

Getting Ready for the Next Sandy!

Proactive response: where education meets science and society

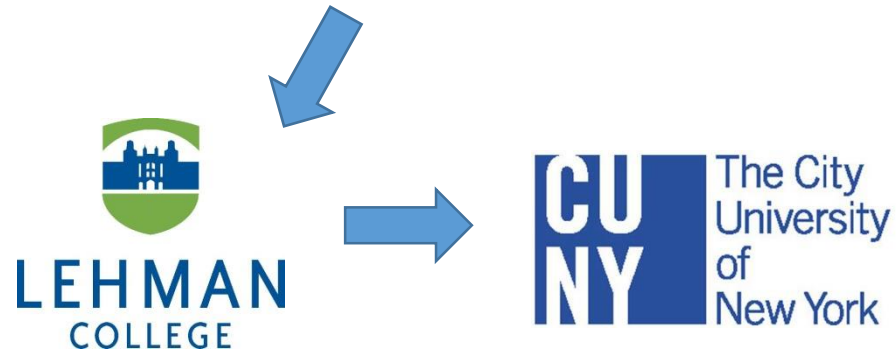
Professional Development Seminar

Lehman College, May 27th 2015

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What did we learn from Sandy?

"Rulers, Statesmen, Nations, are wont to be emphatically commended to the teaching which experience offers in history. But what experience and history teach is this - that people and governments never have learned anything from history, or acted on principles deduced from it. Each period is involved in such peculiar circumstances, exhibits a condition of things so strictly idiosyncratic, that its conduct must be regulated by considerations connected with itself, and itself alone."

G. W. F. Hegel, German philosopher, 1770 - 1831

Lesson #1: hurricane education is poor

People lack education about hurricanes including understanding of hurricane related terminology used in media (e.g. storm surge, meaning of high/low pressure, relationship between tides and storm surge, etc.)



-> but knowledge does not necessarily translate into action (ex. Smoking and lung cancer)

Lesson #2: strong events do not happen often

People are not prepared in the wake of hurricane (no water supply, no flash lights, no first aid medical kit, no canned food, no emergency radio, no power supply, etc.); strong hurricanes do not happen every year, people forget



Lesson #3: “government is always one day late and one buck short” (L. Mervin, last mayor of Centralia, PA, on undergroundfire problem there)

Municipal response is reactive. NYC Office of Emergency Management (OEM) does not know where the most vulnerable population is located until disaster happens; employment of police, volunteers and FEMA officers is too late to provide help (e.g. Far Rockaway)

What do we know?

Dangerous places

Federal Emergency Management Agency (FEMA)

Map Legends

FEMA Special Flood Hazard Area (or SFHA)

