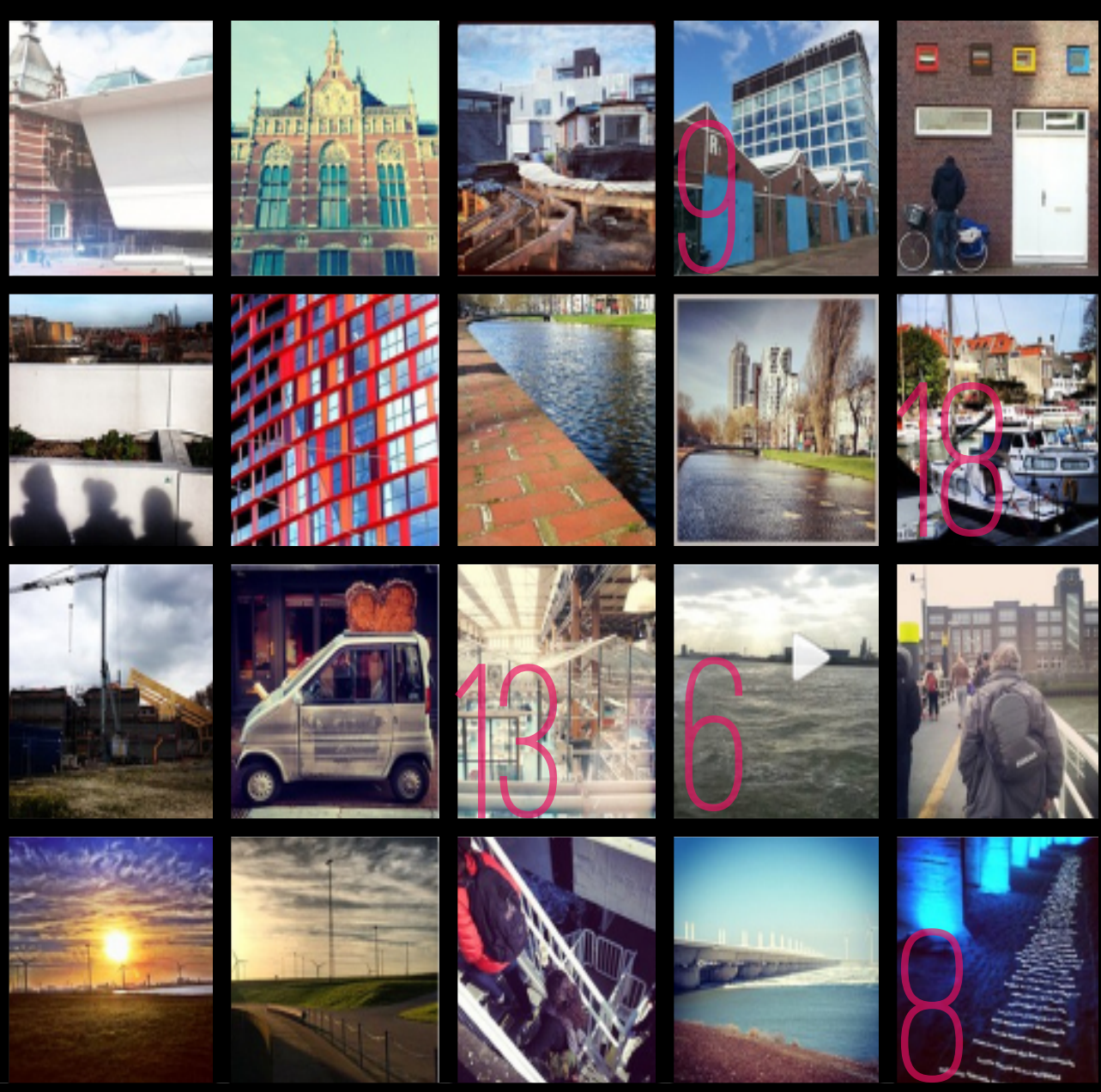




# ROTTER DAM

# X

**RAMP**



# RAMP ROTTERDAM EXCURSION

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# INTRODUCTION

In the aftermath of Superstorm Sandy, New York City's coastal communities were forced to reconsider relationships to their surrounding waters. The October 29, 2012 storm directly affected a wide variety of diverse social, economic and physical communities along the coastline of the New York City region. Low- and moderate-income families, including immigrant and non-immigrant, White, Latino and Black residents were adversely affected, as were many small businesses and manufacturing establishments. The community organizations operating within the most vulnerable and heavily impacted neighborhoods, with long histories of neighborhood advocacy and engagement, found themselves serving the roles of not just disaster relief but also of long term resilience planning. In the aftermath of the storm, the lesson was clear. These communities and other communities that were spared need to be better prepared for the future challenges associated with climate change. Also at this time, a parallel policy response from the Bloomberg administration offered visions of sea gates, walls and other new physical adaptations along our coastline. Their efforts culminated in the release of the Special Initiative for Recovery and Rebuilding report which focused on physical rather than community rebuilding.

Organizing community and advocating for policy change are roles that community organizations like Red Hook Initiative, GOLES (Good Old Lower East Side) and the Rockaway Waterfront Alliance are very familiar with, but the design and operation of water management innovations such as sea gates and walls was new territory which now required their attention. In the Spring of 2013, the students and faculty of Pratt Institute's Programs for Sustainable Planning and Development (PSPD) with its fifty-year history of working with community-based organizations committed to social, economic and environmental justice initiated a holistic effort to address the impacts of climate change and assist in the efforts to rebuild after the devastating destruction wrought by Superstorm Sandy. As part of Pratt Institute's Recovery, Adaptation, Mitigation and Planning (RAMP)<sup>1</sup> initiative, the PSPD sought to expose community leaders and community-based decision makers from coastal communities impacted by Superstorm Sandy to innovative ways of addressing climate change, sea level rise and related social and economic development opportunities via an excursion course to the Netherlands.

The Dutch, for decades, have demonstrated their expertise in innovative, large scale water management strategies. With over 50% of the population living several meters below sea level, leveling the flows of rainwater and rising seas is a national agenda. Their innovative Delta Works Plan includes a system of sea gates and walls, dikes, levees and water plazas which integrate public space, municipal infrastructure and landscape into the management of rainwater, rising seas and storm surge.

