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The Resilience Roundup highlights CIRCA's presence in the news, provides links to recent local/state/national news articles related to resilience and adaptation, and announces upcoming events and seminars.

Resilience Roundup

October 28, 2015

A service of the Connecticut Institute for Resilience and Climate Adaptation (CIRCA)

Local and State News Clips

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- **October 20, 2015** - *Wendi Weber: Three years after Sandy, building a stronger Atlantic coast in Connecticut*, New Haven Register

National News Clips

- **October 23, 2015** - *How and why Patricia stands above the four other most severe hurricanes in history*, The Washington Post
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- **October 16, 2015** - *Rising seas overwhelm Delaware tide gates*, America Aljazeera
- **October 14, 2015** - *Antarctic Ice Melt Could Get Worse, But Humans Can Slow It Down*, The Huffington Post
- **October 12, 2015** - *Rising seas to displace millions of Americans if warming unchecked*, Thompson Reuters

Announcements

- **October 30, 2015** - Exploring Climate Solutions Webinar series. Next webinar BGreen2020, October 30 1pm. Webinars scheduled for Nov. 4 & 10
- **November 6, 2015** - UConn Climate Adaptation Academy, *Legal Issues in the Age of Climate Adaptation*. 8am-2:30pm. Register here.
- **November 15, 2015** - Next review date for CIRCA Matching Funds Program. Up to $100,000 available. For more information go to http://circa.uconn.edu/funds.htm
- **November 19, 2015** - Rockfall Foundation Environmental Grants Applications Due
- **November 20, 2015** - Notice of Funding Availability from CT Dept. of Housing CDBG-DR Tranche 2, *Planning funds to address improved resiliency to Infrastructure and Public Facilities in Fairfield, New Haven, New London and Middlesex Counties*. Applications due November 20, 2015
- **December 1- 2, 2015** - Registration Now Open. Living Shorelines: 1st National Technology Transfer Meeting and Regional Workshops, Hartford, CT. Sponsored by

CIRCA and Restore America's Estuaries

Local & State News Clips

October 23, 2015 - *Study: Shorefront development imperils communities as sea levels rise*, CTpost

Rising sea levels will "drown'' the salt marshes that protect coastal communities by 2080, causing marsh areas to advance inland and flood existing roads, homes and businesses, a study out Friday says.

The new study of the impacts of rising sea levels on coastal communities shows that in 65 years even sections of I-95 may be routinely flooded twice a day at high tide.

Preserving open space to allow new marshes and dunes to be created will afford more protection for inland areas from extreme weather, but much of the land needed for that is currently developed, the study found.

The impact in Bridgeport can be mitigated by large open space parcels near the waterfront, including Seaside Park, the study states, but the Steel Point area is also a key. "The city currently owns this property, which could provide nearly 16 acres of marsh advancement; however plans for its redevelopment are underway,'' the report says.

The study, "Salt Marsh Advancement Along Connecticut's Coast,'' was prepared by The Nature Conservancy and includes maps of the projected coastal impacts in Milford, Stratford, Bridgeport and other shoreline Fairfield County communities.

After measuring the existing salt marsh areas and the buffer they provide, the study projects "where and how much conflict there will likely be between the built environment (roads, airports, schools, neighborhoods, businesses, etc.) and daily flooding from tides,'' said Adam Whelchel of the Nature Conservancy.

There are 24 communities fronting on Long Island Sound, and each faces unique challenges as sea levels begin to rise, the study says. Some cities, like Bridgeport and New Haven, have structures that may have to be abandoned or relocated in the coming years.

A portion of I-95 that runs along the Long Wharf area of New Haven could routinely be flooded by 2080.

The Nature Conservancy report could be used by municipal governments to make planning and zoning and other land-use decisions now to lessen future impacts of sea-level rise, Whelchel said in a press release.

Some findings from the study:

Bridgeport has a large amount of current and planned waterfront development that will be in direct conflict with rising sea levels and advancing marshes.

Town-owned properties make up the largest share of suitable land cover for marsh advancement in Fairfield, about 237.2 acres. The Country Club of Fairfield accounts for the privately-owned portion of the open space advancement area.

Milford faces the need to relocate, replace or abandon structures on 295 acres of land projected to be routinely flooded by 2080.

There are 428 acres in Stamford that will be inundated with water by the year 2080 that currently

have buildings and roads on them.

Almost half of the 2,383 acres of potential new wetland areas in Stratford have buildings, roads or other infrastructure on them now.

Westport is projected to have an increase of 884.8 acres in wetlands; 218 acres, or nearly a quarter of that area is currently occupied by buildings.

Open space buffers along the immediate shoreline can protect people and infrastructure from extreme weather and climate change. "Fortunately, our state has a remarkable diversity and abundance of natural resources that ... defend the shoreline and rivers against storm surge, inland flooding, and sea level rise," the study says.

Whelchel will discuss the study and its implications at a public information session, Nov. 11, 7 p.m. at St. John Vianney Church in West Haven.

October 21, 2015 - *Study: Climate Change Could Affect When Autumn Arrives*, CBS Connecticut

HARTFORD (CBS Connecticut)- Climate change could affect when autumn arrives in New England over the next century, according to new research.

The new study found that climate change may not only affect temperatures rising, but also factors like drought, frost, and other stresses, as reported by Phys.org.

University of Connecticut researchers found that the yearly onset of autumn may change, prompting later leaf changes in northern New England and a possible earlier shift in coastal southern New England.