Moderate to Low Risk Areas

- X < 1% ACF
- 0.2 PCT ACFH * < 1% ACF

High Risk Areas

- A 1% ACF, no base flood elevations
- AE 1% ACF, periodic base flood elevations

High Risk-Coastal Areas

- VE =/> 1% ACF + Storm Waves

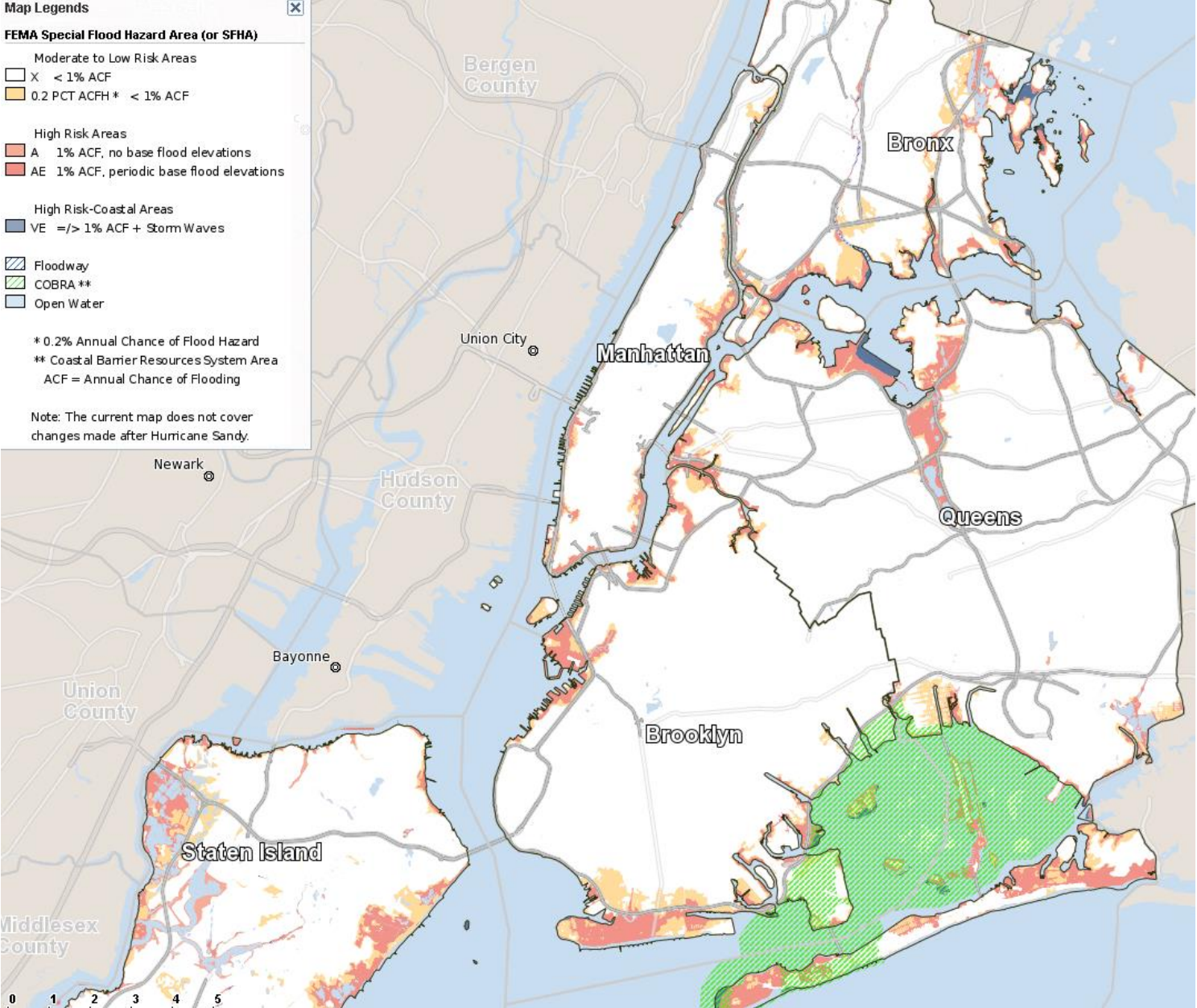
Floodway

COBRA **

Open Water

* 0.2% Annual Chance of Flood Hazard
** Coastal Barrier Resources System Area
ACF = Annual Chance of Flooding

Note: The current map does not cover changes made after Hurricane Sandy.



New York City Hurricane Evacuation Zones

NYC EVACUATION CENTERS

BRONX

88 CONN COLLEGE 80 W. 205TH ST	18 202 770 BROADWAY AVE	PS 102 8071 AMSTER ST
KNASHER CHILDS HS 217E. SUNNYSIDE BL	LEHMAN COLLEGE 140 SUNNYSIDE BLVD W	PS 20 1200 WEST 234TH AVE
NY OF LAW, GOVT AND JUSTICE 244 E 43RD ST	HS-181 600 W. 217TH ST	PS 206 40 W. TREMONT AVE
18 98 244 E 43RD ST	PS 3 244 E 43RD AVE	WILLIAM M. TAYLOR HS 244 E 43RD ST

MANHATTAN

BRADY COLLEGE 700 E. 125TH ST	NY OF GRAPHIC COMM 475 W. 49TH ST	JOHN JAY COLLEGE 447 W. 125TH ST
LOUIS G. BRANDIS HS 40 W. 43RD ST	HUNTER COLLEGE 205 PARK AVE	JULIA RICHMOND HS 205 PARK AVE
BREAD AND ROSES HS 1 E 125TH AVE	18 98 244 E 43RD ST	SEWARD PARK HS 205 PARK AVE
CITY COLLEGE 300 NASSAU AVE	18 98 244 E 43RD ST	244 E 43RD ST
G. WASHINGTON HS 244 E 43RD AVE	18 98 244 E 43RD ST	