<sup>1</sup>RAMP is a Crisco Foundation funded effort in partnership with CSI to make sure that all recovery efforts communities of addressed the needs of low income areas and communities of color. RAMP recognizes that storms and natural disasters do not discriminate but that our responses often do. The KRESGE funded initiative is designed to address that issue.

With generous support from the Dutch Consulate's Office and some of the department's own resources, the PSPD, in March of 2014, was able to lead a week long excursion course to the Dutch cities of Rotterdam and Amsterdam. PSPD faculty members Gita Nandan, Jaime Stein and Ron Shiffman facilitated the trip, which included graduate planning and sustainability students, faculty from the School of Architecture and community leaders from Red Hook Initiative, GOLES and the Rockaway Waterfront Alliance. In addition to exposing community leaders and young professionals to innovative climate change adaptation opportunities, the program sought to:

- *Expose graduate students in urban planning, environmental management architecture to innovative ways of addressing climate change, sea level rise and related social and economic development opportunities.*
- *Gain a greater understanding of how adaptation to climate change can also lead to increased social and economic opportunities especially for here-to-fore marginalized populations.*
- *Enhance the exchange between New York City coastal communities and professionals engaged in adaptation and resiliency efforts and their counterparts in the Netherlands. And to provide an opportunity to build social cohesion within and between the two groups.*

As you will see in the following pages of student research and community leader reflections, the excursion course was full of opportunities to meet with Dutch innovators who are working within social, environmental, educational and economic development areas of climate change adaptation. These opportunities were made possible through a collaboration with the Economic Officer of the Netherlands Consulate General of New York, Arjan Braamskamp, and the former Director of Rotterdam's RDM Campus, Gabrielle Muris.

The trip, which is recorded in detail in the following pages, was an attempt to experience first-hand how the Dutch address these issues, learn from some of their experiences – both the successful ones and those that failed – and adapt some of their initiatives to fit into our local context. The purpose was to help build the capacity of the participants to address climate change, build a greater sense of social cohesion among the participants and tap their innate understanding of the issues to help forge a better understanding of the interventions – pedagogical, technical, programmatic and organizational – that we need to develop.

