than an hour when they are needed. The barrier design starts off with “modular concrete sills on the riverbed,” which would connect all the individual islands together to form an archipelago.” (Bergdoll) During times of storms, sensors within the concrete island would inflate the tubes and “upstream valves will be opened to allow water to enter the tubes.” (Bergdoll). In between these islands and floating barriers the team decided to push the sea inland, connecting it to water basins, swales, and culverts. These connections would absorb all storm runoff, but when the weather is dry these areas would act as parks (Bergdoll).

Unfortunately, all of these ideas cost a lot of money. Funding this project would cost millions, and would drive the cost of living up. Yet, if the current system remains in place the added cost of the externalities, especially when it comes to yearly flooding, would cost greater than the environmentally sustainable alternative. Choosing which path to follow will prove to be rather difficult, if you choose the cheaper path (the one that does not include the externalities) than the infrastructure could be in grave danger; but if the state chooses the most expensive, albeit better, alternative it will be more beneficial done the line. This is a situation where the state either pays off the costs in the beginning or pays for cheaper route in the end (Bergdoll).

This problem has turned out to be an elaborate economical and political debate where each route has its own roadblocks. Removing these obstructions will take time, thwarting the population, the government, and the designers every second of every day. Yet, if we do not make the right, consciousness, move the
State, and its coastline, could be barraged with endless destruction and political scrutiny.
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