Coastal Planning & Rebuilding in the Aftermath of Sandy

Jon K. Miller, Ph.D.
Research Assistant Professor
Assistant Director NJ CPTAS
NJ Sea Grant Coastal Process Specialist

Testimony to Senate Budget & Appropriations Committee
Toms River, NJ– February 11, 2013

Thank you for the opportunity to come talk to you today about an extremely important topic that has the potential to shape the future of New Jersey in the coming century.
By the nature of being invited here today, I am aware that some of you already know who I am and what experience and expertise I bring to the table, but for those of you who don’t I wanted to provide a little background. I have been a NJ resident for 37 years and have been visiting the Jersey shore consistently over that time. I have been involved in the study and profession of coastal engineering for 17 years. I have a Bachelor of Engineering in civil engineering with a concentration in structures from Stevens and a Masters and PhD in coastal engineering from the University of Florida. I have been a professor of coastal engineering at Stevens for the past 8 years. Through NJ Sea Grant I have been providing education, outreach, and technical guidance to a variety of coastal stakeholders over the last 6 years. One of Sea Grant’s national themes and the one I am most intimately involved with is Hazard Resilient Coasts and Economies, a topic which is especially relevant to this hearing. Finally as Assistant Director of the New Jersey Coastal Protection Technical Assistance Service (NJ CPTAS) I have been working with the state and communities along the Jersey shore providing technical assistance on issues related to coastal hazards and shore protection for the past 8 years.
What I hope to relay through my testimony here today and through any follow up questions, is the importance of making sound decisions during the rehabilitation process that will increase the resiliency of the NJ coast to future storms and other hazards. You’ll notice that I will purposely try to avoid using the term rebuilding in my testimony, because it implies that we will shortsightedly try to put back what Sandy has taken down. I believe we have a unique but very short lived opportunity to rethink how we rehabilitate the Jersey shore in a way that preserves everything that is special about it, but that takes advantages of opportunities to make it more resilient, and sustainable for our children and grandchildren.
The first thing to keep in mind, is that coasts are dynamic and left to their own, they will change in dramatic ways. These changes can occur slowly over time, or dramatically during storms like Sandy. The breach at Mantoloking is perhaps the most vivid example; however slower less recognizable changes such as the gradual lengthening of Sandy Hook are occurring all of the time.
This slide is perhaps the most simple illustration of why beaches erode. Stable beaches, like a stable checking account, have an equal amount coming in and going out. The sources and sinks vary, but the concept is straightforward. Beaches erode, just like your checking account when more goes out than comes in. This can happen suddenly or slowly over time, although we typically feel it more in both cases when it happens suddenly.
Long term coastal changes typically result from a reduction of sediment supply either from coastal rivers, bluff erosion, or offshore sources. Seasonal changes are generally temporary and are essentially readjustments of the sand to the seasonal difference in wave climate. Episodic changes are the dramatic changes we saw during Sandy, and to a lesser extent during the November 2009 and March 2010 Nor’easters. The problem with these types of changes is that they can remove sand from dunes (nature’s piggy bank) that can take years to decades to replace. Even worse, extreme storms like Sandy can permanently remove sand from the system that will never come back naturally. Some of this sand ends up in the street and people’s houses and can be put back by mechanical means, some ends up in the back bay, and some is removed far enough offshore that it is lost forever. Estimates in Mantoloking by Stockton and Monmouth Beach by Stevens show losses of 500,000cy from the dry (above water) beach. Together this amount of sand would fill MetLife stadium about half way.
Sandy is not the first, nor will she be the last storm to significantly impact the NJ coast. Early on, less coastal development meant relatively lesser impacts. Specific storms are highlighted to emphasize some of the State’s responses, which have helped reduce our vulnerability. After the 1962 storm, many structures south of LBI were rebuilt to more modern design standards which include more storm resistant pile foundations. After storms in 1984 & 1985, the NJ Beach Profile Network (NJBPN) was established. The NJBPN is housed at Stockton College and provides seasonal monitoring of NJ’s beaches at 105 locations. After the two major Nor’easters in 1991 & 1992, the NJ State Legislature established the Shore Protection Fund which was integral in providing storm protection to many areas of the NJ coast that fared well during Sandy. How we respond to Hurricane Sandy is the chapter that is currently being written, in part here today.
There are many different structural approaches to stabilize eroding shorelines and in NJ we have tried most of them. These range from very traditional to innovative, and I think we need to consider a range of solutions that incorporate many of these alternatives. The truth is that each site is unique, and the solution that works in one location may not in another. In particular I believe we need to find a way to encourage innovation in planning, engineering, and construction, but not experimentation. The State of Florida has a program set up specifically to do this which might serve as a model, should NJ ever consider formally establishing such a program.
Natural approaches or so-called “living shorelines” approaches are erosion control measures that seek to work with nature to provide protection, while also providing natural habitat. Living shorelines approaches tend to be most appropriate on lower energy coasts in bay shore and riverine environments and function by reducing the energy impacting the coast from storm surges and waves. North Carolina, Virginia, and Maryland have implemented many projects which have survived significant storms including hurricanes. New Jersey has implemented relatively few living shorelines projects for a variety of reasons; however there are many in the planning stages. Recently the NJ DEP has taken significant steps towards making the permitting process easier for these innovative and potentially very beneficial projects.
