Thank you
The Upper Manhattan Project

- 3-year process to define and implement beginning stages of resilience plan for community
- Creating a model for equitable resilience and for transdisciplinary collaboration
- Platform for wide-scale action

(Began 2015 - Ongoing)
Defining Resilience

- Overcoming social **AND** environmental threats

- Solutions that address the root causes of social inequality and meet fundamental community needs
Community-based Planning

- Community establishes planning framework/process and key issues
- Private and public partnerships, including governmental agencies provide resources, capacity, and collaborative effort
- Community participants define integrity of plans and process for moving forward
- Creative engagement

(See Jemez Principles)
Environmental Justice

- Disproportionate impacts of climate change on:
  - People of color
  - Low-income earners
  - Women/LGBTQ community
  - People with differing abilities
  - Indigenous communities

(See Principles of Environmental Justice)
A. Upper Manhattan Map

Critical infrastructure such as waste treatment facilities, energy systems, and transportation routes, will be increasingly disrupted by climate change.

Many communities with affordable housing are concentrated in areas that will experience more floods and evacuations in the future.

Areas outside of the flood zone are still at risk from heatwaves and increased precipitation.
Sea Level Rise

Sea levels were 18 to 27 feet higher 120,000 years ago.

Sea levels may rise:
- 2 feet by 2050
- 6 feet by 2100

Millions of New Yorkers could be climate refugees.

Hudson River and Long Island Sound ecosystems disrupted.

In 2016 five states had rainfall expected once every 500 years.

Extreme Precipitation Days:
- 1.5x more frequent by 2060
- 2016: 1
- 2080: 18

Coastal flooding frequency:
- 2016: 1
- 2080: 18x

Upper Manhattan Sea level rise simulations:
- 2 feet rise
- 9 feet rise

West 206th Street and 9th Avenue // Elevation 3 feet
West 130th Street and 12th Avenue // Elevation 7 feet
138th Street and Harlem River Drive // Elevation 0 feet
110th Street and FDR // Elevation 0 feet
Social-Economic Inequality

### Poverty Rate in Upper Manhattan is Over 30%

- **NYC**: 25%
- **Washington Heights**: 30%

Source: NYU Furman Center

In Manhattan, the top 5% of households earn $860,000 per year, or 68 times as much as the poorest 20%.

- **20%**: Poverty
- **88%**: Not in Poverty

### Underbanked Households

- **NYC**: 11.7%
- **Central Harlem**: 20%

*Households relying upon non-banks for crucial financial services such as cashing a check or purchasing a money order.

### Average Income

- **Annual income for majority per block**
  - $7,000 - $14,000
  - $14,000 - $20,000
  - $20,000 - $26,000
  - $26,000 - $30,000

### Median Family Income in East Harlem is $23,000 Per Year

- **Living wage in NYC including cost of living**
  - $60,000/year person with one child
  - $30,000/year individual

- **Federal Poverty Level**
  - $11,880/year person with one child
  - $16,020/year person with one child
Anti-Displacement

### AVERAGE RENT INCREASE FROM 2000 - 2012

<table>
<thead>
<tr>
<th>Location</th>
<th>2000</th>
<th>2012</th>
<th>2015</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYC</td>
<td>87%</td>
<td>94%</td>
<td>7%</td>
<td>24%</td>
</tr>
<tr>
<td>Central Harlem</td>
<td>44.7%</td>
<td>104.2%</td>
<td>2012</td>
<td>2012</td>
</tr>
<tr>
<td>East Harlem</td>
<td>104.2%</td>
<td>94%</td>
<td>2012</td>
<td>2012</td>
</tr>
<tr>
<td>Washington Heights</td>
<td>24.1%</td>
<td>94%</td>
<td>2012</td>
<td>2012</td>
</tr>
</tbody>
</table>

