Resiliency and Continuity: Hurricane Sandy and The City University of New York

Editor’s Note:
Hurricane Sandy, also known as Super Storm Sandy, Tropical Storm Sandy, or just plain Sandy, hit New York City and the surrounding areas on October 29, 2012. Storm-related deaths totaled 285, while cleanup costs are estimated at $71.4 billion, making Sandy the second costliest storm to have hit the United States. A year later, recovery efforts are still underway in some areas.

Set against a backdrop of emergency preparedness planning in America’s largest city, this article describes the role that The City University of New York’s (CUNY) Office of Environmental, Health, Safety, and Risk Management (EHSRM) played in helping to plan for and respond to this extreme event. As the article makes clear, effective emergency planning and risk management involves constant refinement and reassessment to protect the public, vital infrastructure, and the environment.

Hurricane Sandy
When Joseph Bruno, New York City’s Commissioner of the Office of Emergency Management (OEM), speaks about coastal storms, he speaks with the authority of someone who deserves a great deal of credit for the resiliency and continuity that the city demonstrated in the wake of Hurricane Sandy. So when he addressed a forum at New York’s Time-Warner Conference Center and explained the city’s resilience during Sandy by saying simply, “Planning and preparedness is what we do,” (Bruno, 2013), a typical audience might be struck by the understatement. Sandy was not your typical storm.

However, this was no typical audience, either. It was a collection of hardened risk managers and business continuity planners from major institutions throughout New York with whom Commissioner Bruno’s message clearly resonated.

Sandy struck New York City on Monday, October 29, 2012, 14 months after New York City’s Coastal Storm Plan (CSP) was tested by Hurricane Irene (New York City OEM, 2013a). But unlike Irene, which flooded some low-lying areas and left relatively little lasting damage in the city (Dolnick, 2011), Sandy inundated

Environmental, Health, and Safety (EHS) managers shoulder additional responsibilities with storm preparedness planning—and play host to storm evacuees

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to Hurricane Katrina, which struck the city of New Orleans and the Gulf Coast of the United States in 2005, and had an estimated impact of $108 billion (Blake, Landsea, & Gibney, 2011).

Sandy affected seven different countries and 24 states in the United States, and it caused severe damage to coastal areas in New Jersey and New York. It was responsible for 285 documented storm-related deaths, 44 of which occurred in New York City (The New York Times, 2012; The New York Times News Service, 2013). And with a cleanup cost estimate of $71.4 billion, it was the second-costliest storm in recorded US history—second only to Hurricane Katrina, which struck the city of New Orleans and the Gulf Coast of the United States in 2005, and had an estimated impact of $108 billion (Blake, Landsea, & Gibney, 2011).

**Sandy Hits New York**

As late as October 24th, forecasters still expected Sandy to turn east and run its course over the Atlantic Ocean. However, two days later, it became clear that Sandy was turning west and heading full force into the New York Bight (Exhibit 1). The New York Bight is a natural, geographic feature, an
indentation where the New York and New Jersey coastlines meet to form a near-right angle. Unfortunately, when hurricanes strike, the bight serves to funnel storm surges into New York City.

Ultimately, Sandy generated a storm surge of 13.88 feet—almost four feet higher than the previous record documented during Hurricane Donna in 1960. The storm generated two million cubic yards of debris and forced 600 million gallons of water into the city’s underground infrastructure. It knocked down 20,000 trees, damaged or destroyed 40,000 homes, 3,500 cars, and 72 boats, and left more than 700,000 residences, which were occupied by millions of people, without power for an extended period.

The population in the flood zone evacuation area was approximately 2.3 million—less than the worst-case scenario of three million, but still the size of a major city. For those with nowhere else to go—approximately 7,000 people and 197 pets at the peak of the displacement—evacuees were sent to one of the city’s 65 evacuation shelters, ten of which are located at the CUNY campuses, or to one of the eight special medical needs shelters (SMNS), five of which are located on CUNY campuses. These facilities were staffed by more than 4,000 city employees and volunteers who, in addition to monitoring the shelters, served more than four million meals (New York City OEM, 2012).

