

ISSN 2151-2825 (print)  
ISSN 2151-2833 (online)



Special Climate Change Issue

*What is happening in Connecticut and Long Island Sound as the world changes? What surprises may the future bring?*



**Volume 10 No. 2**  
**Fall/Winter 2010**

## Letter from the Editor's desk

**Dear Readers,**

You may not be contemplating climate change while you're shovelling snow, but nevertheless the *Wrack Lines* team offers you a special theme issue on the topic, specific to our Long Island Sound geographic region. We've assembled some top-notch experts who have offered to share their insights. Examples of climate impacts abound, and many Connecticut communities are scrambling to assess what's happening and begin to plan for the future. We hope that this issue of *Wrack Lines* will help generate discussion and ideas.



There are many excellent web sites that can give readers tips on what individuals and businesses can do to help, such as carpooling, calculating our carbon footprints and planning to mitigate our greenhouse gas emissions. We have not tried to duplicate those here, but have included a selected list on the inside back cover. We encourage you to explore more and get involved locally once you've put down this issue.

Finally, I must report, regretfully, that Nancy Balcom, one of our tireless Editorial Board members, has had to step down due to other commitments. We thank her for her devoted service to the magazine over the years. We are seeking a new member to fill the vacancy, so nominees will be welcome.

Our Spring issue will feature the marvelous living creatures who inhabit the Long Island Sound and its shores. I wish you all the best for a happy and healthy 2011.

Your editor,  
*Peg Van Patten*

# Wrack Lines

Volume 10 Number 2  
Fall/Winter 2010

## Staff

Peg Van Patten, Editor

## Contributing Authors

Nancy C. Balcom  
Juliana Barrett  
Mike Dietz  
David J. Nicosia  
Niki L. Pace  
Jennifer Pagach  
Peg Van Patten  
Bob Wyss

## Design/Illustration

Peg Van Patten  
Kevin O'Brien  
Beth Doran

## Production Assistance

Karen L. Massaro

## Editorial Board

Nancy C. Balcom  
Sylvain De Guise, *ex officio*  
Edward C. Monahan  
Sandra Shumway  
Robert Wyss  
Peg Van Patten, *ex officio*

**Wrack Lines** is published twice a year or as resources allow by the Connecticut Sea Grant College Program at the University of Connecticut. Any opinions expressed therein are solely those of the authors.

There is no charge for Connecticut residents, but donations to help with postage and printing costs are always appreciated.

Change of address, subscription information, cancellation requests, or editorial correspondence should be sent to the address below:

Connecticut Sea Grant  
Communications Office  
University of Connecticut  
1080 Shennecossett Rd.  
Groton, CT 06340-6048

# In this issue...

|  |    |
|--|----|
| A Rain Garden Grows in Bridgeport<br><i>Mike Dietz</i>   | 2  |
| The Heat is On: A Look into New England's Future Climate<br><i>David Nicosia</i>                                   | 3  |
| Landmark Climate Change Nuisance Case is Headed to the Supreme Court<br><i>Niki L. Pace</i>                        | 6  |
| Rising Seas, Stormy Skies Ahead<br><i>Peg Van Patten</i>   | 9  |
| What if the Polar Ice Melted? (an inundation scenario)   | 10 |
| Long Island Sound and Climate Change: What is Going to Happen?<br><i>Jennifer Pagach and Juliana Barrett</i>       | 12 |
| An Interview with Andrew Revkin<br><i>Bob Wyss</i>   | 14 |
| Connecticut Sea Grant's Knauss Fellows-Coming and Going<br><i>Peg Van Patten</i>                                   | 16 |
| Town of Groton Starts Planning for Climate Changes<br><i>Syma A. Ebbin</i>   | 17 |
| Sea Grant Coastal Management Fellow to Help Puerto Rico Assess Climate Change Variability<br><i>Peg Van Patten</i> | 18 |
| Sea Grant Alumni--to There from Here<br><i>Nancy C. Balcom</i>   | 19 |



Hurricane photo courtesy of NOAA Image Library.

Back cover: A view of the Hartford, Connecticut Capitol area by Mark Parker, CT DEP

# A Rain Garden Grows in Bridgeport

*Mike Dietz*



P. Van Patten

A new rain garden has appeared in Bridgeport, Connecticut, facing Captain's Cove. It's not just any rain garden—it's a working demonstration garden that will help the school and the city cope with polluted runoff from greater rainfall due to climate change, and teach others about such gardens.