### AVERAGE RENT INCREASE IN NYC FROM 1990 - 2012

- 2000-2012: $x \times 9$
- 1990-2000: $x \times 1$

### MEDIAN RENT FOR ONE BEDROOM APARTMENT

<table>
<thead>
<tr>
<th>Location</th>
<th>Year 2000</th>
<th>Year 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Harlem</td>
<td>$1,600</td>
<td>$2,300</td>
</tr>
<tr>
<td>West Harlem</td>
<td>$1,500</td>
<td>$2,175</td>
</tr>
<tr>
<td>Central Harlem</td>
<td>$1,450</td>
<td>$2,100</td>
</tr>
<tr>
<td>Washington Heights</td>
<td>$1,300</td>
<td>$1,750</td>
</tr>
</tbody>
</table>

### RENT BURDENED RESIDENTS IN UPPER MANHATTAN

- 0%: Rent is affordable
- 25%: Rent is affordable
- 50%: Rent is affordable
- 75%: Rent is affordable
- 100%: Rent is unaffordable

### RENTS IN EAST HARLEM ROSE 5.5% FROM 2015 TO 2016

### TO AFFORD A RENT OF $2,300 LANDLORDS CAN REQUIRE A TENANT TO EARN 40 TIMES THAT AMOUNT, WHICH IS $92,000 A YEAR

### Rent Burden

- Map includes gross rent as % of median household income for households earning less than $50,000

- 30% - 33%
- 33% - 34%
- 34% - 37%
- 37% - 40%
- 45% - 50%
- 45% - 50%
- Community Districts
- NYC Parks
- NYCHA Developments
- HDFCs
- 12 yrs Old Developments
- 18% Vacant Units
- Proposed Rezonings
- Flood Hazard Lines
- Proposed Rezonings
3. Upper Manhattan Climate Action Plans

- Energy
- Emergencies
- Heat
- Food and Waste
- Social Hubs
- Green Infrastructure
- Governance
- Housing
- Waterfronts
The Partners

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Collaborating organizations include: WE ACT for Environmental Justice staff and members, Kresge Foundation Environment Program, Solar One, Columbia University, The New School, Buffalo State University, Fordham Law School, City University of New York, Pratt Institute, NYS Energy Democracy Alliance, NY Renews, NRDC, Morgan Stanley Children’s Hospital, Asociacion de Mujeres Progresistas, Mount Sinai Children’s Environmental Health Center, Brotherhood Sister Sol, Center for Social Inclusion, ALIGN, New Economy Project, WHEELS, Take Back the Land, Grassroots Global Justice, UHAB, Peoples Climate Movement NY, Corbin Hill Food Project, Red Hook Initiative, NYC Community Land Initiative, Picture the Homeless, NASA, Community Voices Heard, Mayday Space, The Point CDC, Fifth Avenue Committee, American Institute of Architects - NY Chapter, 32BJ, Manhattan Community Boards 9, 10, 11, and 12, NYC Department of Health and Mental Hygiene, Office of Emergency Management, Department of City Planning, Mayor’s Office of Recovery and Resiliency, Department of Environmental Protection, NY State Energy and Research Development Agency, and many others.
Energy

A key element in climate resilience is transitioning our energy system from being based on fossil fuels and a centralized grid system to one based on renewable energy and distributed generation. Renewable energy systems can reduce carbon emissions, mitigating climate change, while also creating new industries that are managed communally.

Over the next several decades, billions of dollars will be invested in designing, building, and maintaining new energy systems. These systems can double-down on the centralized grid, gas, oil, and nuclear systems that New York State is already dependent on, or they can be transitioned to sources of renewable energy that are not managed by large bureaucracies, but rather by community-based institutions that can reinvest resources back in the community, including in the form of access to financial capital, jobs, educational opportunities, and more.

Tenants of affordable housing will experience more of a cost burden for energy and a greater likelihood of blackouts as temperatures go up. Renewable energy can reduce energy costs, prevent blackouts, and create local jobs.

New York State is investing millions of dollars in creating microgrids where blackouts occurred during Superstorm Sandy. With greater community participation microgrids can be located in the right places to protect the people at the greatest risk of suffering.

Local financial institutions can provide non-predatory loans for green energy systems.

Energy democracy is when residents of an area have a greater voice in deciding how energy is generated and how the energy system is managed.