Beach nourishment has become one of the preferred methods of shore protection, particularly on ocean fronting coasts. The National Research Council has endorsed this method, which is the only shoreline stabilization approach that adds sand back into the system. Going back to the slide on the sediment budget, beach nourishment is like getting a sudden influx of cash to help stabilize your checking account. In the long run, it doesn’t solve the erosion problem, however it temporarily stabilizes the situation. All Corps of Engineers projects include scheduled renourishments (typically every 3-7 years) that are triggered when the beach erodes past a critical point. Most, but not all Corps projects, also include a dune. From an environmental standpoint, beaches & dunes tend to provide better habitat than wood, steel or rock structural alternatives.
Small beach nourishment projects can be constructed for around $5 million; however the smaller the project, the shorter it lasts. The general rule of thumb is that if you double the length of shoreline protected, the longevity of the project increases by a factor of four. Ideally large sections of the shoreline are constructed together, and indeed the projects are designed with this in mind. The recent experience at LBI provides an excellent example. While the small sections that were nourished in Surf City and Harvey Cedars proved their worth during Sandy, had the whole island been nourished at once, the sand would have lasted much longer. Building sections of a project is like building a table one leg at a time. Will it stand? Perhaps momentarily, but will it ever be as stable as if it were built with all four legs like it was designed? No.
Natural dunes function as nature’s piggy bank. We make deposits today that we ideally won’t touch for many years to come. When the rainy day does come however; we crack the piggy bank and hopefully we’ve been diligent and saved enough. One of the biggest misconceptions about dunes are the typical heights. We’ve done a bad job in the past talking about the difference between height and elevation. As the sketch shows, dunes typically have elevations of 20+ ft, but elevation is measured from the water, not the beach, or the boardwalk, or someone’s patio. Heights are more typically between 6 & 15 ft when measured from one of these reference points. Unfortunately, healthy dunes can only exist with a wide fronting beach. The sand that builds the dunes comes from sand that is blown along the beach. Scraping or lowering the beach to form a dune just makes the base of the dune that much more vulnerable to wave attack and collapse. There are ways in which dunes can be managed however; and many communities use seasonal sand fencing and/or dune planting to try to strengthen their dunes.
How big does a dune need to be? FEMA has established the so-called 540 rule. The rule states that a dune needs to have 540 ft$^3$/ft of sand in the cross-sectional area of the primary frontal dune above the 100 year still water flood elevation in order to be considered an effective barrier to storm surge and wave action. Most NJ dunes failed to meet this requirement prior to Sandy, and post-Sandy even fewer will meet this criteria. In addition FEMA’s remapping of coastal flood risk will result in higher base flood elevations reducing the cross-sectional area that counts towards the calculation of the 540 rule.
In NJ, we are extremely fortunate to have the aforementioned Shore Protection Fund. The Shore Protection Fund was established in 1994 in response to a series of severe Nor'easters in 1991 and 1992. Originally set at $15 million, the fund was increased to its current $25 million in 1999, but has not been increased in over a decade. The Shore Protection Fund is a vital resource that is used to fund a combination of federal and state shore protection projects. These projects include both bay shore as well as ocean front projects and both structural and non-structural options. In particular, the fund has been integral in attracting federal investment in shore protection projects within the state, where the money is used as the 35% match to the 65% federal contribution. While the previous investments made through the Shore Protection Fund largely proved their worth during Hurricane Sandy (and Irene, and the Nov 2009 Nor'easter) in terms of the damage and loss of life prevented, Sandy also exposed the need for greater investment in the future to protect the coast, its residents, its way of life, and its valuable contribution ($19 billion) to the State's economy.
Now a few examples of what worked and what didn’t. Here the figure on the right is a FEMA damage assessment where each dot represents a structure. Red dots are houses that are no longer there, orange dots have moderate damage, yellow dots have minimal damage, and the washed out dots have no impact. Note the cluster of red and orange dots in Ortley Beach. Now look at the beach profiles prior to the storm collected by Stockton on the left. Ortley did have a “dune” prior to the storm, but look at the size in comparison to Seaside Park and Midway Beach. The beach and dune clearly helped protect the communities of Seaside Park and Midway Beach and significantly reduced the impacts of Sandy on its residents.
Just a follow up to the previous slide with Ortley on the left and Seaside Park on the right. In the top pictures you can actually see the before and after Sandy profiles where the Ortley Beach dune was completely removed but the majority of the Seaside Park dune remains. The bottom picture is an aerial view of Ortley Beach taken after Sandy in the vicinity of the location of the beach profile. The picture provides a small indication of the scale of the destruction in Ortley Beach; however some areas of Ortley fared even worse.
Here we have before and after aerial photographs of a section of the Mantoloking coast near where the breach occurred. In particular focus on the house identified in both pictures. This particular house in Mantoloking benefited from at least two factors which reduced its vulnerability compared to the houses around it. First of all, where every other house is built on the beach and setback from the road, the surviving house is built on the road and setback from the beach. Prior to the storm, the rear of the surviving house was setback 150' or more from the toe of the dune. The second factor protecting the house was the dune itself.
As you can see in the picture, the dune reached as high as the second floor of the house. Sandy carved away a significant portion of the dune, but as you can see in the photograph, the dune did its job. No view from the 1st floor, but the house is still standing. To put things in perspective, zillow.com estimates the value of the houses in this area at between $4 and $6 million. As indicated by the FEMA damage assessment, this particular house was the only “unimpacted” structure for several blocks in either the first or the second row.

