

Weeks 3 & 4: Playing with Maps

Posted on **July 20, 2015** by **Ibrahym Ahmed Sabha**

You might have heard that reading a map if you're trying to reach a destination would help keep you from getting lost. In my case however, I actually managed to become lost after testing out maps from the National Oceanic and Atmospheric Administration (NOAA) and ArcGIS, in a good way of course! Both simulations left me in awe as they showed me such devastation New York City can potentially experience in the next century or so.

NOAA's Simulation

The model that I was testing from NOAA involved simulating the impacts of permanent inundation by toggling different sea level rises. The results that I got were pretty shocking for some existing, low-lying neighborhoods. Such neighborhoods as the Battery, Coney Island, and the Rockaways would either become severely affected by the permanent inundation or even wiped out completely. It's striking to imagine that, for example, Coney Island could potentially disappear a little over 100 years from now if the rate of sea level rise continues to increase significantly. The Jamaica Bay wetlands would be completely destroyed, along with the nearby neighborhood of Broad Channel. Lower Manhattan would suffer catastrophic effects from the sea level rise since about a million people either live or work there each day. Worst part of it all is that this model doesn't even factor in severe storm surges that the city would experience **on top of projected sea level increases**.

ArcGIS Software

The ArcGIS simulation was there to fill in that gap NOAA didn't provide. With this model, I was able to get an idea of how certain parts of the city would be affected by storm surges caused by hurricanes of different strength. I tested the storm surge effects of hurricanes ranging from categories 1-4 as well as Hurricane Sandy. Any one of these hurricanes would have a devastating impact throughout the city, with a category 4 hurricane obviously being the most destructive. A category 4 hurricane in particular, although extremely rare but possible, would submerge virtually all low-lying neighborhoods of New York underwater by more than 9 feet! That means: mostly all of lower Manhattan, Brooklyn, and Queens would be wiped out, as well about half of Staten Island! Keep in mind however, that such figures **don't** even include the projected sea level rise over the next 100 years. In addition, the changing climate would begin to allow New York experience more common "100-year" storms in the future than right now, which also means that extremely rare category 4 hurricanes will have a higher chance of making landfall onto the city.

Combining the two and what our future holds

Combining the two maps together results in even more catastrophic effects on the city. Imagine how much more destruction can take place after combining the two. We certainly cannot afford apocalyptic-like flooding onto our city. This comparison of the maps has definitely given me an idea on how this might be avoided, such as the idea of building a hydroelectric dam/seawall as I mentioned last week. It's just a matter of time on how soon should such a project be built as well as how soon do we need such protection.



— Teterboro Airport in NJ
— Current Sea Level



— Teterboro Airport in NJ
— 1FT Increase in Sea Level



— Teterboro Airport in NJ
— 2FT Increase in Sea Level



— Teterboro Airport in NJ
— 3FT Increase in Sea Level



— Teterboro Airport in NJ
— 4FT Increase in Sea Level



— Teterboro Airport in NJ
— 5FT Increase in Sea Level



- Teterboro Airport in NJ
- 6FT Increase in Sea Level



- Meadowlands in East Rutherford, NJ — Current Sea Level



- Meadowlands in East Rutherford, NJ — 3FT Increase in Sea Level



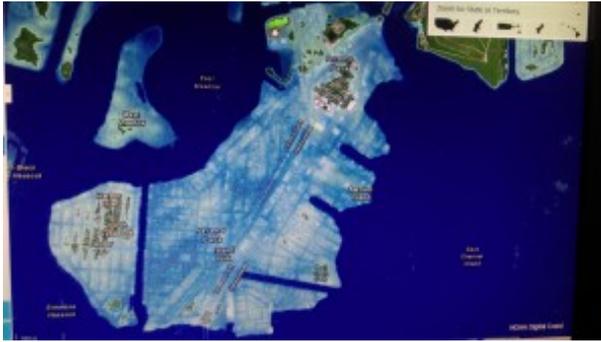
- Meadowlands in East Rutherford, NJ — 6FT Increase in Sea Level



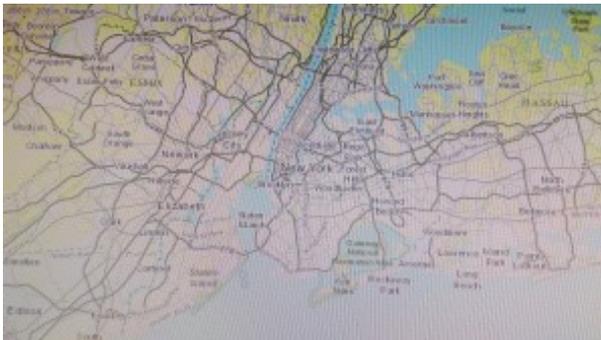
- Island Park, NY in Long Island — Current Sea Level