Organizing residential and commercial tenants into consumers and producer cooperatives can increase investments in energy, reduce costs, and provide needed ownership and employment within energy industries.

Social Hubs can support community members in organizing and installing a “shared solar” system.
Energy Democracy

**Average Cost of Electricity in 2016**

<table>
<thead>
<tr>
<th>State</th>
<th>Cost (cents/kWh)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>7.5</td>
<td>1%</td>
</tr>
<tr>
<td>National Avg</td>
<td>10.5</td>
<td>4%</td>
</tr>
<tr>
<td>New York State</td>
<td>15.5</td>
<td>26%</td>
</tr>
<tr>
<td>Hawaii</td>
<td>19.5</td>
<td>26%</td>
</tr>
</tbody>
</table>

**Con Edison is spending $1,000,000,000 upgrading substations and other distribution equipment after damage from Sandy.**

**The NY-Sun Initiative aims to add 3 gigawatts of small-scale solar across the state by 2023.**

66% of NYC's buildings can support solar panels, making 5.847 megawatts of energy. That amount can supply 50% of peak demand and 14% of the city's annual electricity use.

**Only 26 solar systems have been built in Upper Manhattan.**

Low-income New Yorkers pay up to 13% of their income on energy. The average family in the US pays 1.5%.

5 solar installers were operating in NYC in 2005, by 2015 the number grew to 55 companies and 2,700 workers.
Emergencies

On September 11, 2001:
500,000 PEOPLE WERE EVACUATED OUT OF MANHATTAN IN 9 HOURS BY HUNDREDS OF BOATS

3 MILLION PEOPLE MAY BE WALKING DURING A LARGE SCALE EVACUATION

23 RECEPTION CENTERS & SHELTERS ARE AVAILABLE IN AN EMERGENCY

THE CITY HAS PLANS TO MOVE 400,000 TO 2,000,000 PEOPLE FROM THE PATH OF A HURRICANE

One report stated that:
1 MILLION PEOPLE COULD BE EVACUATED FROM DANGER ZONES WITHIN 1 HOUR

20% OF NEW YORKERS LOST ELECTRICITY AFTER SUPERSTORM SANDY

SEPTEMBER 2005: 3 MILLION EVACUATE TEXAS AND LOUISIANA BEFORE HURRICANE RITA. THIS IS THE THIRD LARGEST PEACETIME EVACUATION IN HISTORY.

OCTOBER 2016: 2.5 MILLION EVACUATE FLORIDA, GEORGIA AND S. CAROLINA BEFORE HURRICANE MATTHEW. THIS IS THE SECOND LARGEST EVACUATION IN U.S. HISTORY.
Community Emergency Preparedness Systems

Emergency Preparedness Information Kiosk (EPIK)

In order to prepare for an emergency, community residents in West Harlem are developing an installation that can support emergency preparedness training, education about climate change, and key services, including reliable communications. Equipment includes two-way radios, solar power, and battery storage, rain water collection, miscellaneous storage space, and other infrastructure that can be utilized by community organizations, tenant associations, and other local groups to help each other plan for safety and navigate moments of crisis. The installation can be replicated in other places to support hyper-local action.

Communications

An emergency communication system enables one-way and two-way communication of messages when normal communications systems, including telephone and Internet, are not functional. Storms, earthquakes, weapons attacks, and other events can physically damage infrastructure that makes communicating impossible, or they can cause high call volume, which can also take down a communications system. The equipment pictured here can maintain communications during those times. They include: two-way radio, short-wave radio, and HAM radio.

Electricity and Supplies

Solar panels and battery storage systems can provide electricity for emergency communications, light, heat, and preservation of medical supplies, among other vital services, when the main energy grid has gone down due to an emergency. When there isn’t an emergency this technology and serve as a demonstration project teaching about renewable energy.

Programming

Provide space and resources for programming including education, entertainment, research, and other activities that bring people together to discuss climate change and preparedness. Pictured here the Gramsci Monument installation in the Bronx.
Case Study: Red Hook Initiative (RHI)

The Red Hook Initiative has been pioneering a combination of community programming and physical infrastructure to prepare Red Hook, Brooklyn, for their next emergency.