We hope this report captures the enthusiasm and excitement which we gained during our travels. Our experience in Rotterdam has ignited a global effort to continue these cross-cultural and interdisciplinary conversations through an extension of the RAMP initiative which we are calling the Delta Cities Curriculum

Sincerely yours,  
Gita Nandan, Ron Shiffman and Jaime Stein

# THE FERRY SYSTEMS OF ROTTERDAM & NEW YORK

Both New York and Rotterdam are served by ferry systems that seek to take advantage of each cities' location along major waterways. New York has seen a recent revival in ferry service that was spurred initially by privately-operated ferry services, and has since seen the publicly subsidized East River Ferry introduced to great success. The privately owned ferry service has focused on connecting areas with great density, including areas with significant existing congestion or areas where the costs in time and in fares of service provide a clear advantage over alternative. All of these private ferry services connect parts of New Jersey with Manhattan. The East River Ferry was started in 2011, and averages over 3,000 riders daily, connecting redeveloping parts of the Brooklyn waterfront with job centers in Midtown and Lower Manhattan.

The ability of the ferry systems to adapt to the effects of climate change and rising sea level will have a significant impact on their long-term viability within the city. New York City's 2013 Citywide Ferry Study did not directly address the impacts of future climate-related challenges on the ferry system, but did highlight the role that the ferry system has played during crisis situations and in providing redundancy to the transportation network in the aftermath of disasters, before acknowledging the difficulty in quantifying the future potential value of the service.



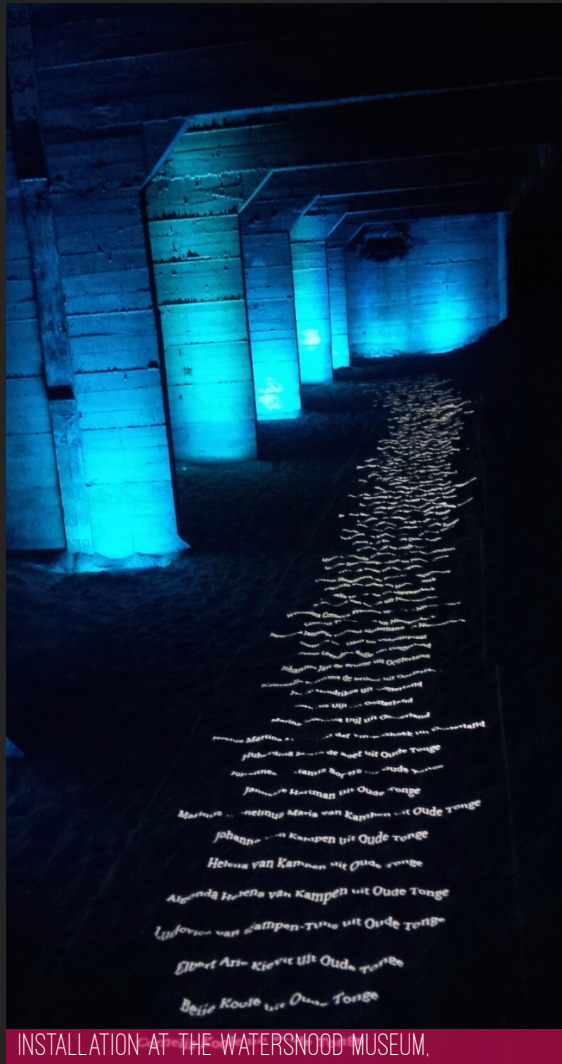
RAMP ROTTERDAM EXCURSION



Despite Rotterdam's far smaller size, it is also served by a robust marine transportation network. The privately operated Aqualiner service connects the downtown areas of Rotterdam to the redeveloping St. Jobshaven and Rotterdam-Zuid areas, as well as to the RDM Campus and neighboring Heijplaat community. The relatively new Aqualiner service, which began in 2008, was necessary to achieve the feasibility of the RDM Campus, as it provides by far the most time-effective mode of transportation between the residences of most of the students and employees of the facility and the physical space. The ferry also provides the opportunity to connect residents of the Heijplaat area to job opportunities. Both of these connective services are augmented by connections to the municipal transit system. Current ferry service in New York is limited to about 20-25 miles per hour, due to fuel efficiency. Most of the ferry service is provided on medium catamarans, with a capacity of about 150 passengers, although proposed rehabilitation plans would increase this capacity to 240. The Staten Island Ferry faces concerns about the conditions of their fleet, as the newest vessel was placed into service in 1965, and two crashes have occurred during the past decade. In contrast, the Rotterdam fleet is poised to upgrade. This innovative technology provides the opportunity for Rotterdam's ferry system to both help mitigate and adapt to climate change ●

BY: DYLAN CAREY

# DUTCH PUBLIC ARTS & CLIMATE CHANGE PREPAREDNESS



INSTALLATION AT THE WATERSNOOD MUSEUM.