"Many other studies have shown that autumn could come later each year based on rising temperatures," lead author Yingying Xie, a Ph.D. student in the Department of Ecology and Evolutionary Biology, told Phys.org "But this is the first study to show the interactions of a range of different climate variables on regional ecosystems."

Xie says that while phenology, the seasonal timing of life events in plants and animals, has been studied for the spring season that autumn is more difficult to evaluate. She says scientists don't have an exact protocol for measuring color change in leaf, and that they often happen slowly.
Previous research is mostly based on temperature and day length to analyze season change, but experts say extreme weather events can be an indication of future global climate change.

The team of researchers used remotely-sensed satellite data from New England forests from 2001 to 2010. The region extended from northeastern Vermont and New Hampshire, to central Massachusettes and eastern Connecticut and was used to evaluate the timing of leaf color change and drop.

The findings indicate that high heat stress could lead to earlier dormancy. The authors also predicted that the years 2041 to 2050 and 2090 to 2099 will see later dormancy in northern New England and earlier dormancy in coastal and southern New England. The differences are attributed to climate and ecology in the areas, researchers say.

"Oaks are more drought-tolerant, which may explain why southern New England shows less phenological sensitivity to drought variation than, say, regions dominated by maples or birches," coauthors John Silander told Phys.org. "Species composition makes a difference."

Researchers say they hope the findings will encourage scientists to look at a variety of factors when examining autumn phenology. The team is now developing a study to measure leaf color variation to measure autumn dormancy.

October 20, 2015 - *City Eyes Millions For Superstorm "Resilience"*, New Haven Independent

Climate change and the threat of more superstorms have put New Haven in position to pull down millions of federal dollars to help it recover from the ongoing impact of Hurricane Sandy and to prepare for future natural disasters. The Board of Alders took a step toward that goal Monday night.

The state of Connecticut is a finalist in the National Disaster Resilience Competition, a program established by the federal government to use community block development grants designated for disaster relief specifically to help communities impacted by natural disasters recover and prepare for future disasters. The two-phased program will provide $1 billion in federal funding to applicants that make the cut.

Annex Alder Alphonse Paolillo said that the competition "encouraged communities to consider not just how they could recover from a past disaster, but how they could avoid future disaster losses.The state developed a process for the application and a review of the unmet needs for communities across Connecticut including New Haven," which was hit hard by Sandy.

During its regular meeting Monday, the Board of Alders voted unanimously to allow Mayor Toni Harp to sign an agreement with the state to help advance the state's application for the grant funds. The item wasn't going to be on the agenda, but the deadline for the state's application is Oct. 27. The resolution was given a first reading during a public briefing for alders last week. The briefing was held instead of a Finance Committee meeting last week to put the resolution in position for a vote Monday.

Dixwell Alder Jeanette Morrison said the pilot projects represent "visions of how a resilient corridor and transit oriented development can look along the historic, topographically diverse Connecticut coastline.

"The project proposed in New Haven solves for the upland and coastal flooding conditions simultaneously while protecting the Long Wharf neighborhood and train station," she said. "If these are done they will enable future economic development opportunities in this downtown area."

The total estimated cost for the project applications is $62.3 million. Some of the proposed projects include stormwater junction bypasses; a dry canal to redirect storm water; a wet/dry stormwater retention, secondary inland brim; protection of the railyard; an extensive bioswale network, and constructing an expansion of multimodal roadway.

October 20, 2015 - *Wendi Weber: Three years after Sandy, building a stronger Atlantic coast in Connecticut*, New Haven Register

Three years ago this week, Hurricane Sandy devastated communities in New Jersey and along the Atlantic Coast with record storm surge, fierce winds and torrential rain. Earlier this month, Hurricane Joaquin reminded us of nature's power, inundating much of the Atlantic Seaboard with heavy rains and chest-deep floodwaters and setting historic records in the Carolinas.

In this age of uncertainty, we have come to expect the unexpected. The science tells us that climate change will cause hurricanes and tropical storms to become more intense - lasting longer, unleashing stronger winds and causing more damage to coastal ecosystems and communities. As we know too well, these storms threaten lives and result in millions of dollars in property damage. They also expose the vulnerability of beaches, sand dunes and coastal marshes that not only provide habitat for fish and wildlife but also protect local communities from flooding.

The question is, what can we do to help these coastal areas stand stronger against the storm?

Federal money for Hurricane Sandy recovery has spurred an unprecedented effort to strengthen natural defenses along the Atlantic Coast to protect communities and wildlife against future storms. The U.S. Fish and Wildlife Service and other Department of the Interior agencies are investing $787 million in hundreds of projects to clean up and repair damaged refuges and parks; restore coastal marshes, wetlands and shoreline; connect and open waterways to improve flood control; and increase our scientific understanding of how these natural areas are changing.

These investments support the goal of President Barack Obama's Climate Action Plan to make communities more resilient to increasingly intense storms predicted with a changing climate. They also create jobs and provide opportunities for fishing, hiking, wildlife watching and other recreational opportunities.

In Connecticut, the Fish and Wildlife Service is investing more than $4.6 million in eight projects to clear more than 70 miles of coastline debris; open more than 100 miles of waterways for fish passage; and restore more than 2,000 acres of aquatic habitat. This includes the recently completed $794,000 White Rock dam-removal project with The Nature Conservancy to restore natural river flow in Stonington and Westerly, Rhode Island. The project will reduce flood risk to local communities, restore habitat for fish and wildlife and open up several dozen miles of fish passage in the Pawcatuck River for the first time in nearly 250 years.