To-date they have launched “Local Leaders”, a bi-annual emergency preparedness training series conducted in English and Spanish for NYCHA residents to become leaders of the response and recovery efforts of any emergency or disaster. Over 125 Local Leaders have participated in the program, including partners such as NYC agencies, EMTs, FDNY, and organizing groups.

Another major project of RHI is the development of a microgrid for the Red Hook Houses, which were severely damaged after Superstorm Sandy. The Federal Emergency Management Agency (FEMA) has awarded a $436 million contract for “new playground equipment, sidewalks, renovation of floor and flooring … new boilers, additional flood protection as well as building two new power plants.” The plan includes 12 new “utility pods” that will distribute green energy and will be elevated in order to be avoided flooding in the future.

The new energy infrastructure will also support a community-wifi program created by Red Hook to ensure communications in preparation for and during an emergency. The wifi system is also paired with physical messaging boards placed around the community. The digital and physical messaging boards allow community members to share resources, including skills that can help train their neighbor in preparedness. The messaging board allows communities to take agency over the services that are provided and allow for rapid action during a crisis.

Other activities of RHI include mobilizing community power and local networks to distribute food and financial support, staff the NYC Recovery Center, connect unemployed residents to recovery jobs, and provide social service case management. More at: http://rhicenter.org/

Top: Red Hook Initiative Offices; Middle: Website for the Red Hook Hub where people can exchange messages in support of emergency preparedness and outreach activities; Bottom: Microgrid infrastructure planned for Red Hook Houses.
Buildings in urban areas absorb heat during the day and emit heat at night. This causes temperatures in cities to be much higher than surrounding areas and poses a serious public health risk.

People at risk of the Urban Heat Island (UHI) effect include people without air conditioning in their home, people who spend long hours outdoors, the elderly who may suffer from other health complications, and other people with unsafe indoor air environments and the lack of resources to improve their conditions.

Historically there has been an underinvestment in trees and green infrastructure based on race and class. These areas have more concrete and impervious surfaces, which makes for hotter surface temperatures and ambient areas.

Green roofs and the use of lighter-colored surfaces in urban areas, which reflect more sunlight and absorb less heat.

The Upper Manhattan electrical distribution system (the grid) is the oldest in the nation, making it more susceptible to blackouts and service disruptions than other places. Solar energy can reduce the likelihood of a blackout by reducing the strain put on energy infrastructure by hot weather, and by connecting with storage systems which can provide energy if there is a blackout.

Green infrastructure in areas with a lot of pavement and other impervious surfaces can help prevent flooding while reducing temperatures. Temperatures along the waterfront can be 10 degrees cooler.
Urban Cooling Techniques

Urban Design
Designing streets so they align with wind patterns can improve air circulation and reduce daytime temperatures. Open spaces and certain architectural features can also improve circulation. This allows maximum penetration of winds, which carry off heat and lower ambient air temperatures.

White Roof
Coating a roof with white reflects sun back into the atmosphere. This reduces building temperatures and energy use. This type of albedo modification can make a white roof up to 10°C cooler than an asphalt roof, and reduces ambient air temperatures by at least 1°C.

Green Roof
A green roof or living roof is partially or completely covered with vegetation and a growing medium that is planted over a waterproofing membrane. It may also include additional layers such as a root barrier and drainage and irrigation systems. Green roofs combat the urban heat island by cooling the atmosphere and reducing the heat transmitted into the building. Around a green roof, the heat evaporates the water in the roots of the plants which emit cool air. Using infrared technology the image below shows over a 15°C heat difference between a standard asphalt roof and a green roof.

Walls and Insulation
Modern materials exist that can cool buildings by increasing ventilation, preventing air leaks and blocking the interior of a building from extreme temperatures. An example is this new brick design posted at archdaily.com.