QUEENS

JOHN ADAMS HS 600 BROADWAY BLVD	BRUNER CLEVELAND HS 217 WOODSIDE ST	SUNY'S COLLEGE 415 W. 125TH ST
AVIATION HS 45-20 36TH ST	HILLCREST HS 90-05 WOODLAND AVE	QUEENSBORO COMMUNITY COLLEGE 222-05 50TH AVE
BAIRD HS 37-20 103RD AVE	JHS 181 20-01 45TH ST	WILLIAM S. BRANT HS 20-01 45TH ST
BEHUNGT RACETRACK 210-100 WOODSIDE AVE	WINDMILLS HS 20-01 45TH ST	YORK COLLEGE 242-05 24TH AVE
FARMING HS 18-00 103RD ST	18 98 244 E 43RD ST	
FOREST HILLS HS 20-01 45TH ST	18 98 244 E 43RD ST	

BROOKLYN

SPY & GALEY HS 300 W. 125TH ST	18 98 244 E 43RD ST	JOHN JAY HS 447 W. 125TH AVE
BROOKLYN TECH HS 27 EAST GREENE PLACE	18 98 244 E 43RD ST	NYC TECHNICAL COLLEGE 200 JAY ST
BUSHWICK HS 400 BUSHWICK AVE	18 2AB 72 WOODLAND BLVD	PS 189 18-01 45TH AVE
CLARA BARTON HS 100 WOODLAND AVE	18 202 770 BROADWAY AVE	PS 249 18-01 45TH AVE
FRANKLIN W. LANE HS 399 JARVIS AVE	18 202 770 BROADWAY AVE	PS 227 18-01 45TH AVE
18 98 244 E 43RD AVE	18 98 244 E 43RD AVE	BOOBEY HS 18-01 45TH AVE

STATEN ISLAND

CURTIS HS 105 W. 125TH AVE	18 20 770 BROADWAY AVE	SUIAN C. WADNER HS 105 W. 125TH AVE
18 98 244 E 43RD AVE	18 98 244 E 43RD AVE	REYNOLDS COMPLEX 18 98 244 E 43RD AVE

VISIT NYC.GOV/HURRICANEZONES OR CALL 311 TO FIND OUT IF YOU LIVE IN A HURRICANE EVACUATION ZONE.

KNOW YOUR ZONE*

1. Determine whether you live in an evacuation zone by using the Hurricane Evacuation Zone Finder at www.nyc.gov/hurricanezones, calling 311 (TTY: 212-504-4155), or consulting this map. If your address is in one of the City's hurricane evacuation zones, you may be ordered to evacuate if a hurricane threatens New York City.
2. Evacuees should be prepared to stay with friends or family who live outside evacuation zone boundaries.
3. If you cannot stay with friends or family, use the Finder, call 311 (TTY: 212-504-4155), or use this map to identify which evacuation center is most appropriate for you.