More than a half-century ago, Rachel Carson, one of our greatest conservation heroes, characterized conservation as "dynamic, changing as conditions change, seeking always to become more effective." Looking toward the future and the uncertainties of a changing climate, communities, government and nonprofit organizations are working together like never before to better understand and adapt to changing conditions.

Clearly it will take time and careful planning before we see a return on many of these investments. But I am confident the long-term benefits of building a stronger coast will far outweigh initial costs when it comes to protecting communities, sustaining wildlife and lessening the financial impact of damages resulting from future intense storms. To that end, we are establishing systems to carefully monitor and evaluate our progress to ensure this work is effective and lasting. The nature we care about and the public we serve deserve no less.

You can track the status of our projects and investments by visiting the Fish and Wildlife Service's Hurricane Sandy website at www.fws.gov/hurricane/sandy.

National News Clips

October 23, 2015 - *How and why Patricia stands above the four other most severe hurricanes in history, The Washington Post*

After attaining peak winds of 200 mph early this morning, Hurricane Patricia became the strongest storm ever recorded by the National Hurricane Center. It jumped to the top of a notorious list of the western hemisphere's most vicious storms, dating back decades.

The record Patricia established spans not only hurricanes that impact western North America, but also those that impact eastern North America and the Caribbean.

The four storms which Patricia now looks down at are:

1. Hurricane Allen, 1980, peak winds of 190 mph (Caribbean and Gulf of Mexico)
2. Hurricane Wilma, 2005, peak winds of 185 mph (Caribbean and Gulf of Mexico)
3. Hurricane Linda, 1997, peak winds of 185 mph (Northeast Pacific)
4. Hurricane Gilbert, 1988, peak winds of 185 mph (Caribbean and Gulf of Mexico)

The unnamed hurricane of 1935 which struck the Florida Keys was also estimated to have peak winds of 185 mph. However, estimates of hurricane peaks winds prior to the 1970s are very

uncertain as there were no weather satellites watching these storms.

Let's take a look back at each of these storms, and what defined them:

Hurricane Allen, 1980
Allen peaked in early August 1980 south of Haiti, where it killed over 200 people. In the U.S., it is most remembered for its impact in south Texas, where - as a weaker storm - it moved ashore with 125 mph winds. It produced up to 20 inches of rain and a storm surge up to 12 feet.

"Since this portion of Texas and Mexico were sparsely occupied, casualties were low, with only six deaths reported in Texas," a NOAA Web site said.
Hurricane Wilma, 2005

Almost exactly a decade ago, Wilma exploded in intensity, deepening from a tropical storm to a Category 5 hurricane over the course of a day in the western Caribbean. It set the mark for the most rapid strengthening in the tropical Atlantic on record.

Wilma made landfall in Cozumel as Category 4 hurricane. NOAA reported at least 19 people were killed from Wilma's rain and wind across the Caribbean and Mexico.

It then curled northeast to the southwest coast of the Florida peninsula where it made landfall near Naples on October 24 as a Category 3 storm. At least five deaths were directly attributed to the storm.

Hurricane Gilbert, 1988
Gilbert experienced an extraordinary period of rapid intensification on Sept. 13 near the Yucatan Peninsula.

"Gilbert crossed the northeast coast of Mexico's Yucatan peninsula on September 14th, becoming the first Category 5 hurricane in the Atlantic basin to strike land since Camille in 1969," NOAA said.

After slamming the Yucatan Peninsula, Gilbert entered the Gulf of Mexico but spared the U.S. Gulf Coast, instead drifting into northeast Mexico south of the Texas border.

"Gilbert's large size and impacts were felt over much of the Caribbean, Central America as well as portions of the United States," NOAA said. "The death toll of 318 gives an idea of the scope of Gilbert's impacts: Mexico 202, Jamaica 45, Haiti 30, Guatemala 12, Honduras 12, Dominican Republic 5, Venezuela 5, United States 3, Costa Rica 2, and Nicaragua 2."

Hurricane Linda, 1997
Prior to Patricia, Linda held the record for the strongest hurricane to form in the Northeast Pacific Ocean. But with the exception of Socorro Island where it damaged some weather instruments, the storm remained over the ocean.

It attained its maximum intensity on Sept. 12, 1997 over the ocean.

Some of the storm's moisture reached southern California, contributing to some rain. Waves generated by the storm reached 15 to 18 along the coast.

What sets Patricia apart from the others

Of all of the above monster storms, none of them struck land at peak intensity. They either weakened or, in Linda's case, stayed out to sea. Patricia is forecast to make landfall very near if not right at peak intensity.

The closest analog to Patricia in recent decades would probably be Super Typhoon Haiyan which hit a high populated portion of the Philippines when it was very close to its maximum intensity. Its death toll was over 6,000 people. The area of Mexico that Patricia is forecast to impact is not as densely populated, which should reduce the amount of destruction and numbers of human casualties.

Going back further, the 1935 Florida Keys hurricane was also near maximum intensity at landfall, and is the most intense hurricane known to ever hit the U.S. That storm, which produced a devastating 20 foot storm surge, killed 408 people, NOAA said.

October 19, 2015 - *Study: Climate change adding billions to U.S. hurricane costs, USA Today*

The cost of U.S. hurricane damage has increased dramatically from 1900 to 2005 as a result of man-made climate change, an economic study released Monday concludes.