Ventilation
Proper ventilation is necessary for healthy indoor air quality and energy conservation. Window openings that are large and oriented to the direction of the wind capture the most air. Air ducts should be sealed to prevent leaks, and HVAC system cleaned regularly so bacteria isn’t spread throughout the building.

Street Trees/Plantings
Trees and vegetation lower surface and air temperatures by providing shade and evapotranspiration. Shaded surfaces can be 20–45°F (11–25°C) cooler than the peak temperatures of unshaded areas. Green surfaces can reduce peak summer temperatures by 2—9°F (1—5°C). Trees and vegetation should be planted in strategically according to which communities are most at risk, including working class neighborhoods, areas prone to blackouts and flooding, and places where homes may have high energy bills and/or a lack of air conditioning. Image: Columbus, Ohio.
**Agricultural Impacts**

**The U.S. food system contributes nearly 20% of the nation’s CO2 emissions; on a global scale, land use contributes 12% of CO2 emissions.**

6M hectares (14.8M acres) of new farmland will be needed around the globe every year to keep up with new demand. As of now, 12M hectares a year are lost through soil degradation.

Manure accounts for about 14% of total greenhouse gas emissions from the US agriculture sector. Smaller sources of emissions include rice cultivation, which produces CH4, and burning crop residues, which produce CH4 and N2O.

**New York State Has:**
- 7.2 million acres of farmland, almost one-quarter of the state’s total land area
- 59% of farmland is dedicated to crops, 22% is woodland, 10% is pastureland, and 9% is for conservation and other uses
- More than 205,000 acres of certified organic farmland
- The average size of a farm in NY is 202 acres
- More than half of New York’s farms are smaller than 100 acres
- $5.4 billion in agricultural commodity sales in NY during 2012
- The total estimated agricultural impact in the state was $37.6 billion in 2011
- As of 2012 NY had more than 35,500 farms
Case Study: Corbin Hill Food Project

Corbin Hill Food Project is a food hub that connects the fresh produce from local and regional farmers to food desert in Harlem, Washington Heights and the Bronx. Corbin Hill seeks to utilize their own land and other agricultural resources in New York State to produce affordable, nutritious food. Their coop also reduces the distance food travels from farm to plate, which cuts down the pollution produced by our food system.

Corbin Hill "collects and delivers fresh farm food, simultaneously accomplishing two missions: linking local farmers to new customers and providing food for people who reside in places with limited access to fresh farm food and who have low incomes." Corbin Hill allows individual or group orders, and even wholesale orders in bulk. Variety of vegetables and fruits are offered, as well as fresh USDA organic turkey meat. To date, Corbin Hill has developed a network of 30 family-owned New York farms and deliver food to more than 47,000 individuals in Upper Manhattan. They have partnered with community organizations to create tailored boxes, which sell at a price much lower than the standard price. For example, by working with Harlem Children’s Zone, they have been able to get fresh produce to families of Headstart kids – kids whose parents may not always be able to afford such things, especially when sold at standard grocery prices. Through other partnerships, they are also able to offer boxes for seniors are priced at $8 and family-specific boxes, range from $14 to $20.

Food coops usually have the following benefits:
* Open membership
* Member Ownership - Each member has an ownership stake
* Member Control: A co-op share comes with the right to vote for the organization’s leaders, board members, and strategic initiatives
* Commitment to Education, Enrichment, and Community Development
* Focus on Local, High-Quality Food and Products
* Supporting Local, Small-Scale Agriculture

More at: http://corbinhill-foodproject.org/

Top: Members of Corbin Hill working at the cooperatively held farm in Upstate New York. Bottom: coop members pick up their farmshares at a distribution point in Harlem, New York.
Social hubs can exist in brownstones or larger buildings that have space to support diverse programming. They can also be included within new
Case Study: Immigrant Movement International

Immigrant Movement International (IMI) is a community space and think tank that "recognizes (im)migrants' role in the advancement of society at large and envisions a different legal reality for human migration; increase the visibility of immigrants; raise public awareness of issues pertinent to immigrants through different zones of contact."