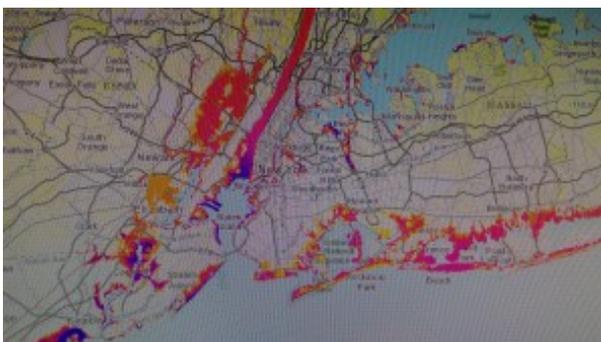
- Island Park, NY in Long Island — 3FT Increase in Sea Level



— Island Park, NY in Long Island — 6FT Increase in Sea Level



— Map of NYC — Normal Conditions



— Map of NYC — Hurricane Sandy Storm Surge on October 28, 2012



— Map of NYC — Category 1 Hurricane Storm Surge



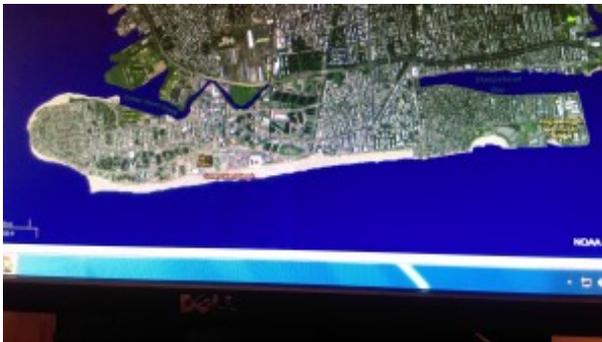
— Map of NYC — Category 2 Hurricane Storm Surge



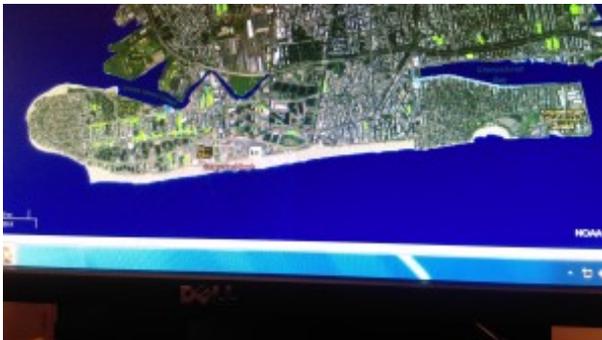
— Map of NYC — Category 3 Hurricane Storm Surge



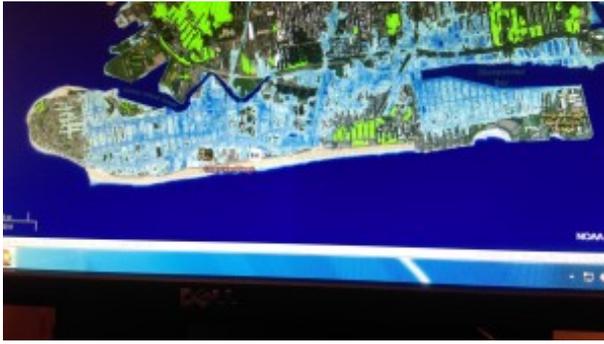
— Map of NYC — Category 4 Hurricane Storm Surge