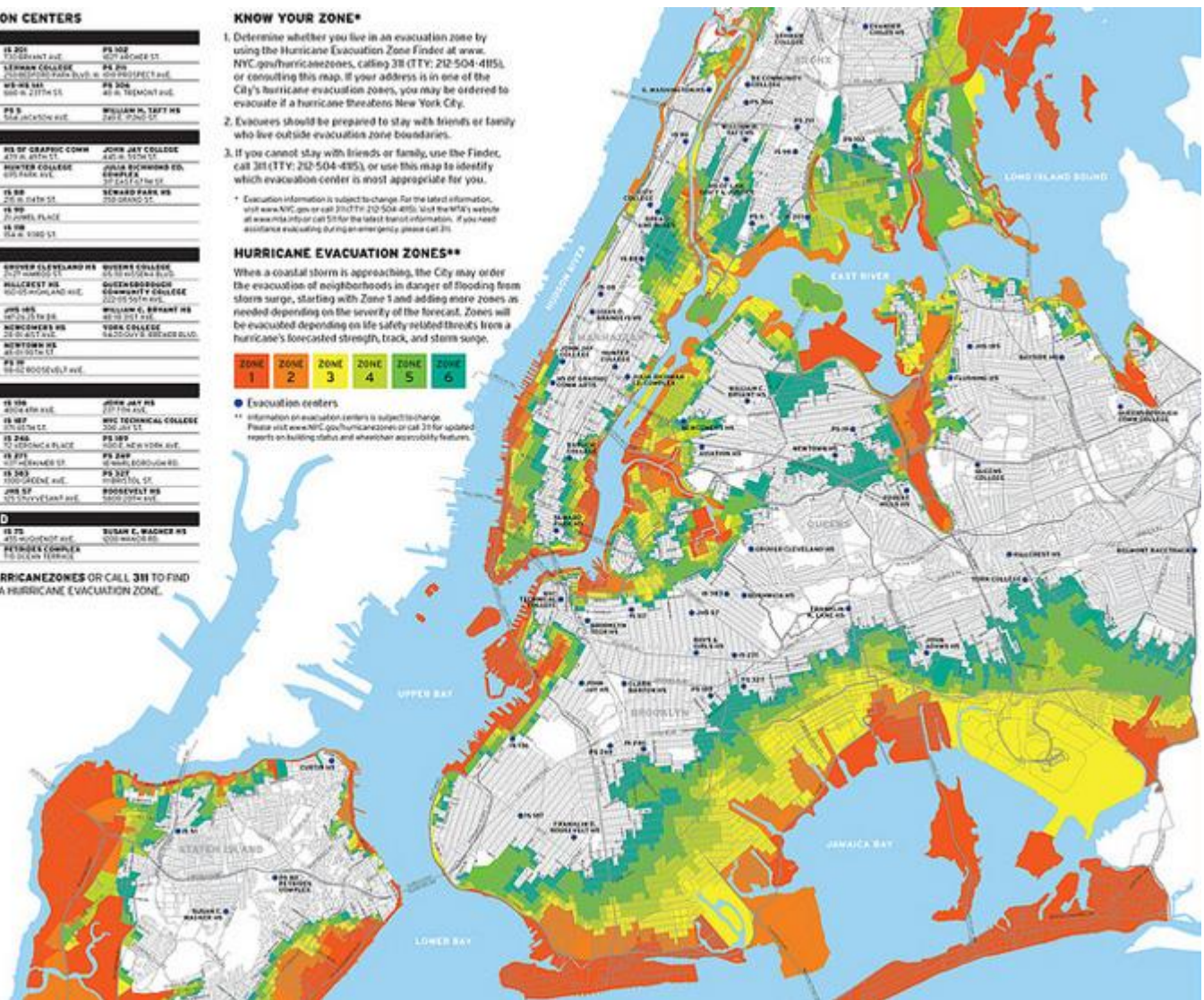
* Evacuation information is subject to change. For the latest information, visit www.nyc.gov or call 311 (TTY: 212-504-4155). Visit the NYA's website at www.nya.info or call 516 for the latest forecast information. If you need assistance evacuating, dial 911 in an emergency, press 4, 311.

HURRICANE EVACUATION ZONES**

When a coastal storm is approaching, the City may order the evacuation of neighborhoods in danger of flooding from storm surge, starting with Zone 1 and adding more zones as needed depending on the severity of the forecast. Zones will be evacuated depending on life safety related threats from a hurricane's forecasted strength, track, and storm surge.



** Evacuation centers
* Information on evacuation centers is subject to change. Please visit www.nyc.gov/hurricanezones or call 311 for updated reports on building status and wheelchair accessibility features.



What we don't know?