Sea level rise due to climate change is a reality; how much rise will occur is the only question. In addition, local precipitation patterns are also changing due to large scale climate changes. Average annual rainfall in Connecticut has been increasing through this century, at an average rate of about 1 inch every ten years. In addition, the intensity of rainfall events has been increasing in the region. Stormwater infrastructure (e.g. storm drains and culverts) in some of our older cities is already being overwhelmed; adding more frequent and more intense rains will only make the situation worse.

Bioretention areas have been used to reduce the impact of stormwater on local water bodies. Their use will become even more critical if current trends in precipitation patterns continue. The concept was developed as part of a Low Impact Development effort in Prince George's County, Maryland. In short, a bioretention area is a depression in the landscape that is designed to collect and infiltrate stormwater. Shrubs, herbaceous perennials and trees can be planted in them, and shredded hardwood mulch is usually applied to the surface. Pollutants in stormwater are trapped in the system, and are taken up by plants or adsorbed to soil and mulch particles. Bioretention systems contain an engineered soil mix, with an underdrain and overflow that are connected to the stormwater system. Typical applications include commercial areas, large parking lots, and other heavily developed areas.

A rain garden is essentially the same concept, but the design is simpler. Typically, native soils are used if they can take up a reasonable amount of water (usually at least 1 inch per hour). A "bowl" is excavated to a depth around 8 inches, plants are installed, and a mulch layer is added. Stormwater

can either be directed overland to the rain garden, such as in a grass swale, or piped directly in from, for example, a roof drain. Overflow from the garden is typically to a grassy area. A rain garden design guide for homeowners in Connecticut can be found at this web site: [http://nemo.uconn.edu/publications/rain\\_garden\\_broch.pdf](http://nemo.uconn.edu/publications/rain_garden_broch.pdf). The rain garden project, coordinated by Juliana Barrett of Connecticut Sea Grant and Mike Dietz of UConn's NEMO program and Connecticut Sea Grant, was made possible by a grant from the National Sea Grant Office as part of the Sea Grant Coastal Communities Climate Adaptation Initiative.

This bioretention area was installed adjacent to the Bridgeport Aquaculture School building, located at 60 St. Stephens Rd. in Bridgeport. Both school and city officials are supportive of the project. Currently, all of the rain that falls on the building is piped directly into the stormwater system, and into the Long Island Sound, which is only a couple hundred feet away. As a result of this project, a portion of this water will be directed to the bioretention area, and will infiltrate into the ground. In addition, the bioretention will improve the aesthetics of the area with a beautifully landscaped garden. Although this impact may seem small when you consider how many roofs there are in Bridgeport, it is a measurable difference, and, when added together, many small rain gardens can make a big difference.

*Mike Dietz is the Connecticut NEMO Coordinator.*



J. Barrett

The rain garden, after initial planting on the aquaculture school property in October 2010.

# THE HEAT IS ON: A Look into New England's Future Climate

David J. Nicosia

Every Autumn, tourists flock to admire the spectacular fiery foliage of New England. Tourists and residents alike take photos and many show children how to preserve colorful leaves by pressing them between sheets of waxed paper. We tend to take this annual show for granted. However, if fossil fuel burning goes unchecked, the climate of southern New England will be very different than it is today. In the worst case, New England's vivid fall foliage display could become a memory of the past.

Consider these scenarios for future New England winters and summers:

It is early December, the weather forecast for tonight is calling for clear skies with a widespread killing frost. It is expected to be the first freeze of the fall season. It has been a long and very mild fall season with temperatures consistently in the 60s and 70s with high temperatures occasionally in the 80s. This first freeze is a sign of things to come, as colder weather will become more common as late fall transitions into winter. Winter typically brings daytime temperatures in the 50s and 60s with morning lows in the 30s. Frost with occasional freezing temperatures will become more common. The chances for snow are slim to none in a given winter season. Measureable snow falls about once every 4 years. When it does fall, entire communities are paralyzed because they just don't have the equipment, salt and sand to cope with snow and ice, and residents don't know how to drive on snow and icy roads. Anytime the weather forecast calls for snow or ice, people rush to the stores, schools shut down, and businesses close. If several inches fall, a state of emergency is declared. Fortunately, a snowstorm of several inches is very rare and occurs once every 10-20 years. The vast majority of the time, precipitation falls as rain. The rains are often heavy and lead to floods.