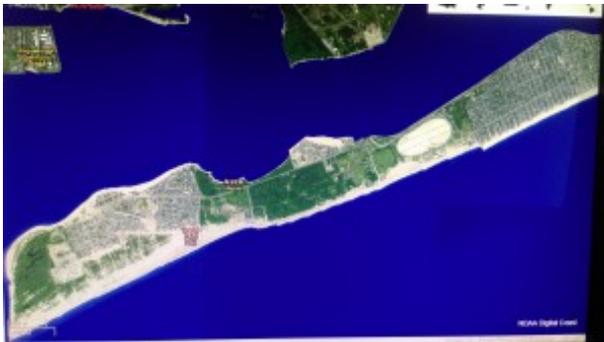
— Coney Island — Current Sea Level



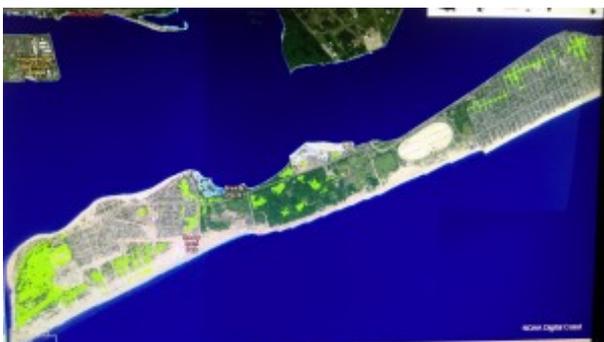
— Coney Island — 3FT Increase in Sea Level



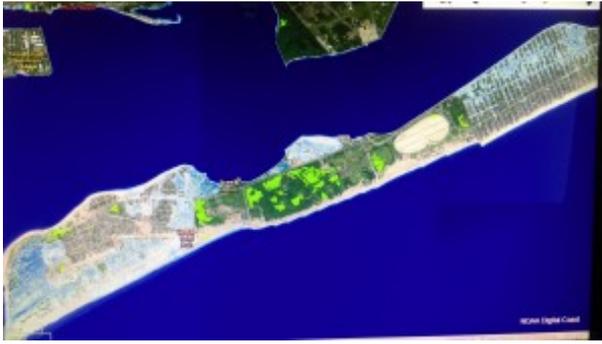
— Coney Island — 6FT Increase in Sea Level



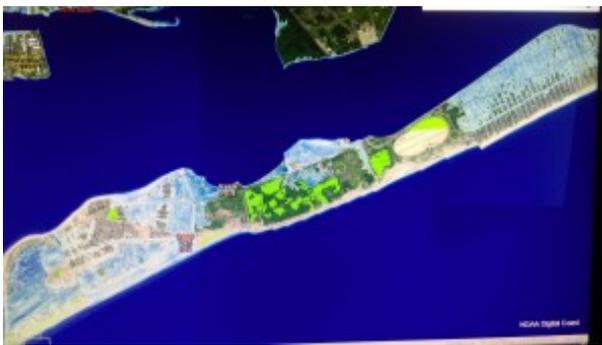
— Western Half of the Rockaways — Current Sea Level



— Western Half of the Rockaways — 3FT Increase in Sea Level



- Western Half of the Rockaways — 4FT Increase in Sea Level



- Western Half of the Rockaways — 5FT Increase in Sea Level



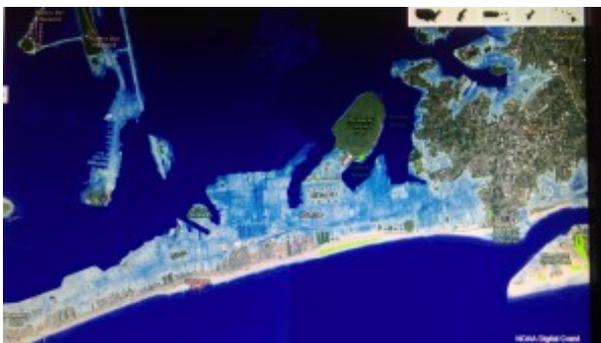
- Western Half of the Rockaways — 6FT Increase in Sea Level



— Eastern Half of the Rockaways — Current Sea Level



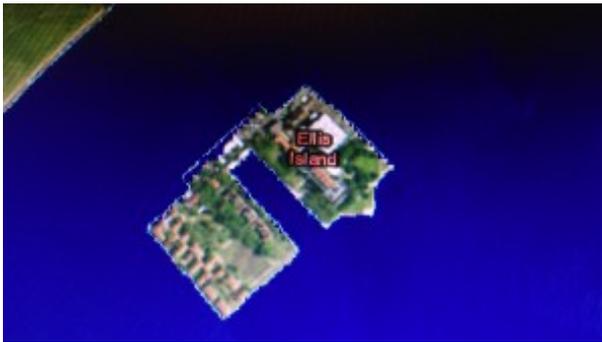
— Eastern Half of the Rockaways — 3FT Increase in Sea Level