1. How well are we prepared?
2. Where do the least prepared people live?

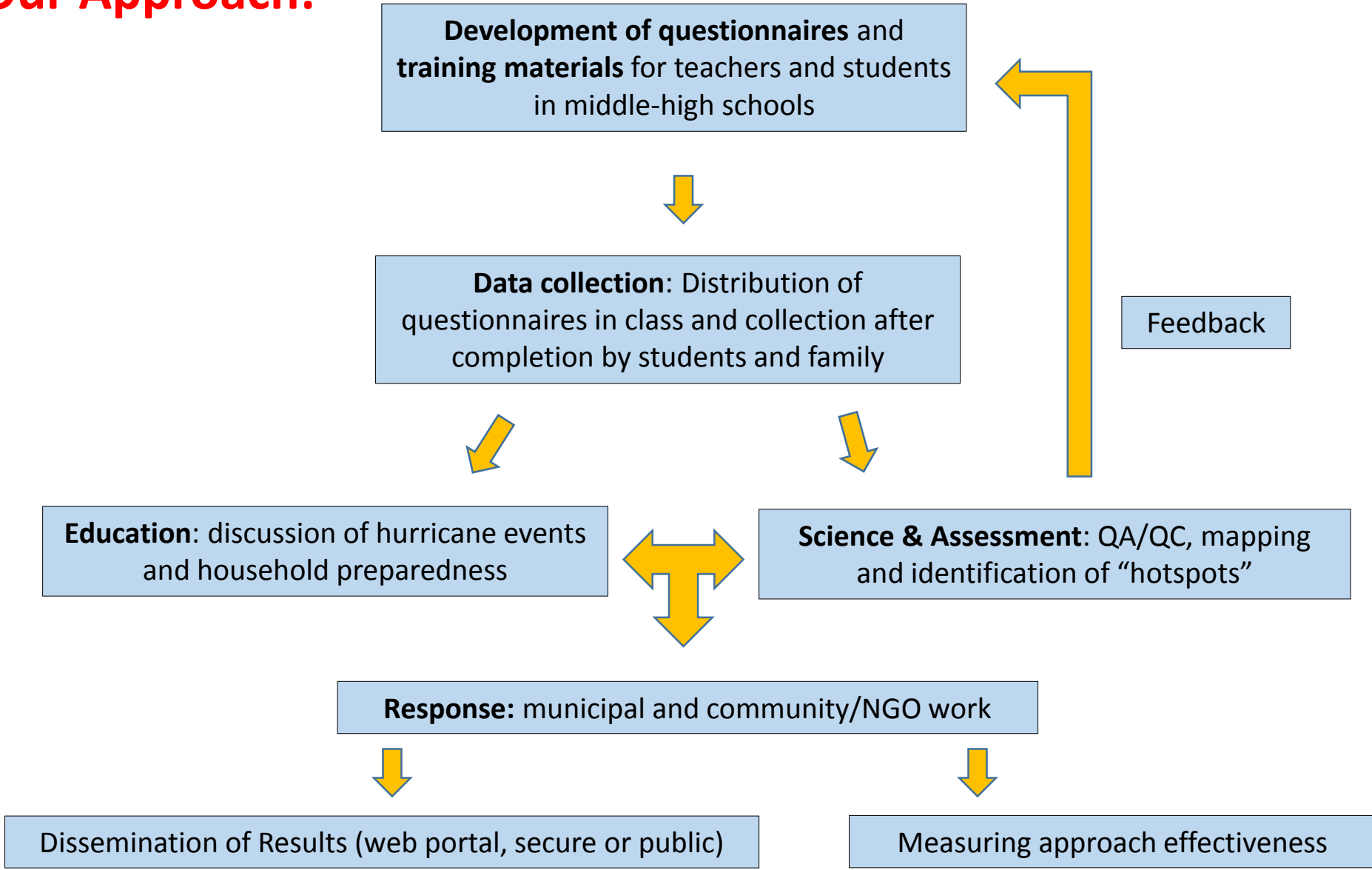
What do we offer?

Proactive Hurricane Preparedness in NYC:

**assessment + education + science +
Response**

-> Approach: is bottom-up and engages
communities

Our Approach:



Expected outcomes:

Education:

- Engage high school students and Earth Science teachers in hurricane preparedness by integrating project- based hurricane activities in high schools' curriculum.
- Increase high school students' interest in STEM disciplines and understanding of STEM concepts related to Earth Science and hurricane formation.
- Develop a dynamic and interactive tool for education with potential for further development and expansion (e.g., competitions, team work, involvement in community, etc.).