Spring arrives early with temperatures frequently rising into the 70s by

March. By the middle of March, the chances of sub-freezing temperatures are extremely small. By May, daytime highs frequent the 80s and toward the end of May, temperatures often climb past 90 degrees. The humidity also kicks in strongly during May. Summers are long, hot, and humid with about 50 days exceeding 90 degrees. On a few days of the summer, temperatures exceed 100 degrees. Even though the heaviest rainfall comes in the summer season, the searing heat of the summer leads to intense evaporation of moisture from the soils. So despite an increased frequency of intense flooding rains, short term drought conditions occur almost every summer. Although rare, longer droughts of up to 6 months occur once every 10-20 years. Thus, the cycle of flooding rains and summer drying with occasional drought leads to challenges for both agriculture, and water supply. The heat and humidity of the summer lasts well into September with cooler weather not typically arriving until October.



C. Arnold

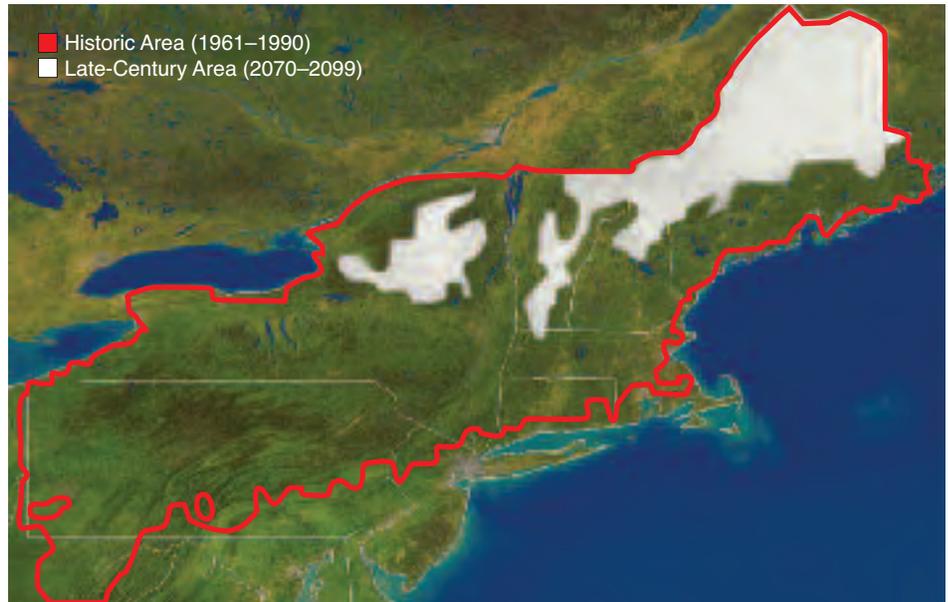
Could New England's legendary fall foliage color become a thing of the past? Many scientists say yes, if we continue to emit the amount of greenhouse gases we currently do.

Even so, temperatures in October often exceed 80 degrees. One would have to travel very far to the north to see fall color. The predominant forest type is pine and oak which lack the brilliant fall hues typical of a maple dominated forest. The above describes the current climate of South Carolina. But, it could someday describe our climate in southern New England.

If fossil fuel burning goes unchecked and we follow the Intergovernmental Panel on Climate Change's (IPCC's) high greenhouse gas emission scenario, by the end of this century, the climate of southern New England will be similar to the climate of South Carolina today.

The forests of maple, beech, birch, hemlock, spruce and fir will respond, as climatic zones shift to the north, vacating central and southern New England. Indeed, there was a time 6 to 8 thousand years ago, as indicated from pollen samples taken from lake cores, when these tree species did retreat far to the north of central and southern New England. The forests were predominantly oak, pine and chestnut. It is postulated that summers were 4 to 8 degrees F warmer than today during this time. Thus, it is entirely plausible that our forest composition will change with maples becoming much less common. With the retreat of the maples to the north, comes the loss of the brilliant fall colors so common in much of New England today. In addition, the maple sugaring business will suffer. Snow will become much rarer, especially along the coast. Snow cover will become non-existent across most of New England except over the far north and in the higher mountains of Vermont, New Hampshire and Maine. In these areas, snow cover would still remain for about 1/2 of the winter. The ski industry would be decimated with only a few resorts hanging on across the highest mountains.