Something else we need to keep in mind. What happens on the barrier islands can have a dramatic impact on the bay shore communities behind them. The opening of breach can dramatically increase water levels and wave exposure to communities not typically prepared for it.
The example shown here is from the north end of Bay Head. The houses that were destroyed during Sandy were located north of the seawall that protects 75% of the town. A before photo of the same area shows that the oceanfront structures are actually embedded within what would be the primary dune. The surviving ocean front houses were built on pile foundations that had up to 6 feet of erosion around them. There are several lessons here. The wall helped. Pile foundations helped. And building in the dune is a bad idea. Interestingly, those oceanfront lots were built prior to 1920 (the oldest aerial I could find).
As most of you are aware, a massive seawall protects much of Monmouth Beach and Sea Bright. While few structures protected by the seawall were directly impacted by waves, many experienced flooding or foundation damage due to the scour caused by water spilling over the seawall. The house shown in the picture is notable for several reasons. Based on a visual inspection it appears to have suffered no damage. Notice the hurricane shutters on every window, and the elevated ground on which it sits. Even the majority of the landscaping survived the storm. I like this house because it embodies the philosophy of not relying on a single measure for protection. In spite of the massive seawall which to some provides a false sense of complete security, the owner of the house incorporated several additional measures to increase his hazard resiliency.
Poor coastal construction practices can be blamed for some of the devastation as well. Here we see two examples of inadequate connections between the substructure and the main structure at two beach clubs located seaward of the seawall in Sea Bright. Both were completely destroyed. In the one case 1” x 1” wood strips were used. In the other proper straps were used however both the straps and the nails were completely rusted through. The picture in the upper right shows proper strapping used to secure a section of the boardwalk in Sea Girt that survived Sandy. Not only are the clips and fasteners in good condition, screws were used instead of nails, and every available hole was utilized.
In this example from Seaside Park, notice the reduction in damage adjacent to the natural area identified in the picture. Conceptually, this is the idea behind the living shorelines approach, utilizing nature to reduce the damage from waves and storm surges. Admittedly, I have not done a detailed analysis of this area; however I am intrigued by what if any role the natural undeveloped area indicated by the arrow played in limiting the damage to the adjacent structures.
Buyouts should be a part of the solution for repetitive loss properties, but it must be done in a coordinated fashion so as not to leave communities pockmarked. The reality of this solution is that given the property values along the Jersey shore this will be a difficult and expensive proposition. Unlike many inland repetitive loss properties where the owners want to sell, but can’t find a buyer due to the very public flooding problems, many buyers are willing to overlook “nuisance” flooding for a chance at owning a piece of NJ shore property. In effect, there is almost always a buyer for shore property. The pictures on this slide are from Rahway where I grew up, and I can remember the controversy the buyouts caused in the community because the families being bought out couldn’t find similar properties in Rahway for the price they were being bought out for. Lastly, we need to be careful not to change the character of the Jersey shore through buyouts. If the cheapest properties are targeted, we may force out the fishermen, policemen, fire fighters, that live in these communities year round and help make them what they are.
Conclusions

- Sandy not unprecedented
- All options need to be considered
- We can and must engineer a safer and more sustainable coast
- Need to take a systems approach

(jmiller@stevens.edu, 201 216-8591)

Testimony to Senate Budget & Appropriations Committee
Toms River, NJ–February 11, 2013