"The rise in losses is consistent with an influence of global warming on the number and intensity of hurricanes, an influence which may have accounted for 2% to 12% of the U.S. hurricane losses in 2005," according to the study, which was published in the peer-reviewed British journal Nature Geoscience.

In 2005 alone, climate change was likely responsible for close to $14 billion of additional damage, including devastation caused by Hurricane Katrina.

The study claims that the extra costs in recent decades do not just stem from more homes, businesses and infrastructure that have been built near the coastlines. "Increases in wealth and population alone cannot account for the observed trend in hurricane losses," according to the study, whose lead author is Francisco Estrada, an economist at Mexico's National Autonomous University.

Estrada and two colleagues from Europe said that this unexplained increase in economic losses over time is consistent with a climate change signal.

One scientist who has written extensively about U.S. costs from weather damage said the study is flawed.

University of Colorado's Roger Pielke, who was not involved in the study, said it should have included hurricane damage data from just the past 10 years (2006-2015), which have been quiet for hurricane activity. He said it's "misleading" to end an analysis with the "exceptional" hurricane year of 2005.

"The period 2006-2015 has been well below average in terms of damage and U.S. hurricanes," Pielke said in an email to USA TODAY. "It is shocking that they did not include this further data."
He also said that U.S. hurricanes have not become more common or more intense, based on long-term data from 1900 to the present.

Another expert, meteorologist Steve Bowen of global reinsurance firm Aon Benfield, said "the study seems to use a reasonable approach to determine the results."

Since 1960, Bowen said, economic losses from natural disasters as a percentage of the U.S. economy have largely been flat.

"From my perspective," he added, "it is always healthy for there to be robust conversation within the scientific research community to challenge conventional thinking to better understand any trends that we're seeing."

October 16, 2015 - *Rising seas overwhelm Delaware tide gates*, America Aljazeera

SOUTHBRIDGE, Delaware - Down by the railroad tracks that cut through the neighborhood's south end, water is pooled on the road even on a hot August day, remnants of a downpour the day before. The road is submerged regularly here, flooding the basements of nearby residents.

Richard King grew up in the neighborhood. "When I grew up and we got a big rain, we didn't have to worry about it," he said. "The only thing that flooded was right down here at the park, and that would maybe be half the day ... but that would go down with the tide, and that was the end of that."

"When there are big rains in the middle of the night, you'll see the waters. It looks almost like a wave. It will wash up and then roll right back out," he said.

The Southbridge neighborhood is part of Delaware's largest city, Wilmington, at the northern end of the state. With a population of 72,000 people, the city sits on the Delaware River, where Brandywine Creek meets the Christina River, 65 miles from the ocean. Yet Southbridge, although far from the beaches of Delaware's bay and the Atlantic, is vulnerable to the effects of sea level rise. The neighborhood already faces chronic flooding, due to a combination of its low-lying location and aging infrastructure, and the flooding is likely to get worse as sea levels rise.

"The Christina River, which encircles all of South Wilmington, is subject to sea level rise, just like the rest of the tidal water bodies in the state," explained Susan Love, the leader of the climate and sustainability division at the Delaware Department of Natural Resources and Environmental Control (DNREC) and a former project manager for its sea level rise initiative. "Over the past 100 years, the average tide level has risen by about a foot, so that means that high tides are higher today, and the tides that affect flooding happen more often in this area. So the flooding that we're seeing is in part being exacerbated by the effects of sea level rise."

According to the DNREC's researchers, future rates of sea level rise on the Delaware coast could range from 1.6 feet to 4.9 feet by 2100, potentially submerging up to 11 percent of Delaware's land, putting roads, railroads and water wells at risk. More than 20,000 people in the state living less than 5 feet above sea level could be directly affected, about 10 percent of them in Wilmington, where many of them are socially and economically vulnerable.

Although income levels have risen in the neighborhood since 2010, about 30 percent of Southbridge households were below the poverty line in 2012. Limited economic opportunities and poor public transportation connections to the rest of the city have contributed to high unemployment in the neighborhood, which reached about 14 percent in 2012, almost double the national average. Many households don't have the option to leave the neighborhood when floodwaters rise and have less money available to rebuild after a storm or extreme weather. Flood insurance is out of reach for many of Southbridge's 1,900 residents.

"We've held flooding symposiums with [the Federal Emergency Management Agency]," said Rysheema Dixon, the chairwoman of the South Wilmington Planning Network. "We're trying to talk to them about how we can get some insurance for a lot of these residents, who have mostly had basements flooded and now have mold in their basement because it floods every time it rains."

During a light rain, road runoff and household wastewater are channeled through underground pipes to a treatment plant. When a heavy rain comes, water flows out to the Christina River through tide gates. But when the river runs high, those gates can't open, the system is overwhelmed, and water rushes back up onto the street through pipes and drains.

The floods get so bad, you're knee deep in water sometimes, said resident Shalonda Davis. "It's like you're swimming out of Southbridge."

"The buses can't get in," she added, "so people miss work." Residents have to wait until the water goes down, when the buses can make it through.

"The most dangerous time it would [flood] is when we have a full moon and a nor'easter comes," said Clarence White, who has operated his auto workshop in Southbridge for 49 years. "You've just got to cut your power off because you don't know how high it's going to come."

"When it starts raining, you can be inside your office and about an hour you look out and you can see waves coming down the street," he said. "It's been a way of life."

And when the floodwaters rise, Southbridge residents face the damaging effects of not only the water but also an industrial past and aging infrastructure.