GRAFFITI PIECE BY DUTCH ARTIST CES53.



RAMP ROTTERDAM EXCURSION



SIDEWALK BEACON MARKING A BOMB EXPLOSION



WE HART VAN ROTTERDAM HOOR I EL BONKT HET I

Since the end of World War II, public art and government support of art was very prevalent in the Netherlands. In 1949, government sponsorship of artists began. This was effectively a salary that the government paid artists to ensure their economic stability. Coupled with the reconstruction of destroyed city's like Rotterdam post World War II and the calamitous North Sea flood of 1953, public art and artistic pedagogy would play a crucial role in the development of a modern Dutch society. However, as the Dutch government begins to rely more and more on private investment and funding streams, the Dutch government's sponsorship of public artists has dwindled, and the program that subsidized their incomes no longer exists. Nevertheless, this is leading to more grass roots and ground up projects that do not rely on government funding, such as the Rotterdam "high line" and associated projects, and a plethora of community based initiatives in Amsterdam, particularly in the Noord area. Dutch citizens instill a high amount of trust in their government when it comes to the issue of flood protection and climate change adaptation. For this reason, many of them are not aware of certain facts about climate change adaptation issues, such as evacuation measures or the fact that they are living a few meters below sea level. For this reason, most public art doesn't necessarily focus on climate change awareness, or

BY: ADAM GARRETT

# STORMWATER MANAGEMENT & RECREATION

The city of Rotterdam has taken a unique approach to addressing Combined Sewer Outfall (CSO's) issues by tweaking the traditional interventions of grey infrastructure to serve more than their main use of water storage. Two examples of this are the Benthemplein Water Plaza and the Museumpark Garage CSO storage system. Evaluating both of these projects against the indicators of storage capacity, catchment area, topography, additional uses (non-water management), existing infrastructure requirements, allows for a greater understanding of how these projects could be related to the Gowanus Canal watershed.



MUSEUM PARK WATER RETENTION PARKING LOT



ROTTERDAM WATER PLAZA

RAMP ROTTERDAM EXCURSION



The Benthemplein Water Plaza is an above ground, upstream intervention type which diverts storm water for storage prior to it entering the sewer system. The water plaza allows for a diverse range of activities to take place when the weather is dry which has been a great asset for the community. Although the water plaza does great job storing water, it does ultimately release into the sewer system. If the water storage could be connected to green infrastructure projects, the water plaza would not need to be connected to any existing infrastructure and could help to cool the area and provide clean air. The Museumpark Storage Garage is a downstream below ground water storage facility that allows sewage and stormwater to overflow into its four storage tanks during wet weather events. The garage was built near a major sewer line and then equipped to serve double duty as a CSO tank when needed. This project has direct implications for the Gowanus Canal area as the canal is facing massive residential redevelopment, much of which will have on site parking. Because major sewer lines run along both sides of the canal, a parking garage storage system could be implemented. Both public spaces are magnets for the city's skateboarding community due to the similarities in design that skateparks and water management infrastructure share; sloping, smooth pavement, ledges, etc. Skateboarders could be natural allies in the water management advocacy realm as they could occupy and activate these spaces during dry weather ●

BY: JOSH EICHEN

## INCLUSIVE CLIMATE ADAPTATION & RESILIENCY STRATEGIES

Recent proposed flood adaptation efforts in both the Netherlands and New York City have largely focused on physical infrastructure that enables life by the water. They have sought to exploit the intersection of function and form—envisioning berms, dikes, retention pools, and permeable surfaces that also serve as spaces for entertainment, recreation, and other city infrastructure that enhance the “livability” of waterfront areas. These strategies to unite urban living with water, reutilizing harbors and historic waterfront parts, naturally attract tourists and more affluent groups enthused by the prospect of living by the water. To capitalize these benefits, governments have thus turned to private waterfront residential development as a strategy not only to address threats of climate change and reduce net costs in developing such capital-intensive projects, but also to boost its cities’ economy during financial crisis. Some examples of these projects proposed include Seaport City proposed by Michael Bloomberg in NYC, or De Sphinxen Luxury Housing block in Huizen. In fact, gentrification has become a prime strategy for the Dutch government to boost the economy by attracting a “creative class” into their cities. Climate change adaptation through physical infrastructure investment has the potential to benefit all residents; however, these projects often cater to the wealthy and can lead to gentrification and displacement of low-income, especially minority residents. Can climate adaptation better include