Expected outcomes:

Preparedness:

- Jump start the long-term preparedness of NYC to hurricanes (possibly other natural hazards).
- Increased awareness of OEM about the preparedness level in NYC, e.g., locations of low preparedness “hot spots”. Maps can be interactive and updated in real-time.
- Create a knowledge base for NGO’s and other organizations to help people prepare for hurricanes via public lectures, distribution of supplies, etc.
- Reduction of human related losses (lives, property, etc.).

Questionnaire:

Knowledge & Preparedness capacity:

- In which evacuation zone is your home located?
- Have you (or your immediate family) received any information or training to be better prepared in case of a disaster or evacuation?
- Indicate the street address, closest intersection, or name of the closest emergency shelter/evacuation center to your home.
- Explain what is meant by “storm surge”.

Resources/provisions:

- Do you have a first Aid Kit at home?

Planning:

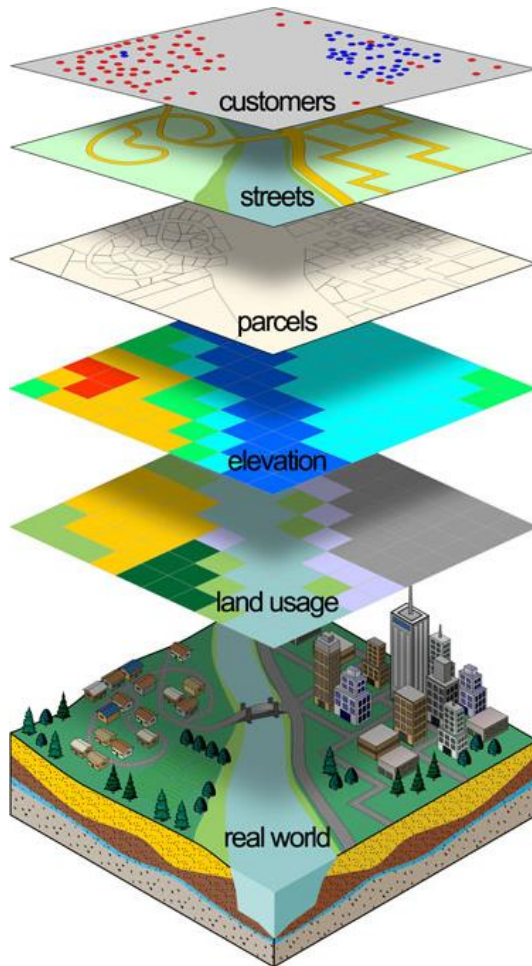
- Have you and your family members ever spoken about or planned what you would do if a disaster or emergency occurs?

Pilot Study: Questionnaire, preparedness index (PI) calculation, mapping

Preparedness Index (PI) = SUM (Wq * Wa)