Storms like Sandy have occurred in the past and will continue to occur in the future. While there may be some debate about whether or not the frequency of such storms will increase in the future, there are very few people if any arguing that we will have fewer Sandy-type storms in the future. In order to increase our resiliency to future storms like Sandy, we must make smart decisions today during the rehabilitation process. I hesitate to say rebuilding, because simply putting back what was knocked down is insufficient. What we decide today in the wake of Sandy will impact what the Jersey shore looks like a century from now. We must take a multi-faceted systems approach that considers the entire spectrum of techniques for increasing hazard resilience. These approaches include targeted buyouts as Governor Christie has suggested, changes to planning and zoning codes, modification to coastal construction methods, and the consideration of a range of engineering solutions including both traditional and innovative techniques for protecting the coast. Furthermore we need to consider combinations of these approaches so that we are not entirely reliant on a single structure or factor for our safety. Thank you for your time today, and with that I will be glad to take any questions.
OBSERVATIONS ON THE IMPACT OF HURRICANE SANDY ON THE ARRAY OF COASTAL NEW JERSEY’S NATURAL AND MAN-MADE SHORE PROTECTION FEATURES

DR. STEWART FARRELL, DIRECTOR RICHARD STOCKTON COASTAL RESEARCH CENTER

Dr. Farrell studied coastal engineering and coastal processes at the University of Massachusetts, being awarded both a Master’s in Geology and a PhD in Sedimentary Geology in 1972.

Dr. Farrell was part of the founding faculty at Stockton College in 1971 and helped develop both the Marine Science and Geology degree programs at the College. His first association with NJ regulatory legislation was an appointment to the Academic Committee tasked with helping the fledgling NJDEP implement the policies to deal with the 1970 Wetlands Act and later the 1972 CAFRA legislation. Many of the early NJDEP employees were graduates from the Stockton marine and environmental science programs.

The Coastal Research Center started with a request from the Borough of Avalon’s Environmental Commission to determine why a section of the shoreline was eroding rapidly during the summer without any storm activity.

The NJDEP requested assistance in building a database to document storm and annual changes to the entire NJ coastline in 1986 following Hurricane Gloria damages plus those from a year earlier northeast storm. This was the official start of a 26-year relationship with the Bureau of Coastal Engineering where the CRC has surveyed the dunes, beach and offshore regions at 105 stations from the Raritan Bay, Sandy Hook, south to Cape May Point and up the west shoreline of Cape May County.

In 2008 a 5-year project was started to quantify the erosion and dune breaching potential for the entire oceanfront coastline under a NOAA-guided congressional award of almost $1 million. This has been named the NJ Dune Vulnerability Analysis and models the ability of the beach/dune system to resist the array of FEMA-generated storms equal to 1-, 2-, 5-, 19-, 20-, 50-, and 100-year theoretical storm events.

Hurricane Sandy

1944, Gloria and Irene were hurricanes with reasonably predictable winds, tides and impacts. The 1962, 1992 and 2009 Northeast storms were easily as damaging as the last 75 years of hurricanes to hit NJ, but are far more difficult to predict, analyze, or quantify. Sandy was the unfortunate combination of both a hurricane and a northeaster that was blocked in its movements to the northeast by a high pressure cell off Greenland. The resulting combination and the forced turn to the northwest produced unexpected destruction to the NJ coast particularly Ocean & Monmouth Counties. While this type of event does occur, it is rare enough that to duplicate it in exactly the same region is very unlikely. In 1991 the “Perfect Storm” was a similar combination of meteorology, but situated east of the Canadian Maritime Provinces. The staff of the CRC commenced surveys and photography of the 105 stations October 31, 2012, continuing until finished prior to Thanksgiving. These studies were compiled into reports submitted to the NJDEP and posted on the site www.stockton.edu/crc. There are six separate reports extending from Union Beach, Monmouth County to Reeds Beach, Cape May County.

- 55% of the developed NJ oceanfront coastline has been modified under either Army Corps or NJ Bureau of Coastal Engineering shore protection projects since 1986.
- 25-years of study has shown that the AVERAGE shoreline position & quantity of sand present on the beaches has increased by a modest amount.
- The RANGE of shoreline changes was pretty huge however: on the plus side, Barnegat Light Borough saw a 2,400-foot shoreline advance due to the re-alignment of the inlet jetty in 1990. The biggest retreat occurred in North Wildwood where 1,057 feet of shoreline retreat occurred between 1986 and 2005. This was noteworthy because almost no one thinks of beach erosion and Wildwood in the same sentence.
The present effort by the Federal Army Corps commenced in 1989 with a shore protection project for Cape May City, which totally changed the appearance and the economy of that City.