Beginning in the late 1800s, Southbridge was transformed from an agricultural area to a major industrial center. Canning, lumber, tanning and iron industries moved to Southbridge to take advantage of available land and its proximity to water. Oil and coal companies moved into the area in the 1900s. When industry and manufacturing declined in the postwar years, Southbridge was left with their environmental legacy.

"Remnants of industry, arsenic, lead, chromium, heavy metals - things that are byproducts of historical as well as contemporary commercial and industrial activities - remain in the soil for quite some time," said Victor Perez, a sociologist at the University of Delaware who is part of a team of scientists there studying the effects of sea level rise on soil contaminants.

In the late 1800s and into the 1900s, there was a large tanning industry on the waterfront, said Donald Sparks, the director of the Delaware Environmental Institute at the university, who is leading the study. "They used arsenic and chromium to help tan the leather, so there are quite a few sites there that have elevated levels of [those] metals."

Some soils have properties that make them hold on to contaminants, preventing their release into the environment. What scientists don't yet know is whether repeated flooding with salt water will mobilize those contaminants and, if they do, whether that poses any risk to residents.

"We know a lot of the chemistry of the material. We know how they react in soils," he said. "But what we don't know is, what will happen under these rather dramatic conditions?"

"What we're trying to understand is, is it a potential problem?" said Sparks. "As long as these things are stabilized, it may not be a problem ... The answers are just still out there. We don't know."

It's a problem that could affect communities throughout the mid-Atlantic. "We have a lot of old abandoned industrial sites and old brownfield sites that are contaminated with a whole host of different pollutants, including metals and organic chemicals," he said. "A number of these are in urban areas ... There are obviously some environmental justice issues related to all of this as well."

While the prospect of hazardous contaminants seeping into the neighborhood is cause for concern, the public health risk from sewage in the floodwaters is greater.

"In this area, contaminants don't affect the drinking water supply, which is usually the key path of contamination," said the DNREC's Susan Love. "The human health issue in Southbridge is more that flooding sometimes has untreated wastewater in it. That is definitely a primary contact human health issue."

As with many old sewage systems along the East Coast - such as in New York, Philadelphia and Washington, D.C. - Wilmington's stormwater and sewage pipes are combined, creating a nasty mix of road runoff and sewage that floods the streets of Southbridge during rains.

"Usually, people who have basements would take [the flooding] in their stride, until it started mixing with the sewage. Then they were afraid for their kids and the health issue and the stench that's in the house," said White. "I have a drain right outside my business, and any day, you could just smell it."

Residents are hopeful that plans for a new 20-acre wetland park will bring some relief from the floods, keep sewage-laden waters off their streets and offer some protection from sea level rise. In late September, local agencies and residents gathered at the Elbert-Palmer Community School in Southbridge for an open house event to view and comment on plans for the new wetland development as well as a new transportation project designed to connect the community to Wilmington's waterfront.

The wetland project, which will make use of an existing but degraded wetland in the

neighborhood, has been 10 years in the making. New pipelines will direct runoff from Southbridge streets into the wetland, where many sediments and pollutants will fall out before the water makes its way to the Christina River. Designs for the park include raised walkways, bike paths, meadows and an upland forest area. Southbridge residents hope the park will bring new life to the community.

"They're not just worrying about the flood. They're bringing in a beautiful park, a bike park, a park for the dogs," said Davis. "I think that will also bring this community together. That's something that we need. This isn't going to just help the flood. It's going to help better our community and beautify our community."

The wetland can provide only a short-term fix in the face of sea level rise. Other strategies will be needed to protect the community in the future, said Love, but the wetland is a key part of addressing both the historic and some of the future flooding.

While plans for the park have been approved by the city, work has yet to begin on the project, and funding gaps remain.

As seas rise, financing adaptation strategies to build and maintain infrastructure will be a growing problem for many coastal states. State and federal agencies currently pick up the tab to protect Delaware's coastline, but resources are finite, and the state will increasingly be called upon to prioritize scarce funds.

Delaware's popular tourist beaches on the state's Atlantic coast, at Rehoboth and Lewes, are regularly replenished using state and federal funds, but maintenance costs are likely to rise as erosion becomes more severe and more frequent replenishment is needed. Upgrades in 2013 to six Atlantic beaches and the Indian River inlet cost $26 million, paid for by federal disaster relief funds.

Maintaining these beaches is considered beneficial to U.S. taxpayers, so the cost of beach replenishment is shared by the federal and state governments, with federal funding covering three-quarters of the cost. Delaware Bay beaches are dependent on state largesse, with replenishment covered by dedicated state beach replenishment funds.

For other environmental fixes - wetland restoration, dike construction and raising houses - the state needs to find funding from other sources.

"There's no dedicated funding source for that," said Love. Funding for those projects come from money "pieced together from federal grants, from local grants, from foundations, from private contributions ... so it's really difficult."

That includes projects like the new wetland park at Southbridge.

"It's necessary and needed to stop an environmental justice community from going under water on a fairly routine basis and to fix some public health issues," she said. "We're cobbling funding together from a variety of sources, and there's still a shortfall. There's no designated pot of money for a $20 million project like that."

It's a problem that's not unique to Delaware, and it doesn't bode well for the large-scale infrastructure projects that could be needed to hold back the water in the future. Unless rising tides can be accommodated by improved drainage, raising buildings or other means that would allow people to live on the shore despite the threat of flooding, there are just two options available: retreat from the flooded shoreline and remove existing structures or protect and fortify the coast to hold back the water, at substantial cost.