ROTTERDAM FLOATING PAVILLION

RAMP ROTTERDAM EXCURSION



STUDENT VOCATIONAL TRAINING AT RDM CAMPUS

How can climate adaptation better include the most vulnerable in our cities? How can waterfront safety and enjoyment also be accessible for low-income communities of color? How can it occur without displacement but rather through the strengthening of these communities’ adaptive capacities? This research explores the differing local contexts and lessons learned from Rotterdam and New York City climate change adaptation, focusing on the need for acknowledgement and initiative to strengthen the base for social resilience in low-income communities of color. Size and scope is an important difference, as climate vulnerabilities are more geographically and unequally dispersed in New York City compared to the Netherlands at large, enabling greater unity on the issue and prioritization in the federal government’s investment in resilience projects. Another important distinction is the strength of governmental institutions in the Netherlands and their stronger social welfare system that have enabled less concentration of poverty, a smaller inequality gap, and a more stable population relative to NYC. Another important difference is the level of citizen trust in government. The context that unifies Rotterdam and New York City is ultimately the opportunity for both cities to address how large investments in climate adaptation projects can go beyond flood prevention and crisis management, but will also address the long unaddressed issues in low-income minority communities ●

BY: GIOVANIA TIARACHRISTIE

# ADAPTING RDM CAMPUS STRATEGIES FOR NYC

The campus of RDM is located on the former shipyard of the Rotterdamsche Droogdok Maatschappij (Rotterdam Dry Dock Company). In its redevelopment, the new campus used the original abbreviation, RDM, to take on new meaning as a campus of Research, Design, and Manufacturing. The RDM campus is a unique model of the collaborative efforts on the part of the City of Rotterdam, and many partners. Through administration by the Port Authority of Rotterdam, with economic investments made by universities and manufacturers to create what is known as the “synergy” model. RDM prides itself on the interconnectedness between the educational sector, private entrepreneurs, and government.



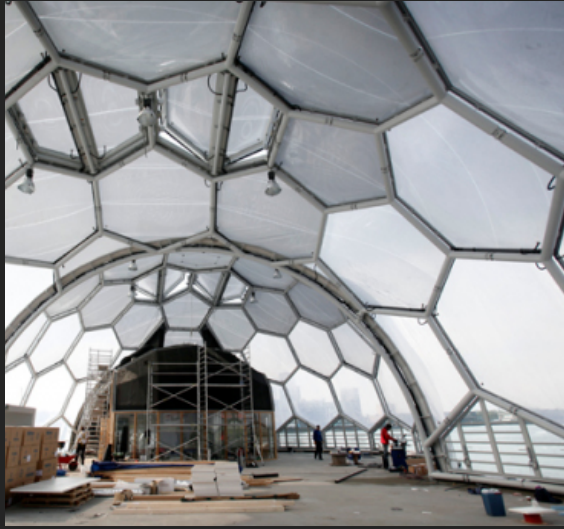
The most important strength of the RDM model is the city government support for the endeavor. The Port of Rotterdam being so large and important to the culture and economy of the city has allowed the Port Authority of Rotterdam to play an integral role in the development of the campus and in future economic development strategies on the water. RDM also serves an important role in preserving the industrial heritage of the city. Rotterdam is known for its famously striking modern architecture, and the city wanted to recognize that some of the most historical structures in the city are of an industrial nature. There are many strengths to the RDM model, and while a collaborative approach to the strategic planning of the overall campus stresses cooperation and process, there are some gaps in the actual implementation and execution. There is no formal employment assistance programs at RDM. Most of the companies that provide incubator space and training for research and development are multi-billion dollar international firms, and smaller local businesses are not well represented. Even though the RDM campus is located in the village of Heijplaat, there is a distinct skills mismatch between the village residents and the campus. These types of gaps are ones that can be seen as opportunities for improvement should this model be adapted for use in New York City, where our history of community organizations and social justice groups would be an vital part of improving these issues ●



