As world talks climate, US city fights flooding, sea rise

December 8 2015, byBruce Smith

In this Thursday, Oct. 1, 2015 photo, a pedestrian walks past two barriers in place to stop vehicles from driving through the flooded streets of City Market in Charleston, S.C. Heavy thunderstorms can leave intersections impassable like the streets flooded near Charleston's City Market area, a popular tourist haunt. (AP Photo/Stephen B. Morton)

About 175 years ago, a Charleston mayor offered up a $100 gold medal to anyone who could solve the small coastal city's flooding problems.

That medal was never awarded and the problem never solved, and now it's worse, exacerbated by development and rising sea levels. Historic Charleston has become a place where the slow-moving catastrophe of climate change has come to have near-daily consequences.

So the city is making the kind of commitment few other communities on America's East Coast have made: About $250 million—more than one-and-a-half times the city's annual budget—is being spent to dig deep underground tunnels and build pump stations to send the water back into the ocean.

And that's just a start.

Like most things Charleston, to understand the flooding problem is to understand the city's past. Over the years, the peninsula that juts toward the Atlantic Ocean has largely expanded by filling in creeks and marshes, leaving the streets susceptible because the water has nowhere else to go.

Climate change is expected to bring more severe storms and higher tides to a city where flooding is increasingly routine. On stormy afternoons, runoff from torrential rains cascades through the narrow streets, forcing locals and tourists to wade in deep pools just to get around. Savvy residents sometimes use kayaks or rubber boats to get around.

This year alone, rainstorms rendered many streets unpassable at least six times.

Even on sunny days, flooding can be problematic because of high tides. That sort of "nuisance flooding" happens about 23 days a year, roughly four times as often as it did 50 years ago.

Tides are predicted to get even higher because of climate change, with

some projections forecasting a foot of sea level rise along the South Carolina coast by mid-century.

"There are three basic approaches to sea level rise," said Erika Spanger-Siegfried, a senior analyst for the Climate & Energy Program of the Union of Concerned Scientists. "You can defend against the water with walls to keep it out. You accommodate the water by living with it and elevating buildings and creating channels. Or you retreat."

Charleston, the site where the first shots of the Civil War were fired at Fort Sumter in the city's harbor, is not a city known for retreating. So it is trying the other options.

In this Thursday, Oct. 1, 2015 photo, visitors seek refuge by sitting on the tables of Charleston's City Market during a heavy rainfall in Charleston, S.C. Like most things Charleston, understanding the problem is to understand the city's past. Over the years, the peninsula that juts out toward the Atlantic Ocean has largely expanded by filling in creeks and marshes, leaving the streets susceptible

to flooding because the water has nowhere else to go. (AP Photo/Stephen B. Morton)

In the 1980s, engineers drew up a drainage master plan. Since then, millions have been invested in sinking deep drainage shafts and boring miles of horizontal tunnels through the grayish-clay marl as much as 150 feet below historic homes and churches, trendy restaurants, the former slave market and other attractions that draw millions of visitors a year.

The tunnels have been sunk deep to avoid other underground infrastructure such as old water and sewer tunnels built during the city's almost 350-year history.

The tunnels, some of them 12 feet in diameter, will connect with pump stations designed to send floodwater into the Ashley and Cooper Rivers - two waterways locals like to say meet to form the Atlantic Ocean.

This year, crews began on still another segment of the work along U.S. Highway 17, the main route along the South Carolina coast. It, too, routinely floods in Charleston because it was built on filled-in creeks and marshes.

Mayor Joseph P. Riley Jr., who is winding up 40 years as the city's chief executive, said that work completed, under way and planned has a price tag of about $250 million in a city with an operating budget of about $150 million.

"That's a substantial capital investment for a city our size," he said, adding that "we don't see this work as necessarily all the work that needs to be done."

He says more drainage work and perhaps walls along waterfront streets may be needed in the future as the city monitors sea level rise.

"As each year's worth of data comes in, it gives you better guidance on what long-range sea level rise is and it's prudent to plan for intermediate steps," he said.

The mayor credited the drainage work already completed for preventing even more extensive flooding in October, when what was called a 1,000-year-storm dumped 16 inches of rain and essentially shuttered Charleston—and much of South Carolina—for three days.