Sandy tested the resilience of New York City—and CUNY. It also prompted a thorough review of the city’s existing CSP as well as a serious reexamination of New York’s waterfront development planning in anticipation of a future in which climate change may contribute to more frequent and intense coastal storms.

Much has been written about the sustainability of coastal cities (Cohen, 2011), and the impact of Sandy on the New York metropolitan area will doubtless generate much more. This article has a more modest scope. It highlights the synergistic relationship between New York City and CUNY in preparing for and responding to this significant coastal storm event.

**Risk Management and Business Continuity at CUNY**

CUNY is the United States’ largest urban university system and the third largest university system in the country. CUNY consists of 24 colleges, graduate schools, and professional schools, and it serves approximately 540,000 matriculated and nonmatriculated students. It also has 35,000 faculty members and other employees and more than 23 million square feet of space in almost 300 buildings located throughout New York City’s five boroughs, as Exhibit 2 shows. CUNY is responsible for keeping a population of around 600,000 (including visitors and passersby) safe under normal circumstances. In the event of an emergency, this task becomes ever more daunting (Apsan, 2008).

At CUNY, as at other universities, risk management and business continuity are widely shared responsibilities. Naturally, Chancellor Matthew Goldstein and Allan Dobrin, CUNY’s executive vice chancellor and chief operating officer, are ultimately accountable. Nevertheless, as noted in a 2008 article in the Annual Journal of the University Risk Management and Insurance Association (URMIA), the integrated structure of the university fosters reliance on local campus leadership, as well:

Although CUNY is an integrated university, each campus is encouraged to take advantage of its unique characteristics
An Expanded Role: Office of EHSRM Takes on Additional Responsibilities

That said, the day-to-day responsibility of coordinating the university’s risk management and business continuity efforts falls to CUNY’s Office of EHSRM. As the quote in the previous two paragraphs explains, EHSRM was established in 2006, shortly after the horrific active-shooter incident at another school in the United States, Virginia Polytechnic Institute and State University, by adding the because they benefit each college and the university as a whole.... Although many decisions are made consultatively (e.g., closing the campus because of a snow storm), the college president is ultimately accountable for... an emergency decision that requires immediate and often unilateral action (e.g., activating the CUNY alert emergency notification system).

As a result, the college presidents are asked to play a pivotal role in CUNY’s risk management effort. They have been asked to select their designee to the Risk Management Council, and they seem to have all given the selection due consideration. Additionally, they have been tasked with establishing local campus risk management committees to focus on campus-specific concerns and serve as the liaison to the CUNY Risk Management Council (Apsan, 2008, p. 52).
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A University of the City Joins the City’s OEM in Storm Planning

CUNY is not a New York City agency, but it is of the city, and therefore, like a good neighbor, it is often called upon to lend a hand. So when the CSP team at New York City’s OEM asked for assistance, CUNY was there. CUNY has a number of large, accessible campuses—with gymnasiums, showers, and cafeterias—that are outside the flood zones and well suited for evacuation centers and shelters. Alas, as Sandy highlighted, CUNY also has a number of campuses that are located within the flood zones and also exposed to coastal storm risks.

As a world-class city, New York City has its share of emergencies, and its OEM, by extension, has had a lot of practice in disaster preparedness and recovery. In fact, the experiences associated with the September 11, 2001, attacks on the World Trade Center established OEM as a national leader in disaster planning and coordination. Further, as America’s largest coastal city, New York has a long history of hurricane planning, as explained in a page from OEM’s website, which appears in Exhibit 3.