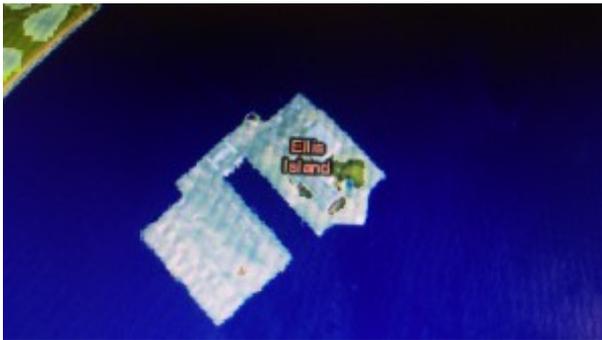
— Eastern Half of the Rockaways — 6FT Increase in Sea Level



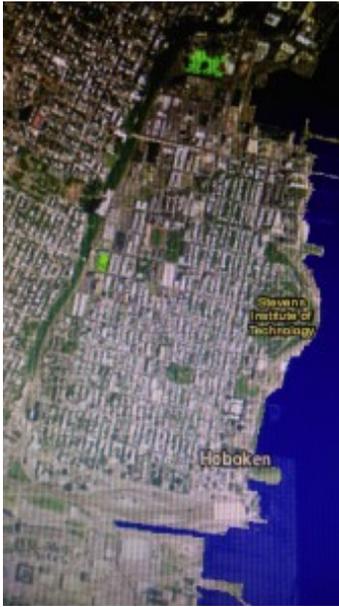
— Ellis Island — Current Sea Level



— Ellis Island — 3FT Increase in Sea Level



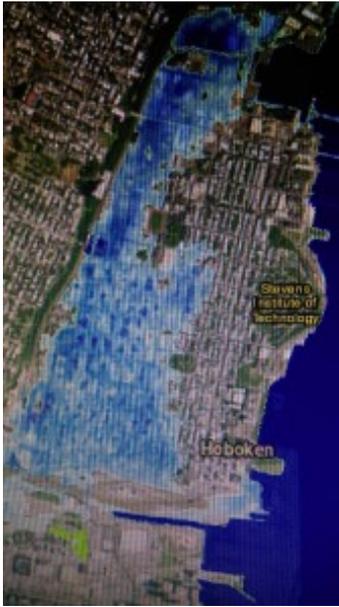
— Ellis Island — 6FT Increase in Sea Level



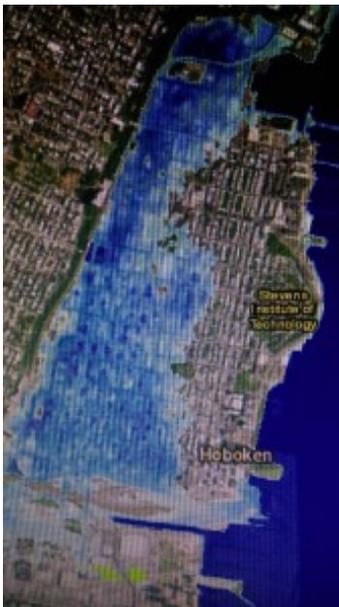
— Hoboken, NJ — Current
Sea Level



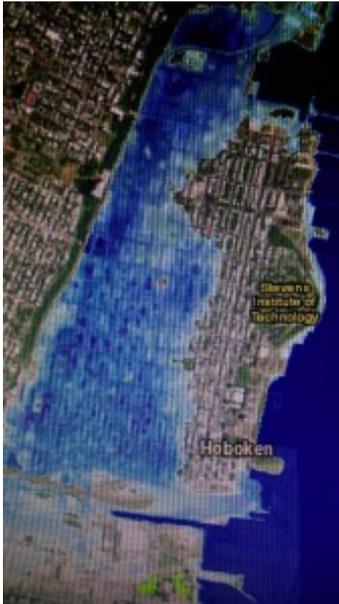
— Hoboken, NJ — 3FT
Increase in Sea Level



— Hoboken, NJ — 4FT
Increase in Sea Level



— Hoboken, NJ — 5FT
Increase in Sea Level



— Hoboken, NJ — 6FT
Increase in Sea Level

Posted in [Visionmaker Jamaica Bay](#)

Week 2 — Finalized Internship Plan as well as an Interesting Visit Outside of My Research

Posted on **July 8, 2015** by [Ibrahym Ahmed Sabha](#)

I apologize for the great amount of delay on posting about my second week with Cooperative Extension since Ramadan along with a few other outside time commitments can really slow you down quite a bit!