In this Thursday, Oct. 1, 2015 photo, brackish sea water washes over the center line of a street in Charleston, S.C. The National Oceanic and Atmospheric Administration notes that nuisance flooding - that is flooding from ordinary high tides exacerbated by sea level rise and accompanying land subsidence - has increased 400 percent in Charleston since 1960. (AP Photo/Stephen B. Morton)

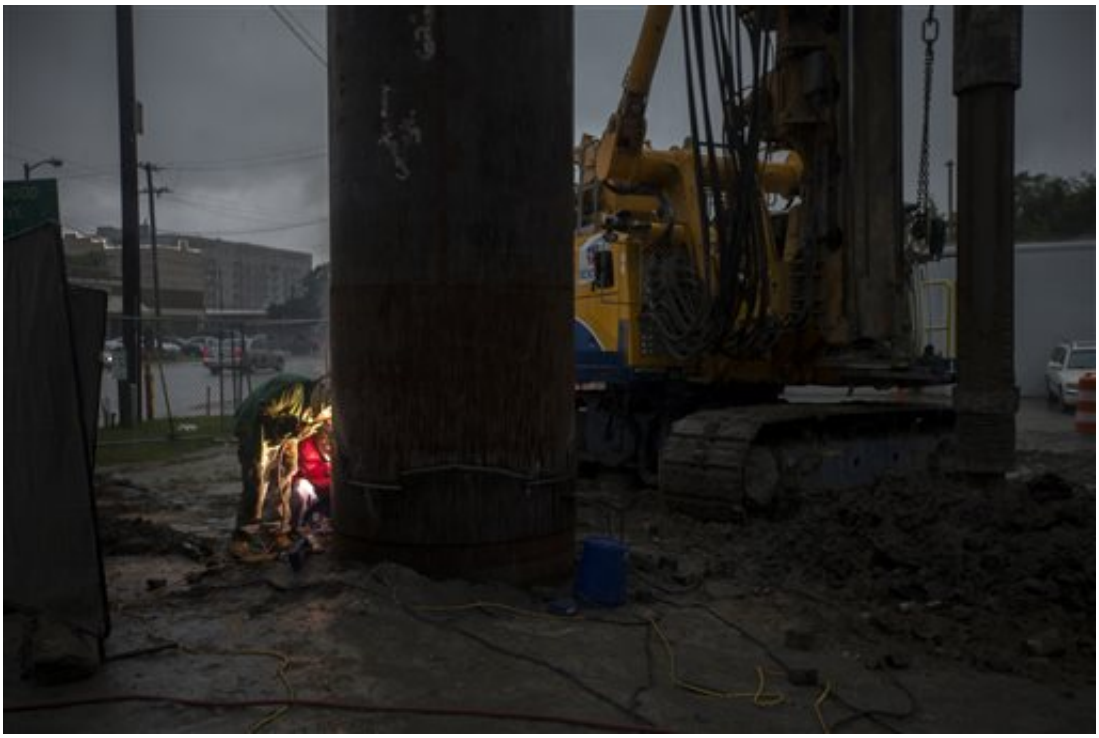
"The damage would have been far more severe" without the improvements, Riley said. "I think it's proof that these very costly and major construction projects are extremely helpful."

Several other East Coast cities are also dealing with storms and sea level rise but, for its size, Charleston's commitment is far-reaching.

New York City, with a budget of $79 billion, has embarked on a $20 billion program to provide shore protection since Superstorm Sandy. Miami Beach, Florida, with a budget of about $300 million, has embarked on an estimated $500 million program of installing seawalls, raising roads and installing pumps.

And Norfolk, Virginia, which annually spends $7 million on storm and sea-level rise mitigation, has identified projects it plans to pursue totaling more than $1 billion—roughly equal to the city's annual budget.

All the way back in 1837, Charleston Mayor R.Y. Hayne warned in his annual report to citizens that a better drainage system "is essential to enable Charleston to fulfill her higher destinies." The city never awarded the proffered medal—worth about $2,500 in today's money—because the economic Panic of 1837 set in.



In this Thursday, Oct. 1, 2015 photo, workers weld part of the massive stormwater system, in Charleston, S.C. In a place where the slow-moving catastrophe of climate change has come to have daily consequences, historic Charleston is making the kind of commitment few other U.S. East Coast communities have: About $250 million has been spent to dig deep underground tunnels and build pump stations to send the water back into the ocean. (AP Photo/Stephen B. Morton)

Hamilton Davis, the energy and climate director for the South Carolina Coastal Conservation League, said what is happening in Charleston today is just a beginning, and it could prove impossible to save everything that makes the city a world-renowned tourist destination.