Much of the current version of the CSP was developed by OEM in 2000. However, because of the lessons learned in New Orleans and elsewhere during and after Hurricane Katrina, which struck the Gulf Coast of the United States in 2005, OEM revised its plan significantly in 2006. Further, the Mayor’s Office and OEM’s “Hurricane Sandy After-Action Report” recommended updating the evacuation zones and upgrading the city’s 311 telephone lines (Office of the Mayor, City of New York, 2013).
One of the toughest challenges in implementing the CSP is the evacuation and sheltering of coastal area residents. Because of New York's densely populated waterfront neighborhoods, the scope of an evacuation can be staggering, depending on the severity of the storm. The onomatopoetic SLOSH maps—SLOSH stands for Sea, Lake, and Overland Surges from Hurricanes (United States Department of Commerce, NOAA, 1992)—are included in the CSP and provide an illustration of the potential range of impact.
An example of a SLOSH map appears in Exhibit 4. The computer modeling that defines the locations likely to experience storm surges and supports the SLOSH maps is updated regularly, which helps officials prepare and update evacuation plans. Exhibits 5 and 6, respectively, show the populations affected by evacuations based on the severity of the storm and fact-and-figure estimates for the CSP. Exhibit 7 shows a map of the evacuation zones.
The Art and Science of Storm Planning

In most cases, coastal storms do not reach New York without warning. The United States’ federal meteorological agencies can identify most major storms from their inception and track them as they advance along the Atlantic coast (Office of the Mayor, City of New York, 2013). State and local emergency agencies are kept informed, and the information is then shared with other agencies. In New York City, OEM begins to communicate storm information with relevant agencies as soon as the storm is identified.

Initially, most of the communication is done through e-mails and web-based alerts. However, as the storm approaches and it becomes apparent that there will be some impact, OEM begins to conduct citywide agency conference calls. These calls include most city agencies as well as other participating institutions, such as CUNY, the American Red Cross, the area’s electrical utilities, such as Consolidated Edison, the Metropolitan Transit Authority (MTA), and other governmental, corporate, and not-for-profit organizations that may play a response or recovery role. Virtually all of the key players have a seat at OEM’s Emergency Operations Center (EOC) during catastrophic events.

Countdown to Sandy’s Landfall

Once OEM begins its regular alerts and conference calls and prepares to activate the CSP, CUNY and other key participants commence their own, similar, internal procedures. For CUNY, this typically includes a series of university-wide conference calls an hour or so after the OEM call to share and update information among campus officials. In the case of Sandy, this process began in earnest on Wednesday, October 24, five days before the storm’s landfall.

On Thursday, October 25, OEM activated the CSP and began to prepare for the implementation of its evacuation and sheltering components (New York City OEM, 2012). Exhibit 8 shows
a timeline for this process. The CSP has a set structure for its sheltering system, as shown in Exhibit 9. This structure includes the EOC, the United Operations and Resource Center (UORC), the evacuation centers, and the hurricane shelters, which include the SMNS and transitional shelters. Although the mayor and his commissioners discuss strategy and set policy at the EOC, the UORC serves as the “air traffic controller” for the shelters. CUNY had representatives at the EOC and at the UORC, and Don Winters of CUNY’s Office of Public Safety provided overall coordination.

Throughout the weekend, CUNY continued to monitor information from the US National Hurricane Center and review OEM’s situation.
agers could share critical information on issues such as supplies and staffing resources. The ability to communicate among the shelters became especially important as unexpected challenges arose, such as the power outage south of 40th Street in Manhattan, which affected the shelter at Baruch College and four other CUNY campuses in lower Manhattan, and fuel shortages that threatened CUNY buildings, vehicles, and emergency generators.

Exhibits 10 and 11 show two of the CUNY shelters during the hurricane.

Because each CUNY shelter had at least one CUNY manager and point-of-contact, these managers could share critical information on issues such as supplies and staffing resources. The ability to communicate among the shelters became especially important as unexpected challenges arose, such as the power outage south of 40th Street in Manhattan, which affected the shelter at Baruch College and four other CUNY campuses in lower Manhattan, and fuel shortages that threatened CUNY buildings, vehicles, and emergency generators.
Exhibit 10. York College Special Medical Needs Shelter During Hurricane Sandy

Photo Credit: H. N. Apsan, 2012

Exhibit 11. Queens College Evacuation Shelter During Hurricane Sandy

Photo Credit: H. N. Apsan, 2012
On Sunday, October 28, one day before President Obama signed the emergency declaration qualifying state and local governments for federal assistance, New York Governor Cuomo ordered the closure of the MTA, suspending all subway, bus, and commuter rail service in New York City (Office of the Governor, State of New York, 2012). Finally, New York City’s Mayor Bloomberg ordered the evacuation of residents in “Zone A” (Office of the Mayor, City of New York, 2012).