Since then projects have been completed in Ocean City, Atlantic City, Brigantine, Avalon, Stone Harbor, Cape May Point, most of Monmouth County, Surf City, Harvey Cedars, and Brant Beach on Long Beach Island.

The State of NJ has current projects in North Wildwood, Strathmere in Upper Township, southern Ocean City, and prior to Federal authorization conducted projects in many of the above list of communities since 1983.

The Legislation enacted in 1994 creating the stable fund for shore protection was used as financial leverage to generate the highest percentage of a state coastline under Federal jurisdiction for the nation by FAR.

65% of cost is Federal share; 35% is local (of that the State fund pays 75% of the local share with the local community paying 25% of the 35%)

This is the only program of coastal storm protection of its kind in the nation.

**SANDY’S STORM CONDITIONS**

This storm was essentially a 20-year recurrence event in Cape and Atlantic Counties. Dunes at 14 feet elevation withstood the storm preventing overwash into the community.

The situation was far more intense in Ocean and Monmouth Counties. Wave run-up on dunes was measured at 10 feet higher at Seven-Presidents Park in Long Branch than in Atlantic City or Avalon. North of the eye’s landfall the storm will likely be considered a 100-year event.

The high degree of shore protection projects in Cape/Atlantic Counties produced a high level of damage prevention except at a few “hot spots” of erosion (Ocean City).

The piecemeal construction of the Federal shore protection project on Long Beach Island provided an unintentional laboratory on the worth and value of its efficacy in protecting property, public and private landward of the segment where the work was completed between 2007 and 2012 and the high loss rates in those sections of coast where it was not.

Hard structures parallel to the beach made some difference, but have extreme installation costs.

The Dune Vulnerability Model for the 100-year storm event accurately predicted where dunes on the Northern Ocean County shoreline would fail and where they would survive. The CRC will soon acquire pre- and post-Sandy LIDAR* data so an accurate assessment could be made using the vulnerability model to determine where and how substantial replacement dunes should be.

*LIDAR is digital survey data obtained from aircraft that covers the ground in 600 to 900-foot wide swaths with a data point every sq. ft.

**KEYS TO SUCCESS;**

**BEACH WIDTH>** A wide beach makes the wave break far from the dune. Massive energy released out to sea as the wave breaks away from the dunes.

**BERM ELEVATION>** The 6.75-foot elevation seems to cause the wave to attenuate dramatically before hitting the dune.

**DUNE HEIGHT>** At least 16.0 feet up to 22.0 feet depending on wave run-up, which depends on storm intensity and the “still-water elevation” generated by the storm surge. (14.5 feet in Avalon vs. 24.5 feet at 7-Presidents Park).

**PROJECT MAINTENANCE>** Damage from waves was zero in Avalon (project just maintained) vs. Real damage in the 50’s blocks in Ocean City due to limited maintenance.

I strongly recommend that the means be found to extend the Federal NJ coastal storm protection program to the remaining 45% of the coastline not currently protected as soon as possible. The sand is available offshore (NJ Geological Survey data), and the Federal design worked in LBI and elsewhere.

The biggest hurdle is the private ownership of real estate to the high tide line in Ocean County where easements must be obtained from each and every owner prior to a Federal project commencing. Yes, Sandy has convinced many holdouts to sign and others may come on board, but there will be those who refuse all encouragements. The answer may have to come in the form of legislation making all NJ beaches public land seaward of the dune crest or conduct eminent domain actions against those who refuse to do something in the best interest of their property and to the benefit of the community at large.
Issues Surrounding Coastal Planning and Rebuilding in the Aftermath of Sandy

Presented on February 11, 2013 in Toms River, New Jersey before the Senate Budget and Appropriations Committee
New Jersey State Legislature

Invited testimony by
Clinton J. Andrews, Ph.D.
Edward J. Bloustein School of Planning and Public Policy
Rutgers, The State University of New Jersey
33 Livingston Avenue, New Brunswick, NJ 08901
Thank you for the opportunity to testify on this important matter. The perspective I bring is that of a researcher on planning and policy issues. This includes practical experience in the building industry dating back to the 1970s as well as planning research on Jersey Shore communities before and after Superstorm Sandy. In this testimony I draw in part on research that my students and I completed in May 2012 that we have necessarily revisited following Sandy.¹

Planning at its best is about the future, bringing foresight to action. At its worst it is a reactionary, regulatory function that gets captured by self-serving interests and constrains initiative. A market economy needs planners when interdependencies, indivisibilities, irreversibilities, or ignorance hinder sound private decision making.² Hence planners coordinate investments in buildings and infrastructure, protect public goods like clean water and public safety, help communities avoid mistakes from which they can’t recover, and provide information about expected future conditions. Today, we need planning at its best.