The space was developed by Cuban artist Tania Brugera, in partnership with the Queens Museum, as a method of engaging/supporting local immigrant populations in Corona, Queens. The space, a former beauty supply store, has classroom and storage facilities, and is strategically located near key public spaces, transportation, and the Queens Museum. IMI offers comprehensive educational programming including English classes, computer instruction, legal help and impromptu performances, health, and legal services. These programs are offered at no cost in order to empower immigrants personally and politically; community space where practical knowledge is merged with creative knowledge through and with a holistic approach to education open to all regardless of legal status.

Programming also works to link isolated Latin American populations with local Asian cultures. It does this with art, such as theater workshops that function as safe places to work out stress, reimagine reality and rehearse political interventions.

The IMI manifesto states their main goals are free movement, right to be included, the right to be an explorer. They believe that means movement and the functionality of international borders should be re-imagined in the service of humanity. The driving motto of the organization is that "the right to be included belongs to everyone."

More at: http://immigrant-movement.us/wordpress

Images of the IMI workshop space at Roosevelt Avenue and 133rd St in Corona, Queens.
Infrastructure

Geology of Manhattan

Pinehurst Avenue and West 183rd Street in Bennett Park, is the highest natural elevation in Manhattan at 265 ft.

Cameron's Line

Running along 125th Street, through layers of schist, lies Manhattan’s fault line. In 2001, it experienced a magnitude-2.4 tremor.

Schist is a medium-grade metamorphic rock with medium to large, flat, sheet-like grains. It has a consistency that presents challenges for water absorption and green infrastructure.

Images of Manhattan before it was developed by European settlers. It was then known by indigenous peoples as Mannahatta, which means the land of many hills. In the images it is apparent that areas like East Harlem (above), Inwood (top), and West Harlem, are at low elevations and contain sensitive coastal environments. More at https://en.wikipedia.org.
Green Infrastructure Types

Green Roof
Green roofs can intercept between 15% and 90% of rooftop runoff. Absorption will vary based on the type of growing medium and plant cover variability. Targeted green roofs can make sure high-risk areas are protected.

Rain Garden
A rain garden is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas, the opportunity to be absorbed. The soil depicted on page 82 makes it difficult for rain gardens to effectively drain water in some areas.

Permeable Materials
Permeable materials describes a range of pavements and other building techniques that allow the movement of stormwater through the surface of a material into natural filtration. In addition to reducing runoff, they can trap suspended solids and filter pollutants from the water. Permeable paving can infiltrate as much as 70% to 80% of annual rainfall. Construction costs may be 50% more than conventional asphalt and concrete. Permeable pavements may give urban trees the rooting space they need to grow to full size.

Community Garden
A community garden is any piece of land gardened by a group of people, utilizing either individual or shared plots on private or public land. Gardens play a critical role in stormwater management both in absorbing water and in bringing people together to deal with the aftermath of a major climate event.

Coastal Buffers
Measures aimed at protecting the coast against coastline retreat, floods, loss of biodiversity, and more. Buffers are a natural method, as opposed to building hard infrastructure, the coast, and the hinterland from erosion. Buffers can include landscaped areas and natural wetlands, to name a few.

Daylighting
Deliberately exposing some or all of the flow of a previously covered river, creek, or storm water drainage that were buried in culverts or pipes, covered by decks, or otherwise removed from view. Daylighting re-establishes a waterway in its old channel where feasible, or in a new channel threaded between the buildings, streets, parking lots, or other hard surfaces. Some daylighting projects recreate wetlands, ponds, or estuaries. All require the removal of concrete, or de-paving. Pictured here is the Cheonggyecheon River in Seoul, South Korea, which was once covered by a freeway, and the Saw Mill Creek in Yonkers, New York.
Case Study: Water Square, Rotterdam

Rotterdam, Netherlands is one of the wettest cities in Europe. The city has taken an innovative approach at The Benthemplein Water Square, “the first water square in the world”.