"We can't adapt our way out of climate change," said Love. "We do need to reduce our greenhouse gas emissions, because there's only so much adaptation, particularly for sea level rise, before we just have to get out of the way."

"If we can mitigate our greenhouse gas emissions, we might be able to limit our level of seal level rise by the end of the century to 3 feet or less, and I think we could deal with that over

time," she said. "When you start thinking about 5 feet or 6 feet to the end of the century, it becomes a much harder task to preserve what we have."

October 14, 2015 - *Antarctic Ice Melt Could Get Worse, But Humans Can Slow It Down, The Huffington Post*

A view of the retreating Knox Coast ice shelf in Antarctica in 2008. Ice shelves are important barriers that prevent land-based ice sheets and glaciers from melting into the ocean.

The melting of Antarctic ice shelves could double in the next 35 years and lead to ice shelf collapse by the end of the century if fossil fuel consumption continues at the current rate, according to a new study published Monday in the journal Nature Geoscience.

Floating ice shelves, which act as a natural "door stop" by slowing land-based ice sheet melt into the ocean, are affected by both air and ocean temperatures, explained Luke Trusel, the study's lead author and a postdoctoral scholar at Woods Hole Oceanographic Institution in Massachusetts. As air and ocean temperatures rise due to climate change, the shelves melt at an accelerating rate.

Melting ice shelves alone do not contribute significantly to sea level rise, but if those shelves collapse and ice from glaciers and ice sheets then melts in the ocean, that would create a much more significant issue, Trusel said. Previous studies have estimated that the melting of the Antarctic ice sheets could contribute as much as 200 feet to global sea level rise.

Trusel said the study looks at how Antarctic ice shelf melt changes over time in response to climate change. "What we see is that melt kind of behaves like a threshold system -- either an ice shelf is pretty cold and not much melting is happening at all, or if you warm it up even a little bit, you exponentially increase the melt rate," he said.

That current threshold, Trusel said, is somewhere around the average Antarctic Peninsula summertime temperature of -3 degrees Celsius (about 26 degrees Fahrenheit). The peninsula is the northernmost part of the continent.

Trusel said temperatures have exceeded this key threshold over the past few decades on the Antarctic Peninsula, and the progressive warming from north to south has caused ice shelves to collapse.

"Essentially, this is a region where the climate has warmed at rates faster than the global average," he said.

Using satellite observations of ice surface melt and climate model simulations, researchers projected two scenarios through the year 2100: One with high levels of greenhouse gas emissions that are similar to or more intense than current levels, and another scenario with "intermediate," or reduced, emissions levels.

With reduced emissions levels, ice shelf melt would continue, but wouldn't reach the projected threshold where ice sheets become unstable. But under current or accelerated levels of greenhouse gas emissions, temperatures could warm enough to critically erode those ice shelves.

Trusel's co-authors looked at the peninsula's history and evidence of past changes in its ice shelves, and applied those projections across all of Antarctica.

Melting ice can cause water to pool on the surface, Trusel said. When that happens, rather than reflecting solar energy as ice would, the meltwater absorbs energy from the sun, and that warmer water trickles into cracks and crevices in the ice, causing further melt.

"Ice sheets just do not like water. Not on top, not below, not from the ocean -- unless the ocean layer is very cold. Water on ice means that the ice is very unstable," said Ted Scambos, the

lead scientist for the science team at the National Snow and Ice Data Center, in an email to The Huffington Post. He wasn't involved in the study published Monday.

"This study shows that we can expect much larger areas of flooded ice in the future," Scambos said, noting that variables like snowfall can complicate projections. "An ice sheet area with a lot of annual snowfall can tolerate a lot more melting before these factors affecting stability come into play."

Warmer air and ocean temperatures speed the disintegration of ice shelves, but reducing greenhouse gas emissions would help slow this process, scientists say.

Ocean warming is the biggest concern when it comes to changing ice shelves, Trusel said. After examining how much melting occurs every day and making some extrapolations, he said that researchers found "a number of ice shelves are due to disintegrate just due to ocean warming."
"If we add on to this bottom-up melting and top-down melting -- which is what we're projecting -- that raises future concern," Trusel said.

He also noted that the study makes projections based on known trends and conditions, but does not predict how the disintegration of ice shelves might impact global sea levels (or how much trouble awaits New Orleans and Miami, for example).

Despite the study's alarming projections on potential ice shelf collapse, Trusel said there are two ways of looking at it.

"You could interpret this as bad news, or you could interpret it as good news -- in that we have this really clear control on the climate of Antarctica," Trusel said. "And because of that control, we ultimately determine what path we're on."

Even if the world reduces its greenhouse gas emissions, there will still be an increase in ice melt -- just not to the point where humans will have to worry about ice sheet stability, Trusel explained.
Adopting energy policies and other practices like reducing deforestation, all of which reduce carbon emissions, are central to the issue, Trusel said.

"It's up to us what path we go down. There's a silver lining here."

October 12, 2015 - *Rising seas to displace millions of Americans if warming unchecked*, Thomson Reuters

TORONTO, Oct 12 (Thomson Reuters Foundation) - Millions of people in the United States could be forced to abandon their homes if planet-warming emissions continue unabated through 2100, pushing global sea levels up by more than 14 feet (4.2 metres), researchers said.

In the United States, between 20 and 31 million people are living on land that would be submerged by rising oceans without aggressive cuts to greenhouse gas emissions, according to a study published on Monday in the Proceedings of the National Academy of Sciences.