It is clear that Shore communities are no strangers to flooding and storm damage. “Here we go again,” was the slogan spray-painted on one boarded-up storefront just prior to Superstorm Sandy’s arrival.³ We can trace the terrible impacts of hurricanes and nor’easters on our coastal communities over hundreds of years. We can also see how public policy has evolved in response. Table 1 summarizes storm events and associated responses at the local, state, and federal level. It shows that we have shifted over the past fifty years from viewing disaster response as primarily a local responsibility to the current situation in which state and federal governments play significant roles. I highlight three items:

- Following the 1913-1914 Christmas Storm and January Storms, New Jersey enacted the Waterfront Development Act, requiring permits for development within 100 feet of the 18-year mean high water line.
- Following the 1962 Great Ash Wednesday Nor'easter, New Jersey squandered the opportunity to purchase shore front properties with Green Acres funds.
- Following additional disasters, the Federal government in 1968 launched FEMA and the National Flood Insurance Program (NFIP), which provides subsidized coverage for the most vulnerable properties. In 1972 it passed the Coastal Zone Management Act, which led to New Jersey’s CAFRA legislation in 1973, which requires environmental impact statements for certain developments within the coastal flood plain, and set maximum pervious coverage limits and minimum vegetative requirements. Each of these laws has been amended over time.

---

³http://media.nj.com/monmouth_impact/photo/11776657-large.jpg
Thus, a century ago, New Jersey began to regulate coastal land uses to prevent people from building in harm's way. CAFRA and its successors strengthened this theme. However, in recent years, the courts have placed limits on this power and made implementation of local defensive measures more difficult.

The National Flood Insurance Program meanwhile provides information and incentives to encourage private property owners to build in less hazardous locations. Recent updates are driving the program to pursue more actuarially balanced rate schedules.

This mostly sounds like the stuff of good planning. However, recent events have identified several opportunities for improvement, as follows. In the short run:

1. Coordination of individual, municipal, county, state, and federal efforts is critical; now it seems like total chaos. The web is underutilized as a means of communicating with dispersed constituents of flood-ravaged communities.
2. Existing zoning ordinances have become straightjackets and need to be rewritten on a wholesale basis. For example, tens of thousands of properties in dozens of municipalities need height variances to allow structures to be elevated above expected flood levels. Local planning boards are overwhelmed, and state funding to un-choke the process is needed.
3. Professional surveyors have a lock on the authority to provide basic, policy- and investment-relevant basic elevation data. This is an archaic arrangement in an era of ubiquitous GPS and LiDAR data, and that requirement should be relaxed because it has become a severe bottleneck that prevents rebuilding. Until a property owner knows the precise elevation of their structure, they do not know how to rebuild, nor do they know their flood insurance rates.
4. Many communities could benefit from visioning processes that identify and share new ideas. Currently some towns are instead stuck in a “rebuild things exactly as they were” mindset. Whatever else we know, the way things were doesn’t work any more. A state-funded grant program might get these visioning efforts going.

For the longer run, five things stand out:

1. The state needs to ensure that communities and property owners pay attention in a timely manner to the best available data on hazards. As regional relative sea levels continue to rise, and as our understanding of what makes structures resilient continues to improve, FEMA will update the flood insurance maps and the NFIP rate sheet. Unpopular as it may be to say it out loud, we must pay attention to FEMA, because their information will help reduce the impacts of future storms.
2. A surprisingly large number of property owners do not have flood insurance, because they have no mortgages and have been willing to gamble that they would not get hit. The local, state, and federal governments need to find humane ways to stop rewarding those gamblers. Wealthier property owners
can afford to rebuild without subsidies, and government should help those with fewer resources to move to less risky locations.

3. On a related note, this is the time to pursue buyouts of a large number of the properties that are in harm's way. The state missed this opportunity following the “Storm of the Century” in 1962, and it should act decisively this time around.

4. The Legislature should scrutinize publicly subsidized beach replenishment programs to determine the incidence of costs and benefits. Ideally, those who benefit should pay. Put another way, if the general public of New Jersey is paying, it should fully benefit via enhanced beach access.

5. Perhaps surprisingly, our estimates of the local fiscal impacts of rebuilding versus more adaptive courses of action suggest that municipal finances may be stronger in the latter case. Revenues may go down, but expenditures will go down even more. Thus, both municipalities and the state should encourage selective demolitions and the creation of buffer zones.

In summary, we need to remove several residual regulatory artifacts that are preventing an effective short-term response to Sandy, and we need to bring the best information to bear in planning our shared future at the Shore. Thank you for your attention.