Department for Environmental Conservation (DEC) Meeting at Hunter College (6/24)

What I found to be most interesting throughout the DEC meeting at Hunter College is the discussion of the base sea level rise projections over the next 100 years. Not only has the City of New York experienced a 1.2ft sea level rise for over the past 100 years, but the rate at which the sea level is rising is also increasing. If we were to calculate the rate of sea level rise from 1880 up until 2012, the city experienced a sea level rise of 0.6 inches per decade. Now, if we were to narrow down this range of time to the past 20 years or so (1993 to 2012), the rate at which the sea level has risen increased to 1.2 inches per decade! This change may not sound like much to some, but over the next 100 years or



- Just crazy to imagine that a little 100 years from now, this can happen to lower Manhattan! Taken from DEC meeting presentation

so, NYC waters could potentially experience a 2ft+ increase in sea level. There's the potential for extreme changes, such as a 3ft, 4ft, or even a 6ft change in sea level when factoring in rapid snow melt from the arctic ice shelves, which can impose even greater danger, or even permanent inundation to low-lying communities such as parts of lower Manhattan, the Rockaways, and Coney Island! Above all, the frequency of storm surges weren't even factored in with the sea level rise projections throughout the DEC presentation. Storm surges in relation to climate change is a factor that cannot be ignored since there is the potential for more frequent, Hurricane-Sandy-like storm surges that can devastate the city **on top of sea level rise projections!**

This meeting has allowed me to consider a starting point of my research project, which is determining the effects of the base sea level rise projections as well as the frequency and strength of storm surges in low-lying communities. Once that information is found, perhaps figure out how soon would such effects impact these communities and thus, organize a plan to mitigate permanent inundation (i.e. construct a giant, hydroelectric dam/seawall around New York harbor).

Going Back in Time to High School was Pretty Fascinating — Why? (6/25)

Dr. Philson Warner from Cooperative Extension at NYC fascinated me as he showed me around his hydroponics and aquaculture labs at the Food & Finance High School.

Essentially located in the heart of Midtown, where you would expect dozens of gas-guzzling vehicles maintaining typical bumper-to-bumper traffic, Warner's hydroponics lab boasts the cleanest air quality in New York City! That's pretty remarkable given the amount of naturally regulated crops he grows inside there as part of his research as well as his consortium with Food & Finance high school students in his internship. Perhaps the most fascinating aspect of my visit is how he manages to allow his crops, such as lettuce, pineapples, and oregano, to grow far quicker and more abundantly than a typical crop a farmer would normally grow using natural processes that I cannot even explain due to its



- Dr. Warner explaining how his lettuce, separated by their ages, grow through normal, farmer conditions as well as his use of hydroponics technology! Taken on June 25th, 2015

staggering, but very clever complexity! Such an example of his marvel is that lettuce that a typical farmer grows would normally take around a month or so to fully mature, but lettuce that Dr. Warner grows through his natural processes take only two weeks to fully mature, ready to be consumed! Additionally, on an acre of land, a farmer would normally grow around 10,000 heads of lettuce compared to Warner, who would be able to grow 2 million heads in the same given area! Although somewhat unrelated to my project, I found this visit extremely interesting as it shed light to me an interesting aspects of biology, which I normally consider as downright boring (no offense to anyone passionate about this subject!).

FINALLY! (6/25)

As you may recall from my first week at Cooperative Extension, my intentions with this internship throughout the summer was still under the development stage. But now, after my very productive meeting with Jen Tiffany and my faculty advisor Art Degaetano, we were finally able to organize a more detailed idea of what will I be doing for the rest of my summer at CCE. The plan I intend to work with, which I like to call “the stools on a chair,” is as it follows:

1. **What I plan to do with Art:** Collaborate with him on the research question I created (see Week 1’s post) through extensive analysis of Horton slides, DEC Hunter meeting (sea level rise projections), as well as connecting with Dan Bater, who collaborates with NOAA, NASA, and Columbia University. Eventually meet with Bater to figure out what resources I can use to conduct my research (i.e. connecting with colleagues from any one of these 3 organizations). Final outcome that I hope to accomplish with this is to provide the City of New York insight on a plan they can follow to fully prepare themselves for the projected sea level rises as well as future weather events like Hurricane Sandy through the innovation of sustainable energy sources and thus, minimize dependence on fossil fuels. Additionally, I hope this would not only make the City of New York more resilient to such events and projections but also help mitigate/reverse the effects of climate change.
2. **What I plan to contribute to CCE:** Attend seminars held at CCE or other locations discussing the issue of climate change. Have informal discussions in the office about our projects as well as concluding the summer with another, final discussion on what we have done throughout the summer in each of our projects. Attend any climate-change-related meetings (or even other interesting meetings outside of my research) Jen invites me to whenever time allows to gain different perspectives of this growing issue or get a sense of what CCE does as a whole in their Cooperative

Extension program (great examples already done include attending meetings like with DEC at Hunter and the aquaculture and hydroponics labs at Food & Finance). Final outcome that I hope to accomplish with this is to become an active member in the CCE community, gain a better sense of what CCE does, as well as strengthen CCE's role with regard to climate-change-related issues preeminent to New York City.