That scenario could occur if global average temperatures rise by 3.3 degrees Celsius (5.9 degrees Fahrenheit) from pre-industrial levels by the end of the century, said the study's lead author, Benjamin Strauss.

Scientists fear ice sheets in Antarctica and other regions will melt as global temperatures increase, leading to major rises in sea levels.

"I would avoid buying property in South Florida in particular," Strauss told the Thomson Reuters Foundation.

Coastal California, New York and other cities on the U.S. east coast would also be hit hard by rising seas if carbon emissions are not cut drastically, he said.

To substantially blunt the threat, emissions reductions would have to be bigger than those pledged by the United States and more than 145 other countries as part of a new U.N. deal to tackle climate change due to be agreed in December.

An independent, science-based analysis released this month by Climate Action Tracker, said those plans, if implemented, would keep global warming to 2.7 degrees Celsius, higher than an internationally agreed limit of 2 degrees.

"Our actions today determine sea-level rise tomorrow," said Strauss, from the scientific group Climate Central, in a statement.

"We can act ... or we can delay and leave a legacy of irreversible rising seas that threaten to destroy some of our nation's most iconic cities."

The study did not look at the impacts of rising sea levels on cities in other countries.

To hammer home the message in the United States, where some politicians and voters remain sceptical about human-induced climate change, researchers built a map allowing residents to type in their postal code to see if their city is projected to be underwater by 2100 (choices.climatecentral.org).

Announcements

October 30, 2015 - Exploring Climate Solutions Webinar series. Next webinar BGreen2020, October 30 1pm. Webinars scheduled for Nov. 4 & 10

The series explores innovative and successful climate change solutions across Connecticut and the nation. The webinars provide first-hand accounts of high-profile municipal climate programs, climate initiatives in the corporate world, new greenhouse gas reporting frameworks, statewide sustainability programs, low-carbon fuel initiatives, and other programs and projects that help reduce greenhouse gas emissions and/or improve climate resilience.

The webinars are free and open to the public. Registration required. Attend scheduled webinars from any computer connected to the web. During the webinars, attendees may submit questions for the presenters to answer.

Upcoming webinars

BGreen2020
October 30, Noon to 1:00
Learn about the BGreen 2020 initiative, a public-private partnership between the City of Bridgeport and the Bridgeport Regional Business Council, a consortium of local business groups. By building on Bridgeport's existing strengths, BGreen will modernize the city's infrastructure, create wealth, intensify urban amenities, enhance environmental quality, enable revitalization without gentrification, and retain Bridgeport's historic character. Early priorities are the creation of an Energy Improvement District to support energy efficiency and production, adopting a "Transit First" policy, developing a plan for open space use and maintenance, expanding recycling, and protecting the region's waterways through enhanced stormwater management. A Green Collar Institute will train workers and act as an incubator for developing green industries.

Portland, OR, Equity Work Group
November 4, Noon to 1:00
Learn about the Equity Work Group from the City of Portland, Oregon. As a part of the city's

Climate Action Planning, the Equity Work group was tasked with identifying opportunities to enhance the benefits of climate change programs and policies for all residents -- and avoid potential negative impacts or missed opportunities for communities of color and low-income populations. The Working Group also provided the city with recommendations on "climate equity metrics" to help measure progress toward equity while achieving the goals of the Climate Action Plan.

Clean Energy Communities
November 10, Noon to 1:00
Learn about Clean Energy Communities, a collaboration between Connecticut Green Bank and the Connecticut Energy Efficiency Fund that helps communities come together to support energy efficiency and renewable energy. The program is built around simple guidelines enabling community leaders, households, and local businesses to set clean energy goals, track their progress, and earn energy efficiency and renewable energy points that can be redeemed for clean energy systems and grants for energy-saving projects. It provides guidance on issues such as solar permitting, Commercial Property Assessed Clean Energy, and energy-savings performance contracting. The webinar will give an overview of this innovative program and talk about how it is driving clean energy in communities across the state.

November 6, 2015 - UConn Climate Adaptation Academy, *Legal Issues in the Age of Climate Adaptation*. 8am-2:30pm. Register here.

Legal Issues in the Age of Climate Adaptation

HOW TO PROTECT LIVES, PROPERTY AND RESOURCES IN THE FACE OF CLIMATE CHANGE

November 6, 2015 | 8:30 am-2:30 pm | View Agenda
Location: Saybrook Point Inn | 2 Bridge Street | Old Saybrook, CT

The first in what is expected to be a series of workshops exploring how sea level rise and climate adaptation efforts may be addressed through legal concepts like the Public Trust Doctrine and regulatory processes like permitting and how climate adaptation may change how we look at those concepts and processes.
Environment Chairman Rep. James Albis will provide opening remarks.

Aging ImageSpeakers include:
CT Ass't. Attorney General David Wrinn
Attorney Marjorie Shansky
Clinton, CT ZEO Eric Knapp
Attorney Mark Branse
Attorney John Casey

The Climate Adaptation Academy is a partnership of the Connecticut Sea Grant at UConn and the UConn Center for Land Use Education and Research.

November 15, 2015 - Next review date for CIRCA Matching Funds Program. Up to $100,000 available. For more information go to http://circa.uconn.edu/funds.htm

The CIRCA Executive Steering Committee is excited to announce its fourth round of funding under the Matching Funds Program - up to $100,000 is available. CIRCA will consider requests from Connecticut municipalities, institutions, universities, foundations, and other non-governmental organizations for matching funds for projects that address the mission of the Institute. To be funded, a successful Matching Funds request must have a commitment of primary funding within 6 months of the CIRCA award announcement, or have received a waiver from the CIRCA Executive Steering Committee. CIRCA Matching Funds will provide up to 25% of the primary funder's contribution other than municipal or State of Connecticut funds to

enhance the likely success of project proposals that advance CIRCA research and implementation priorities. In evaluating proposals preference will be given to those that leverage independent funding awarded through a competitive process.