---

**Bio**

Clinton J. Andrews is professor of urban planning and policy development, and associate dean for planning and new initiatives at the Edward J. Bloustein School of Planning and Public Policy at Rutgers University in New Brunswick, New Jersey. His research focuses on improving the process and substance of public decision making on energy and environmental issues. Much of his recent work addresses ways to improve the performance of the built environment—how innovative practices diffuse, how actors behave, and how simulation modeling can contribute to better architectural and urban designs. He teaches courses in green building, industrial ecology, environmental planning, energy policy, and quantitative methods. Dr. Andrews was educated at Brown and MIT as an engineer and planner, and holds professional certifications in mechanical engineering, city planning, and green building. Previous experience includes working in the private sector as a design engineer and energy technology assessor, helping to launch an energy policy project at MIT, and helping to found a science policy program at Princeton. At Rutgers, he has launched initiatives in energy policy, green building, and innovation studies. He has published over 90 scholarly and popular articles, and his books include *Humble Analysis: The Practice of Joint fact-Finding, Regulating Regional Power Systems*, and *Industrial Ecology and Global Change*.

http://policy.rutgers.edu/faculty/andrews
CJA1@RUTGERS.EDU
Table 1: Selective Chronology of Storm Events Evoking Policy Responses

<table>
<thead>
<tr>
<th>Storm Event</th>
<th>Local Defensive Responses (ex.)</th>
<th>State Law Enactment</th>
<th>Federal Law Enactment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1757 – barrier island breached</td>
<td>Rare event from Sea Bright</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1890’s – barrier island breached</td>
<td>First rock “wall” attempted at Sea Bright cottages rebuilt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1913-14 – Christmas storms</td>
<td>Railroad retreated inland by a block</td>
<td>1914 Waterfront Developments Act</td>
<td></td>
</tr>
<tr>
<td>1944 – Great Atlantic storm</td>
<td>Sea Bright sea wall built on former rail right of way</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1973 CAFRA</td>
<td>1972 CZMA &amp; updates</td>
</tr>
<tr>
<td>1992—Nor’easter</td>
<td>Middletown Master Plan</td>
<td>1993 CAFRA update</td>
<td>1994 Reform Act (NFIRA)</td>
</tr>
<tr>
<td></td>
<td>Adopted 2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999 – Hurricane Floyd</td>
<td>Benefit replenishment (again)</td>
<td>2004 Flood insurance Reform Act (FIRA)</td>
<td>2005 CZMA updated</td>
</tr>
<tr>
<td>2009 – Tropical Storm Ida</td>
<td>Multi-hazard Mitigation Plans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011 – Hurricane Irene</td>
<td>NFIP Flood Map acceptance</td>
<td></td>
<td>NFIP reforms</td>
</tr>
<tr>
<td>2012 – Superstorm Sandy</td>
<td>?</td>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>
THE CHALLENGE: Municipalities need better tools to put development where it makes the most sense—where it will enhance their communities and where services can be provided in an efficient manner. They also seek affordable ways to create parks and to preserve the open spaces, farmland and historic sites their residents treasure. Existing planning tools, like clustering, can help them reach their objectives at minimal cost to the taxpayer, but these tools need improvement.

BETTER TOOLS HELP TOWNS, PROPERTY OWNERS, DEVELOPERS AND THE ENVIRONMENT: When municipalities authorize clustering, developers and landowners can work together to preserve land and build strong neighborhoods; instead of spreading development evenly across a site or sites, they may build it at a higher density on a portion of the site or sites and preserve the remaining land. (See reverse page.) Landowners gain another way to use their development rights, developers can win community support for more marketable projects, and residents gain more parks and open lands. But clustering needs improvement. Noncontiguous clustering, in particular, may be used only in certain specified ways that limit its effectiveness. When municipalities have attempted to use it more broadly, the courts have struck down their ordinances as not being authorized by statute.

THE PROPOSED LEGISLATION (A3761): The cluster bill is “permissive”; it improves tools that municipalities may use. It amends the Municipal Land Use Law to update authority for contiguous and noncontiguous clustering and lot-size averaging. (See reverse.) Enhancements for noncontiguous cluster include: empowering municipalities to provide for locations where growth and preservation are desired and allowing development applications either in the conventional form or as a planned development.

SUPPORTERS
American Planning Association/NJ Chapter
Association of NJ Environmental Commissions
New Jersey League of Conservation Voters
New Jersey Audubon
New Jersey Builders Association
New Jersey Farm Bureau
New Jersey Future
New Jersey Highlands Coalition

Clustering results in a development project that includes preservation of open space, farmland or historic sites along with a growth area that is developed more intensely.

For more information or to join our growing list of supporters, please visit the New Jersey Future website at http://njfuture.org or contact Chris Sturm at 609-393-0008, x114 or csturm@njfuture.org.
BACKGROUND: HOW CLUSTERING WORKS

Under the Municipal Land Use Law, municipalities have many options to plan for and regulate development. Shown below are several of the common planning approaches used for residential development in rural and suburban areas. Note that these concepts can also be applied in urban settings.