Sandy reached New York City on Monday, October 29. The storm surge flooded neighborhoods, left millions without power, and trapped those who could not or would not evacuate. Although most “Zone A” evacuees made their way to friends and family on high ground, the 7,000 or so who had no such options arrived at CSP Shelters, with 2,700 going to CUNY facilities.

**Evacuees Stay Longer Than Expected**

Under the CSP, planners had anticipated that evacuees would remain in the shelters for a few days at most, and then return to their homes. However, that scenario assumed that residents’ homes would be habitable when the storm receded. That clearly was not the case with Sandy.

Entering the third week—two weeks after Sandy had passed—CUNY still had 900 evacuees in four remaining shelters, and classes could not resume in those areas until the shelters were closed. The challenge was not restricted to the presence of the evacuees. Early on, there was a shortfall of shelter volunteers and serious concern that the shelters would be understaffed. However, as the storm subsided, a vast number of volunteers arrived. City employees, community emergency response teams, health and hospital corporation personnel, federal disaster medical assistance teams, and public health service officers descended on the CUNY shelters. In all cases, these additional hands were much appreciated, but they had to be coordinated, and in some cases, redirected to other shelters. At times, certain shelters had more volunteers than evacuees.

As the evacuees began to return home and the shelters began to close, Mayor Bloomberg addressed New Yorkers and thanked them for their efforts and perseverance during Sandy. When he spoke about the shelters, he said that he must:

> particularly thank [CUNY], which has been a great partner to us in this effort. The volunteers and city employees manning these shelters have done a phenomenal job and they deserve all of our thanks (CUNY Newswire, 2012, para. 3).

With still-open shelters and evacuees reluctant to leave, the congratulations were a bit premature. It took another week before all CUNY campuses were out of the sheltering business and able to resume fully their higher education missions.

Finally, on Sunday, November 18, CUNY campuses were slowly returning to normal. Now, in addition to resuming college activities, it was time to conduct the postmortems for Sandy and begin to assimilate lessons learned for the next emergency. As CUNY’s executive vice chancellor and chief operating officer Allan Dobrin said:

> The one thing you can be sure of is you’re going to have emergencies. You just don’t know what they’re going to be....So it’s very important to have processes in place that cover everything you can imagine, and to make constant improvements (CUNY Matters, 2013, para. 7).
Conclusions

For CUNY and for the rest of New York, the recovery from Sandy has been a long and arduous process that is still incomplete a year later. During the planning process, it was uncertain how the CSP would acquit itself when tested. Hurricane Irene, which struck New York City in 2011, was the CSP’s first real test; it passed—but not without many hard lessons learned. In the “hot washing” process—an after-action discussion and evaluation of an agency’s performance following an exercise—Irene was often referred to as the “live fire” drill—a realistic scenario used to test specific equipment and training—for the CSP, and it raised the level of confidence in the plan. Sandy’s devastating impact did not undermine that confidence, but it reminded us squarely of how unpredictable nature can be.

Citywide, Hurricane Irene provided valuable lessons in logistics, communications, and management that mitigated the impact of Sandy. For example, compared with Irene, during Sandy, the delivery of supplies was generally much smoother and better coordinated; communication between the EOC and the UORC, and between the UORC and the shelters was improved; and shelter management was better organized and, at least at CUNY, led by campus managers and staff who knew the facilities and had a stake in them. By most counts, the needs of the city’s most vulnerable—special medical needs evacuees, hospital patients, and nursing home residents—were addressed more effectively during Sandy than during Irene.