November 19, 2015 - Rockfall Foundation Grants Program

The Rockfall Foundation invites representatives of non-profit organizations, municipalities, and schools to apply for grants for projects that contribute to the general environmental education of the public, promote environmental planning, contribute to the preservation of the Connecticut River watershed, or fund an internship with a non-profit organization for an environmental project. For the 2015-2016 Grant Cycle, Rockfall will entertain grant applications for amounts ranging from $500 to $15,000. Proposals must have ties to Middlesex County in order to be considered. This includes projects or programs based in Middlesex County as well as applicants based in Middlesex County. Proposals that focus on the Connecticut River corridor or Long Island Sound will also be considered as long as there is a demonstrated impact on Middlesex County. Special consideration will be given to projects that impact youth (preschool through college) or are multi-generational.

The FY2015-16 guidelines and application form, as well as additional information about The Rockfall Foundation, are available on the Rockfall website: **www.rockfallfoundation.org**. The application deadline is12:00 noon, Thursday, November 19, 2015; grant awards will be announced and funds distributed early in 2016.

An informal workshop where potential applicants can ask questions and discuss their ideas will be heldWednesday, September 16 from 5:00 to 6:00 p.m. at the deKoven House Community Center, 27 Washington Street, Middletown. Anyone with questions or who would like to RSVP for the workshop should contact Tony Marino, Interim Executive Director, attmarino@rockfallfoundation.org or 860-347-0340.

November 20, 2015 - Notice of Funding Availability from CT Dept. of Housing CDBG-DR Tranche 2, Planning funds to address improved resiliency to Infrastructure and Public Facilities in Fairfield, New Haven, New London and Middlesex Counties. Applications due November 20, 2015

State of Connecticut
Department of Housing
NOTICE OF FUNDING AVAILABILITY
Community Development Block Grant- Disaster Recovery- Tranche 2
Planning funds to address improved resiliency to Infrastructure and Public Facilities in Fairfield, New Haven, New London and Middlesex Counties

Deadline for Submission of Application: November 20, 2015

This Notice of Funding Availability (this "NOFA") is directed to eligible applicants seeking assistance for planning activities associated with improved resiliency of infrastructure and public facilities within eligible counties under the Community Development Block Grant Disaster Recovery ("CDBG-DR") Program.

A. Goal of this NOFA:
The goal of this NOFA is to provide funding for necessary planning/preconstruction expenses related to the hardening of infrastructure and public facilities in Superstorm Sandy eligible counties. The State of Connecticut Department of Housing ("DOH") intends to provide assistance which will lead to added resiliency and mitigate future damage in a manner that supports energy conservation, efficiency and environmental stability.

B. Eligible Applicants:
Applicants eligible for consideration under this NOFA include state agencies, units of local

government and local councils of government (e.g. regional planning agencies).

C. Eligible Activities:
Eligible activities include the following:

- Research to develop strategies to address the health and safety of homeless individuals and families and other vulnerable populations;
- Plans to address foreseeable mitigation and resiliency projects, particularly as they relate to critical infrastructure;
- Plans to avoid fuel shortages during disasters;
- Plans to address coastline resilience;
- Research to develop strategies for creating off-the-grid public facilities, homes and commercial businesses;
- Plans to address resiliency/mitigation of potable water or waste water systems; or
- Plans to address resiliency/mitigation of roads and drainage systems.

D. Funding Amount:
The amount of funding to be made available under this NOFA is approximately $4,000,000. The minimum amount of funding that can be applied for is $100,000. There is no maximum amount.

READ MORE

December 1- 2, 2015 - Registration Now Open! Living Shorelines: Sound Science, Innovative Approaches, Connected Community 1st National Technology Transfer Meeting and Regional Workshops

When: December 1-2 2015
Where: Hilton Hartford Hartford, CT

Restore America's Estuaries, in partnership with the Connecticut Institute for Resilience and Climate Adaptation, is pleased to announce a first-of-its-kind living shorelines event! This Summit - Living Shorelines: Sound Science, Innovative Approaches, Connected Community - will feature nationally-relevant issues and discussions along with region-specific workshops.

Whether you call them "soft shorelines," "living shorelines," "soft armoring," or "soft stabilization projects," you belong at this gathering!
Follow on twitter @LSSummit2015
Contact Jeff Benoit - jbenoit@estuaries.org
Any Questions? Contact Suzanne Simon - ssimon@estuaries.org

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The *Resilience Roundup* highlights CIRCA's presence in the news, provides links to recent local/state/national news articles related to resilience and adaptation, and announces upcoming events and seminars.

The Connecticut Institute for Resilience and Climate Adaptation's (CIRCA) mission is to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways to the growing impacts of climate change and extreme weather on the natural, built, and human environment. The institute is located at the University of Connecticut's Avery Point campus and includes faculty from across the university. CIRCA is a partnership

between UConn and the Connecticut Department of Energy and Environmental Protection (CT DEEP).

circa.uconn.edu

Follow us on twitter

CIRCA, UConn Avery Point Campus, 1080 Shennecossett Road, Groton, CT 06340