This public space is composed of three basins. During dry days they serve as a basketball court, skate park, and performance arts podium. On the rainy days, via stainless steel gutters, the square (basins) absorbs the rain water from the atmosphere as well as the rain water from roofs from the nearby buildings. In this way, the rain water during heavy rains is retained which mollifies city’s sewage system during peak rainy days. The storage capacity is 448,000 gallons. After the rains, the absorbed water in the square is poured out in underground infiltration, but is also used for watering nearby trees.

The largest and deepest pool occupies the center of the square and is only filled when there is a lot of heavy rain, which turns a “water wall” on one of its four sides into a spectacular, abundant cascade. On the northern side of the square, just in front of the main entrance of the church, there is a smaller pool, trapezoidal in shape, and also with tiered seating, as well as a central island which can be used as a stage for dancing. When the third pool is dry, it is used by people who practice their skills on bicycles, skateboards, rollerblades, and other wheels.

All the water-bearing elements have a shiny metallic surface, while the ponds are finished in different tones of blue. The pre-existing trees remain in their former places but are now surrounded by garden plots with tall grasses, flowers and continuous concrete benches.

In New York, the city has an ambitious plan to build a park within a ten minute walk for every resident. This means that many new public spaces will be built in places like East and Central Harlem. These spaces each present an opportunity to build green infrastructure that cools temperatures and retains stormwater.

More at: http://urbanisten.nl/

Top: A basin that doubles as a gaming court in Water Square.
Middle: The gaming court holding water after a heavy rain.
Bottom: Section diagram showing the multiple water drainage and storage facilities that are integrated into the park as useable space or aesthetic features.
Waterfronts

Coastal Protection

Waterfront Barriers
Hard infrastructure will have to be built along coastlines to protect from rising sea levels. This example of a waterfront park in Annapolis, Maryland, demonstrates how hard infrastructure can be multipurpose by also creating public space, exhibiting art, and supporting transportation.

Integrated Buffer Systems
The city government, with support from New York State and federal agencies, is spending billions on a range of micro and site-specific flood damage solutions for Lower Manhattan and other areas hard hit by Sandy. Some of the solutions are permanent with others being deployed during storms. They include raising streets, making buildings more resilient, improving drainage and pumping facilities, raising streets along the waterfront, and deploying temporary flood walls when necessary.

Aquatic Ecosystems
Coastal ecosystems, including those underwater, can create a buffer to storm surges. Creating oyster beds, mussels, and eelgrass tidal marshes, for example, attenuates waves and cleans millions of gallons of harbor water by harnessing the biotic filtration process. These projects can also stimulate biodiversity and help revitalize NY’s marine economy.

Natural Buffers
Wetlands can serve as buffer areas to protect against storm surge by being a transitional zone between dry lands and areas dominated by rivers or estuaries. When natural buffers are eroded, as was the case in New Orleans before Hurricane Katrina, urban areas feel the full brunt of a hurricane’s winds and storm surge.

Floating Architecture
With floating architecture, local coastlines become an asset in the face of climate change instead of a vulnerability. Buildings that have flotation systems, or buildings that are considered “permanently moored” and not usable in navigation, can serve as a barrier to coastal flooding, while also providing critical resources like housing, urban farms, open areas, industrial facilities, and more. Floating buildings are usually towed into location by another ship.
135th Street Marine Transfer Station

One opportunity for community waterfront redevelopment is the 135th Street Marine Transfer Station. Local groups have long been planning for its redevelopment as an environmental center with hydroponics and aquaculture center, a boathouse, a recreational facility, exhibition space, and other facilities. The 20,000-square-foot space, which served as Manhattan’s only round-the-clock garbage depot, has been vacant since 1999 and has become a hazard for the fragile Hudson River ecosystem. The facility has been decommissioned as a waste facility by New York State and is currently in possession of New York City’s Department of Citywide Administrative Services (DCAS). As West Harlem gentrifies, there is more interest in waterfront redevelopment, however the facility, which caused decades of pollution, should be developed according to local plans, which include access and ownership over the future community center’s resources, space, and programs.
Work with Aurash moving forward

- Resilience workshops
- Curriculum development / Education
- Research
- Partnership facilitation
- Project design / implementation
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Cornell University
Community and Regional Development Institute
October 11, 2018