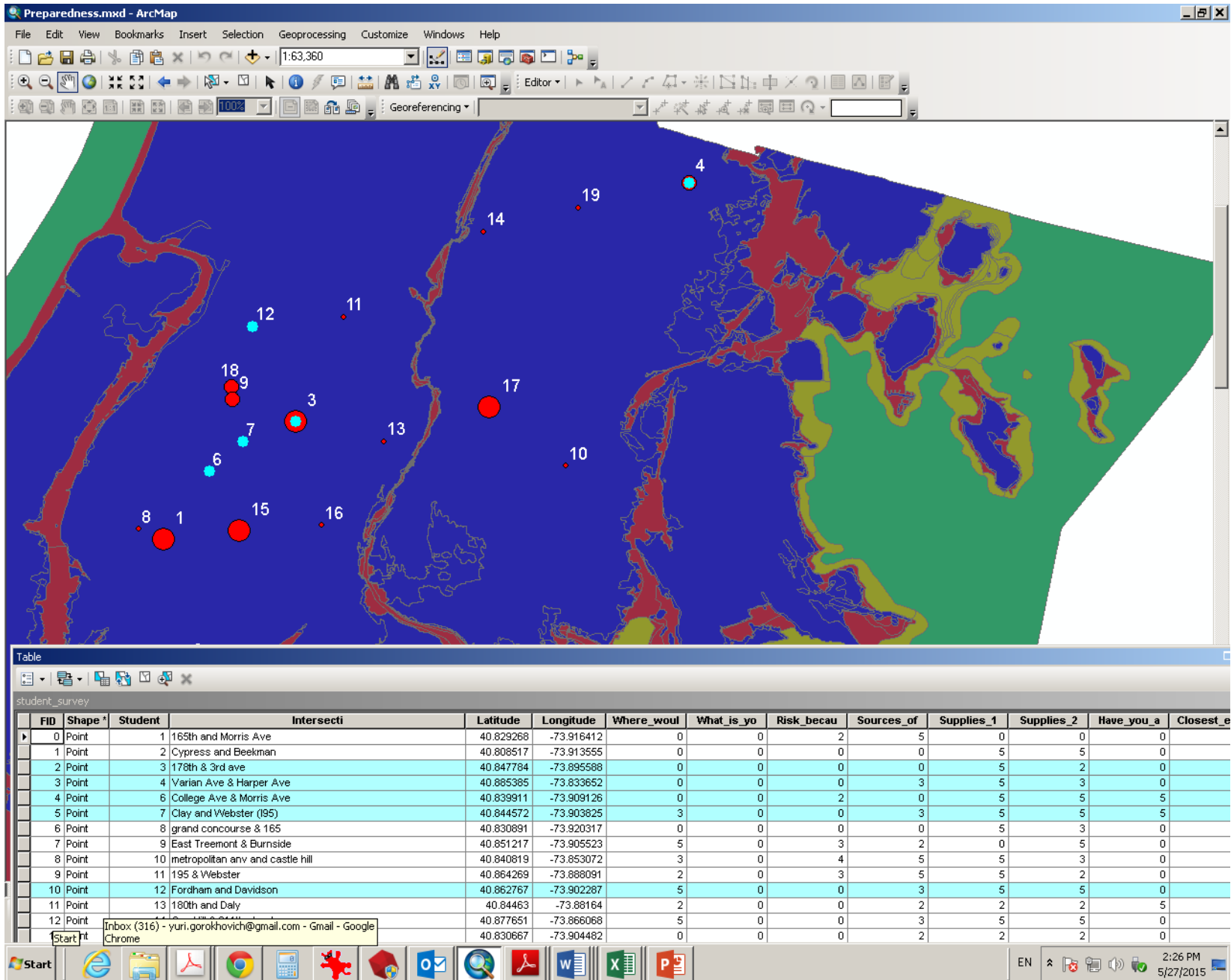
Question	Weight (Wq), 0 - 5	Answers	Weight (Wa), 0 - 5
Where would your family go?	5	Aunt's building: more structurally sound	0
		Lower floor in building	0
		I don't know	0
		to another state closest	3
		we'd go to more higher ground	5
		a hospital	3
		the armory on Kingsbridge	2
		a shelter	5
		inside a school	2
		upstate	5
		Lehman College	3
		basement: it has no windows and is spacious	1
		Risk because of location or construction type?	3
yes: building sways a little	0		
no	0		
yes: building can collapse	2		
I don't think so	0		
its in the basement of the apartment building, it might get flooded	5		
no, because I live on the 6th floor	3		
no, I live on a hill no, because during hurricane Sandy nothing happened to my home	4 3		
broken windows	0		
yes, if there was ever a really powerful earthquake my building would fall apart	0		
no, I think my building is secure and it is not at risk of collapsing	0		

GIS: from survey to map



- A GIS stores spatial information as a collection of thematic layers that can be linked together by geography and visualized
- Linking the “**what**” (features, attributes) and the “**where**”(location)
- Allows the visualization and analysis of different features of an area at the same time (population density, elevation, etc)