Conventional Development

Development is allowed across the site, provided lot sizes meet or exceed a minimum size.

This approach is sometimes called “large lot zoning.” Municipalities increase lot sizes in the hopes of reducing the impact on things like water resources and the number of school-age children, but the development footprint remains the same and no land is preserved.

Contiguous Cluster

Development is concentrated on a portion of the site, and the rest is preserved as open space or farmland.

Contiguous clustering can be done on a single site or on a set of adjacent sites. Land is preserved without relying on public purchase.

Noncontiguous Cluster

Two or more non-adjacent parcels are treated as a single site for the purpose of clustering. The growth area is developed more densely, and the preservation area(s) are preserved as open space or farmland without relying on public funds.

This sketch shows a simple example, where all of the authorized units are built on one site, and the other site is preserved. Other examples can be found on New Jersey Future’s website in Preserving Land through Compact Growth: Case Studies of Noncontiguous Clustering in New Jersey.
Coastal Planning and Rebuilding
Senate Budget and Appropriations Committee
February 11, 2013
Chris Sturm, New Jersey Future

NJ Public Supports Thoughtful Rebuilding

December 10th Poll shows majority support for:

- Stricter building codes in affected areas (almost 90%)
- Allowing state regulators to determine which coastal areas can be rebuilt (two-thirds)
- Allowing homeowners in high-risk areas to rebuild only if they allow dunes or sea walls (two-thirds)
- Using tax dollars to restore existing wetlands and bays to serve as storm buffers (80%)
- Establishment of a regional entity such as a coastal commission (70%)
- Allowing towns in high-risk areas to impose a short-term moratorium on rebuilding (two-thirds)

About New Jersey Future
Smart Growth research, policy and advocacy

www.njfuture.org

Two Approaches to Realizing Smart Rebuilding

Apply guiding principles to public funds

Integrate rebuilding funds with existing government decision-making

Short and Long-term Actions

Quickly:
- Get people back in homes
- Shore ready for summer
- Businesses up and running

Carefully:
- Resilient
- Equitable
- “Smart” for economy, environment & people

Applying Guiding Principles

- Oversight and transparency are important
- So are better outcomes:
  - Safer, stronger, more resilient in the face of storms and rising sea levels
  - Fair for everyone
  - High-quality livable places
  - More job and business opportunities
  - Better transportation, environment, housing, redevelopment...
State Level:
Borrow from NJ State Strategic Plan

- Framework for Investment: “Garden State Values”:
  - Ten goals to guide the state's growth and development
  - Need to add resilience
  - Incorporate into state & federal rebuilding programs
- Require State Agency Rebuilding Plans
  - How are agencies advancing the rebuilding goals?
  - Create opportunity for public comment

Somerset County
“Investment Framework”

- Based on draft State Strategic Plan
- Reflects infrastructure, natural resources
- Supported by all towns
- Need to overlay areas of repetitive loss
- Will drive economic development, infrastructure investments and municipal zoning
- All counties should do

Regional-level Opportunities

- CAFRA and implementing regulations
- Shore Protection Master Plan of 1981
- Coastal Commission possibilities
  - Regional analysis
  - Planning resources
    - Supplement ABFEs with mapping of sea level rise
    - Guide regional (CAFRA) regulations

Municipal-level Opportunities

Fund and reward:
- Municipal master plan update, including Hazard Mitigation Element
- Zoning changes as needed
- Stormwater Plan (green & gray infrastructure)
- Capital Improvement Plan
  - Stormwater
  - Elevate roads and bridges

County-level Opportunities

Municipal Hazard Mitigation Plan

- Municipal Master Plan, Zoning, Infrastructure

Investment Framework for Growth, Preservation, and Service Areas

Other Rebuilding Tools

- Noncondemnation Redevelopment Area (A3615)
- Authorization for Stormwater Utilities (A2641/S1557)
- Options for Land Preservation
  - Blue Acres funds for hardest hit areas
  - Improve planning tools: Cluster Development bill (A3761)
  - Streamline Transfer of Development Rights
Smart Rebuilding

Apply guiding principles to public funds

Integrate rebuilding funds with existing government activities

New Jersey Future Resources

- Local Recovery Manager position
- Report on Somerset County Investment Framework
- Report on Obstacles to Green Infrastructure
- Case Study Report on Noncontiguous Cluster Developments
- Etc., and stay tuned

www.njfuture.org

Thank you!

Chris Sturm
csturm@njfuture.org
New Jersey Future
609-393-0008 ext. 114
www.njfuture.org