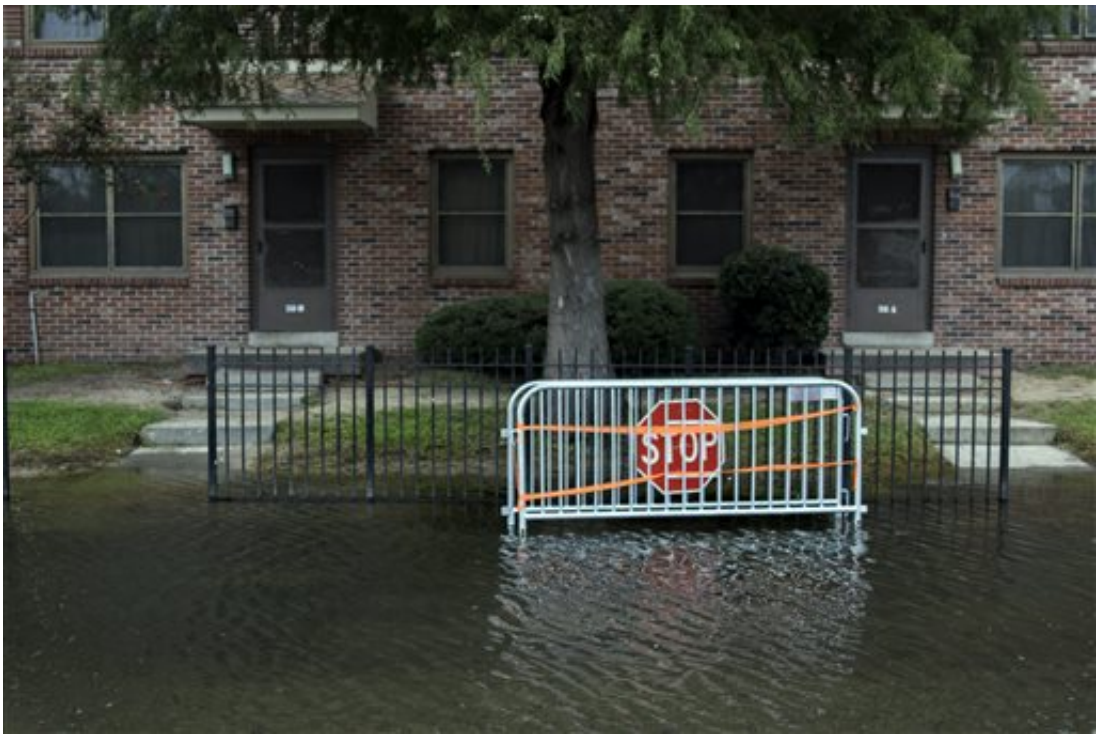
"It may be there are just no affordable options for the places we would like to protect," he said.

In this Thursday, Oct. 1, 2015 photo, Carissa Mines walks through brackish sea water that floods a low lying area in Charleston, S.C. In a place where the slow-moving catastrophe of climate change has come to have daily consequences, historic Charleston is making the kind of commitment few other U.S. East Coast communities have: About $250 million has been spent to dig deep underground tunnels and build pump stations to send the water back into the ocean. (AP Photo/Stephen B. Morton)

Sea level rise means long-term planning, which is often hard to get the public interested in. So in some ways, Davis said, it may not be a bad thing to see the routine flooding.

"When you are late for work or you can't drop your kids off at school because there is flooding you are more motivated to solve that problem," Davis said. "It makes it more real for people and Charleston is essentially ground zero for some of the more severe changes we can anticipate.

In this Thursday, Oct. 1, 2015 photo photo, a motorist drives through the brackish sea water that seeps low lying areas in Charleston, S.C. The National Oceanic and Atmospheric Administration notes that nuisance flooding - that is flooding from ordinary high tides exacerbated by sea level rise and accompanying land subsidence - has increased 400 percent in Charleston since 1960. (AP Photo/Stephen B. Morton)



In this Thursday, Oct. 1, 2015 photo, brackish sea water invades a low income housing development forcing road closures in Charleston, S.C. The National Oceanic and Atmospheric Administration notes that nuisance flooding - that is flooding from ordinary high tides exacerbated by sea level rise and accompanying land subsidence - has increased 400 percent in Charleston since 1960. (AP Photo/Stephen B. Morton)

In this Thursday, Oct. 1, 2015 photo, Jerry Young, an operator with Crowder Construction, carries sandbags to the construction site of a massive stormwater system, in Charleston, S.C. Mayor Joseph P. Riley Jr., who has served as mayor longer than anyone in Charleston's 345-year-history, knows the quarter of a billion dollars being spent isn't all that is needed to protect the city. (AP Photo/Stephen B. Morton)

In this Thursday, Oct. 1, 2015 photo, drivers along Rutledge Avenue face lengthy road closures due to the massive stormwater system in Charleston, S.C. Exacerbated by climate change, the city is making the kind of commitment few other U.S. East Coast communities have: About $250 million has been spent to dig deep underground tunnels and build pump stations to send the water back into the ocean. (AP Photo/Stephen B. Morton)

In this Oct. 1, 2015, photo, a worker welds and grinds part of the massive stormwater system near Rutledge Aveune in Charleston, S.C. Exacerbated by climate change, the city is making the kind of commitment few other U.S. East Coast communities have: About $250 million has been spent to dig deep underground tunnels and build pump stations to send the water back into the ocean. (AP Photo/Stephen B. Morton)

In this Thursday, Oct. 1, 2015 photo, workers weld part of the massive stormwater system near Rutledge Avenue in Charleston, S.C. Charleston has been spending millions and digging deep to deal with flooding that for centuries has plagued a city that is flat, is on the ocean and which, over the years has been built out with paved streets and surfaces that prevent storm water from soaking into the ground. (AP Photo/Stephen B. Morton)

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