BY: ROSA KELLY



## EXPERIMENTATION IN FLOATING STRUCTURES



Consisting of three clear half-spheres made of a lightweight material called ETFE foil, which is “approximately 100 times lighter than glass, so that the floating foundations requires only a limited thickness,” the pavilion is very light. Therefore, the structure can not only float easily, but it can be relocated as well. In fact, the structure will only remain in the Rijnhaven for five years. Not only this, but Rotterdam plans to build fully integrated floating districts where people will live, work, shop, and recreate. There are plans to expand the city’s residential size and floating urban development is a large part of the plan. With this in mind, the pavilion is to be a showcase and a catalyst for this type of development so that future Engidesigners can use the information gathered by it.



Due to Rotterdam’s positioning on the delta, the city has worked historically to keep water out by using many different means—dikes, sluices, levees, and now even massive floodgates and storm surge barriers. Because climate change is rapidly changing the state of the environment and cities, experimentation with new methods to adapt to the water must be a primary focus at this time. As such, the City of Rotterdam has partnered with private firms and universities to engineer experimental floating structures. The two elements that will be discussed are the already built Drijvende Paviljoen, or Floating Pavilion, as well as RDM’s Aqua Dock which has not yet been realized. The Floating Pavilion designed by architecture firms Deltasync and PublicDomain Architects, in the Rijnhaven and is part of a larger movement that recognizes that it must embrace water through architecture and design in order to prepare for climate change, especially at the rate climate change is occurring at this time. Rather than just keeping the water out, it now becomes crucial to engineer structures that will be able to float to combat imminent sea level rise. It is also important to not just build a structure with that in mind, but also ones that can be self-sufficient both in energy and waste. That said, the Floating Pavilion is a wonderful example of a floating structure because it was specifically designed with this in mind ●

BY: BENJAMIN WALLEN

## ADAPTATION IN PLACE: AMPHIBIOUS HOUSING



The impact of Hurricane Sandy was vast and far-reaching. Three hundred thousand homes in New York were either damaged or destroyed as well as an estimated 19 billions dollars in damages. After recent updates to FEMA maps, nearly 400 thousand residents and 67 thousand buildings now New York lie in flood prone areas. Beyond the New York Region, and the set of at-risk Coastal Northeastern Cities of the United States, there are growing migration trends towards both coasts and cities. A recent NOAA (National Oceanic and Atmospheric Administration) study reported that if current population trends continue, the U.S. coast will see population grow from 123 million people to nearly 134 million people by 2020. According to the report, 39 percent of the U.S. population is concentrated in counties directly on the shoreline. Urbanization in delta areas is taking place at an unprecedented scale and speed, exacerbating flooding. These trends, coupled with increases in global population, indicate a strong need to address the structures we live in. As we face increased extreme weather and rising levels, we must look to make our homes more resilient and responsive to sea level rise. Amphibious structures present an option to deal with both of these issues. Floating structures allow communities and their residents to adapt in place (reduces climatic displacement), reframing the way our society deals with water. Several Post-Katrina design initiatives dealt with issue of amphibious housing and could now be expanded and adapted to New York City and other regions. It will be particularly important to explore ways to retrofit existing homes ●

BY: CHRISTOPHER RICE

## DEVELOPING STORM PROOF UTILITIES

When comparing the general approaches to utility protection between Rotterdam and New York City, The Netherlands has taken an approach based in protection via large-scale infrastructure and policy requiring massive movement towards CO2 reduction and renewable energy. In the wake of many disasters including Super Storm Sandy and the Fukushima Nuclear reactor meltdown, the Dutch government has begun to reassess the protection of vital power sources, and is currently in the process of creating a new scale of evaluation for utility protection. The Netherlands are also amongst the first producers of natural gas to reduce their output due to seismic activity induced via drilling of shale.



GREAT FLOOD OF 1953



CON-EDISON PLANT EXPLOSION DURING SANDY

After years without damage from a natural disaster, New York City found itself extremely vulnerable when Super Storm Sandy hit the city in 2012. With the possibility of large-scale infrastructure many years away, New York has set taken to smaller scale measures to protect its utilities in times of disaster. The biggest of these measures is a recently passed bill that will require Con Edison to spend an additional 2 billion dollars on evaluating weaknesses in its electrical and gas utilities, and retrofitting them for greater disaster resilience. In the wake of Fukushima, Government officials have contemplated the closure of New York's closest nuclear power station, Indian Point, due to its potential vulnerability in earthquakes.