Mapping the results from the questionnaire

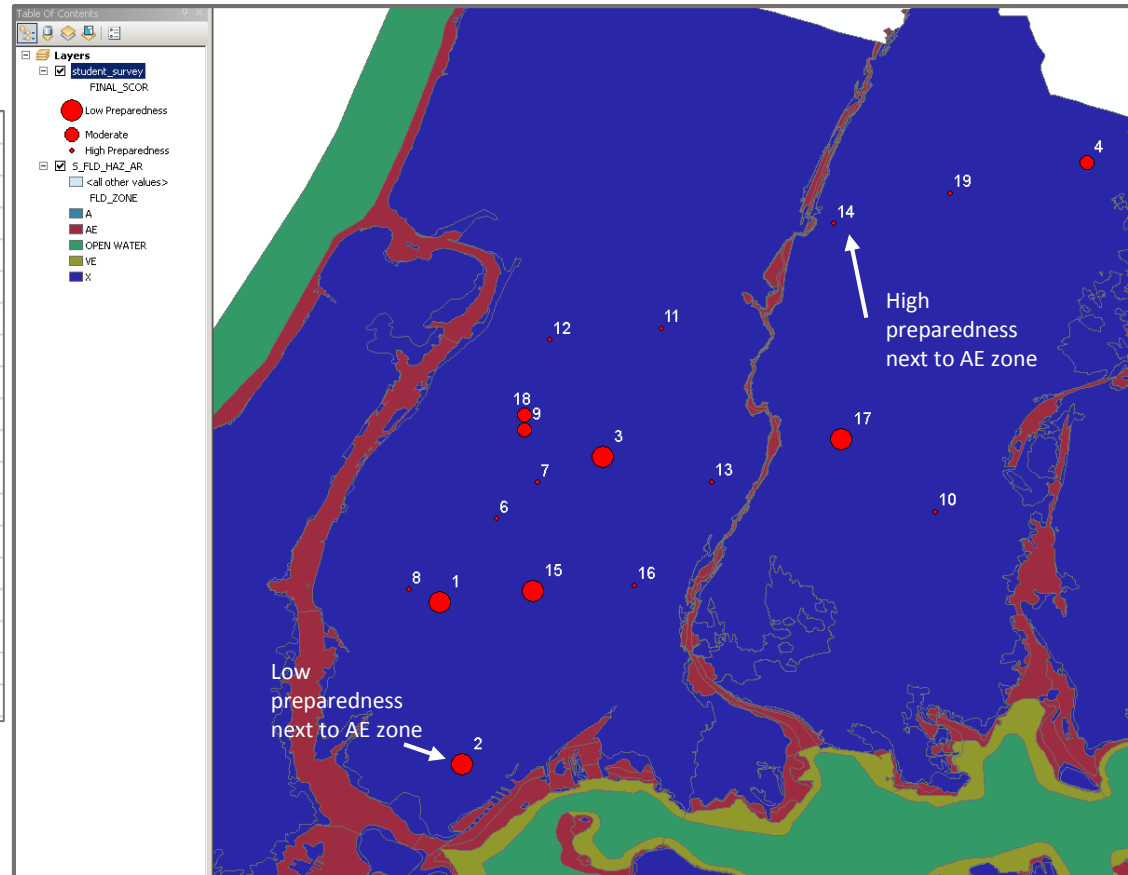


Pilot Study: Questionnaire, preparedness index (PI) calculation, mapping

Low PI

High PI

Student	3	Student	11
Intersecti	178th & 3rd ave	Intersecti	195 & Webster
Latitude	40.847784	Latitude	40.864269
Longitude	-73.895588	Longitude	-73.888091
Where_woul	0	Where_woul	2
What_is_yo	0	What_is_yo	0
Risk_becau	0	Risk_becau	3
Sources_of	0	Sources_of	5
Supplies_1	5	Supplies_1	5
Supplies_2	2	Supplies_2	2
Have_you_a	0	Have_you_a	0
Closest_em	0	Closest_em	3
1_10_How	5	1_10_How	0
Storm_Surg	0	Storm_Surg	0
First_and	3	First_and	0
First_Aid	0	First_Aid	5
Emergency	0	Emergency	5
What_phone	5	What_phone	0
FINAL_SCOR	94	FINAL_SCOR	139



FEMA flood zones:

A - Areas subject to inundation by the 1% annual-chance flood event, **flood elevations are not established**

AE - Areas subject to inundation by the 1% annual-chance flood event, **flood elevations are established**

VE - Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action

X - areas that have a 0.2% probability of flooding every year (also known as the "500-year floodplain")