Posted in **Visionmaker Jamaica Bay**

Week 1: Introduction and Organizing Our Thoughts

Posted on **June 19, 2015** by **Ibrahym Ahmed Sabha**

Who am I?

My name is Ibrahym Sabha, a rising sophomore in CALS who plans to major in Environmental Engineering with a triple minor in Atmospheric Sciences, Sustainable Energy Systems, and Mechanical Engineering. My passion involves discovering new, sustainable ways of powering our cars with alternative energy sources, such as seawater/freshwater technology, wind/electric hybrid technology, and steam technology. In turn, I hope that my contribution in any one of these technologies in the automotive industry will reduce our dependence in gasoline and thus, mitigate harmful effects of climate change.

My First Week at CUCE—NYC

It all began when Jennifer Tiffany sent me a PowerPoint presentation, called "Climate Change and New York City: 2015 Edition" by Radley Horton of Columbia University



- This is just an example of how the city, despite the fact it's already one of the most energy-efficient cities in the world, is so dependent on fossil fuels: the building where the CUCE—NYC office is located is receiving oil in order to power the building's electricity! Taken on June 18th, 2015

, that discussed the changes in climate that NYC will experience over the next 100 years. After reading through both the PowerPoint slides as well as a few other outside sources mentioned in the presentation, the information that I came across was pretty astonishing. Such details I discovered were the significant changes in the mean annual temperature, precipitation, and sea level, the health impacts on the public, how dependent NYC is on fossil fuels, and thus, how do they plan on preparing for future extreme weather events. It surprises me that the total mean annual temperature increased by 3.4F, total mean annual precipitation with an 8 inch total increase, and total sea level rise of 1.1 feet, all over the past 100 years. What's even more shocking is that even if we were to stop burning fossil fuels at this moment in time, we're locked in for at least another 100 years of such continuing changes. What that means is that, for example, during the summer, 90F+ weather will be pretty common in the city, with extremes breaking well past triple digits. Winters in New York would also change, with averages probably averaging in the mid-30s and rarer, if not impossible, single-digit extremes, which could potentially translate to less annual snowfall. Coastlines certainly have the potential to change or are at risk of changing, with areas like Staten Island, the Rockaways, lower Manhattan, and Jamaica Bay plagued with the highest probability of disaster.

More recently, the city was heavily affected by Superstorm Sandy. Power outages went rampant throughout the city, major tunnels were flooded out, NYC's vital transit system was shut down for a few days (some stations took months to recover), and long lines at gas stations—these were just a few examples of how New York suffered Sandy's aftermath. Among the large list of casualties the city had after the storm, the crippling of fossil fuels coming into the city is what mostly caught my attention. During my research outside of the PowerPoint, I came across an article on one of the city's resiliency plans, "Liquid Fuels," under PLANYC, which discusses the effects Sandy had on liquid fossil fuels, and how the city plans on better-managing this energy resource in future extreme weather events. It came to me as a surprise that throughout the entire reading, there was no mention of adapting to alternative, sustainable fuels or use of such alternate energy as an emergency backup. Instead, the city is more concerned about how they would have access to more fossil fuels during an extreme weather event like Sandy.

Pondering this lead me to the research question that I created and hope to answer by the end of the summer with the guidance of my faculty advisor, Dr. Art Degaetano: *"How can NYC better prepare for future extreme weather events through the innovation of sustainable energy sources and thus, minimize dependence on fossil fuels?"* Examples of how I hope to do this is through extensive research of past climate data, experiment different alternative sources of energy, such as pure electricity, water, and steam, in order to discover what source of energy is best to adapt for our future in terms of efficiency, emissions, and availability, as well as compose a scientific research paper in the end. On another spectrum of my internship, Shoma Allred, Jen, Dr. D, and I are still currently in the works of figuring out what specific role will I play in Shoma's project, "Visionmaker Jamaica Bay" under the Science and Resilience Institute, if I decide to take part in contributing.

Everything that was just mentioned in the previous paragraph is still in the development stage, but I have confidence that I will have a final plan for the summer by next week.

Posted in **Visionmaker Jamaica Bay**