Lessons Learned Regarding Sheltering Evacuees

Within CUNY, lessons emerged, as well. First, because Sandy’s effects were much more severe than Irene’s, and many evacuees could not return home for weeks after the storm, the sheltering system was seriously strained. Shelters designed to serve as emergency housing for several days, at most, were forced to remain open for weeks. The stress on shelter leaders, volunteers, coordinators, and the evacuees themselves, led to mounting pressure.

Second, the resources needed to accommodate long-term sheltering tested the mettle of the EOC, the UORC, and the many organizations that provided support. As a result, CUNY shelters began to rely on each other for resources and help.

Third, the facilities, including the gymnasiums, cafeterias, and bathrooms and showers, began to suffer from over use. CUNY quickly began a reassessment process with OEM to determine whether certain facilities continue to be appropriate for sheltering, especially for extended periods.

Fourth, CUNY and OEM had to develop a better endgame to ensure that, once the shelters have completed their humanitarian mission, the evacuees will return home or be moved to alternative facilities so that CUNY campuses could return to their roles as places of higher education.

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Additional Challenges

For CUNY, though, the ultimate challenge is exemplified by institutions such as Hunter College. Hunter’s East 68th Street campus served as a key shelter on the Upper East Side of Manhattan, as shown in Exhibit 12. At the same time, CUNY’s Brookdale Campus, located on East 25th Street near the East River, was flooded by the storm surge and lost electrical power along with most of the rest of lower Manhattan. Its dormitory was evacuated, its research labs were damaged, and the impact to the building components was dramatic.
In addition to the challenges that the Hunter College shelter faced, the Baruch College shelter had to be evacuated because of the power outage, and Kingsborough Community College and Borough of Manhattan Community College, both of which are on the waterfront, were severely flooded. Striking a balance between operating shelters and simultaneously caring for storm-affected facilities had already been acknowledged as a special CUNY challenge, but the severity of Sandy has raised the level of concern.

Despite these difficulties, CUNY remains committed to the city’s CSP, and it will continue to play an integral role in the planning and evaluation process by sharing lessons learned and striving for continuous improvement. After all, that is the essence of resiliency and continuity in storms like Sandy and for other emergencies that the future holds.

Epilogue

We began this article with Commissioner Bruno’s comment on emergency planning, so it is fitting to end with another discussion that was prompted by his presentation: the role of climate change in future coastal storm planning. There appears to be consensus that, regardless of the extent of climate change, future planning must address the possibility of an increasing frequency and intensity of coastal storms. Specific research about this linkage is included in the report of the New York City Panel on Climate Change, which was co-chaired by CUNY (Office of Long-Term Planning and Sustainability, City of New York, 2011).
This report contains a number of recommendations directly related to future coastal storm planning. These include:

- The evacuation zones must be reevaluated with some regularity. Demographic changes, along with residential and commercial development, must be reflected accurately in future evacuation scenarios.
- Construction and land use changes should be incorporated in storm resiliency planning. Buildings in low-lying waterfront areas could be elevated; boardwalks, levees, and other vulnerable structures could be strengthened; and the remaining marshland and riparian buffers that protect the uplands naturally should be protected.
- Infrastructure repairs and future projects should incorporate flood-resistant technology. Electricity, steam, telecommunication, and subway lines in New York City proved to be too vulnerable.
- The stockpiling and delivery of essential emergency materiel—such as the back-up generators and the fuel to run them—has to be reassessed.

Sandy hit New York City and CUNY pretty hard, but it could have been much worse. After all, it wasn’t just a storm; it was the equivalent of a storm, a transit strike, a gasoline shortage, and a blackout all rolled into one. The event even included a one-day snowstorm. The fact that the City and CUNY were so resilient, and that the recovery is well under way, is a tribute to the many who served and battled through Sandy. As for the next storm, it would serve us well to remember former US President and Army General Dwight Eisenhower’s oft-quoted admonition:

In preparing for battle, I have always found that plans are useless but planning is indispensable (Eisenhower, 1957).

Acknowledgements
The author gratefully acknowledges the research assistance of Jordan Fox and Krystal Laymon of the CUNY Office of EHSRM.

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