In the Netherlands, a mixture of large and small-scale infrastructure has allowed a country that has roughly half of its land beneath sea level to stay dry. The effectiveness of dykes, storm barriers, pumps, and green infrastructure, in combination with the creation of local water boards has allowed the Netherlands to flourish since its Sandy-like wake up call that came in form of the Great Flood of 1953. Despite the omnipresence of water in the Netherlands, the existence and constant attention paid to large scale infrastructure by the government has created a culture in which citizens are trusting and dependent on the government to protect them from the forces of water. During my time in the Netherlands, I found that this trust in infrastructure extends beyond culture and into other facets of Dutch life, perhaps most critically its utilities and transit infrastructure •

BY: THOM STEAD

## TONY SCHLOSS, RED HOOK INITIATIVE

I was not prepared for what we would see in Rotterdam, partly because of my lack of preparation (!), but also due to the enormity of the measures the Dutch had taken as a whole to protect themselves from the water. It was presented to us as a national agenda, a movement with the full support of its people, and with this they were able to create grand structures of climate change defense. Seeing this caused me to reflect on the fractious nature back in the states, and the tremendous political will power required of our leaders and too rare cooperation of its people to provide that level of security here in the states. Two ideas resonated with me the most, especially as it relates to Red Hook. First, the Water Plaza which doubles as a rain overflow catchment area seems an innovative and sensible solution to street flooding and sewer overflow, two common issues in Red Hook. Second, the mix of higher education and vocational training at the RDM campus struck me as an intelligent solution that could help grow the workforce here in America. What if Red Hook could be an epicenter for resilient or green technologies, attracting the brightest minds and training staff and providing skills to see those technologies created and installed? Finally, as the federal government creates its designs and plans for flood management here in New York, due to the trip to Rotterdam I feel I have information others might not, and a perspective that allows me to speak knowledgeably on the issue of flood management and risks. Surely that overstates the case, but I am markedly closer than I was before. ●



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## JEANNE DUPONT, ROCKAWAY WATERFRONT ALLIANCE

There is now one in the world I would have wanted to take this journey more than with Ron & Yvette Shiffman. The two of them warm my heart and to see the Netherlands with their insight and perspective was once in a lifetime. I was so honored to joint them, the Pratt-RAMP faculty, students, and community partners RHI and GOLES on this trip to learn more about what the Dutch Government has done to address the realities of climate change and to prepare for future storm surges. During our trip we had the chance to better understand motivation behind the Dutch. Driven by the destruction caused by the great storm of 1951, they began planning and developing massive infrastructure to protect their nation for the next 100 years. As a result, they have invested billions of dollars into their infrastructure, so they public perceive that they are safe from any future floods or disasters and have come to rely on their government to protect them. This was confirmed by the fact that the Dutch do not have any type of emergency plan. In addition to the massive infrastructure, the Dutch have also used innovative approaches to managing their water in the cities of Rotterdam and Amsterdam; water parks to collect rain water in flood events; parking garages that can also hold water for a period of time; permeable surfaces in playgrounds; manmade dikes and dunes. All of these seem replicable in the US and helped show some of the smaller measures that would be appropriate for local government in New York to invest in.

The trip was a great opportunity to not only meet with some of the people in the Netherlands who have spearheaded educational facilities such as RDM, but also spend time with our NYC community partners to discuss ways to build a more comprehensive network to support some of the most underserved communities in future disasters. I think one of the most important things that came out of our trip was the connections with made with other NYC partners such as RHI and GOLES. As we traveled together we were able to talk candidly about the challenges each of us were faced with and discuss how to implement grass root strategies back home in New York to help our communities. It also gave us time to reflect on how to improve on the systems we have in New York City. For the most part, we have no protection from disasters, our government has not built up the type of infrastructure the Dutch have so we really have no one to count on but ourselves. This makes network of families, friends, neighbors and community so much more important. Because in times of emergency, we will need to work together. Many of the people I traveled with became good friends who I know I can count on in the future. Thank you Ron, for including me in this amazing group of people. This is a trip I will treasure forever. ●

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