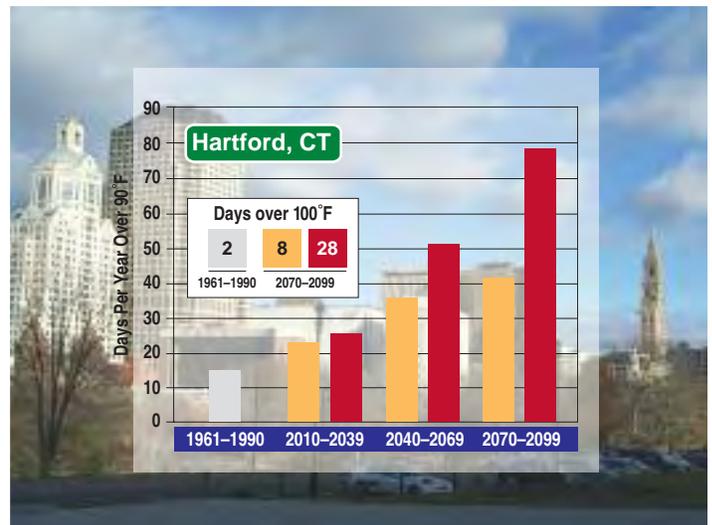
In addition to the loss of fall color, and snow, summers would become brutally hot and humid in southern New England. An average summer would be much worse than even the recent hot and humid summer. For comparison, the summer of 2010 saw 34 days exceed 90 degrees in Hartford, Connecticut; tied for third most days in a year above 90 degrees. The record number of days above 90 degrees is 38 days set in 1983. If such high emission climate projections hold true, the average number of days topping 90 degrees would be a staggering 78, with the number of days exceeding 100 degrees averaging almost 30! This would make the summer of 2010 seem cool in comparison! Coastal locations would see fewer 90 degree days than inland stations but would likely top 50 per year similar to the South Carolina coast.



In a future scenario for climate change in New England, this is the area in which snow covers the ground for at least half of the days in December, January and February.

Source: Union of Concerned Scientists (<http://www.climatechoices.org/>) which is adapted from *Climate Change in the U.S. Northeast* (PDF): A report of the Northeast Climate Impacts Assessment (NECIA), October 2006.

With the marked increase in air temperatures will come a sharp increase in our ocean temperatures. Under a high emission scenario, sea surface temperatures in coastal New England and the Long Island Sound will increase as much as 9 degrees F relative to today. This means that summer ocean temperatures which normally average close to 70 degrees could approach 80 degrees. This change in ocean temperature will have a profound impact on marine life with changing composition of fish species. Cold adapted species, including lobster, would migrate well to the north of Long Island Sound. This would end the lobster industry for southern New England. Brown kelp could vanish from the Sound as well, causing changes in the benthic estuarine ecosystem.



In summer 2010, 34 days exceeded 90 degrees in Hartford, Connecticut; tied for third most days in a year above 90 degrees.

Hartford skyline photo by Mark Parker



Low-lying coastal cities such as Bridgeport, Connecticut and transportation corridors such as Interstate 95 will have to adapt to rising sea level.

Accompanying the rising sea surface temperatures would be a rise in sea level due to thermal expansion of the ocean waters. Sea levels are projected to rise almost 20 inches under a high emission scenario. This is from thermal expansion only. If one factors in potential increase from glacial melt, which is much more uncertain, the rise could reach almost 3 feet. This would certainly flood many of our coastal communities. To make matters worse, rainfall intensity and storminess are projected to increase. Most climate models are indicating that the number of days with 2 inches of rain may double by the end of this century. This increased storminess not only would increase flooding but also lead to more coastal flood events as there would be more frequent coastal storms.

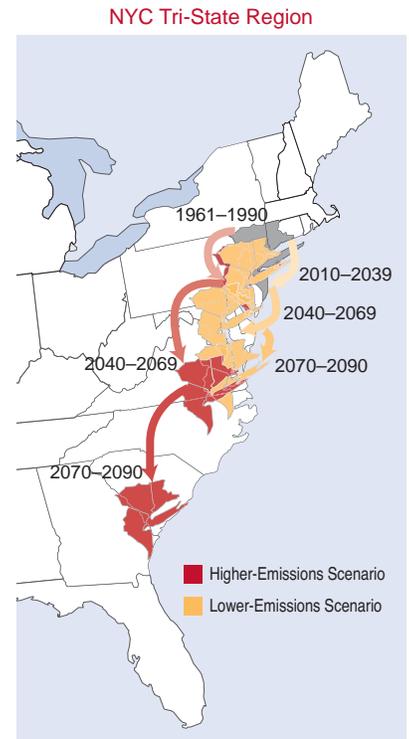
Agriculture will also be significantly impacted by such rapid changes as well. Even with an increase in rainfall over the entire year, the higher summer temperatures will allow evaporation to outpace the increase in rainfall. This will lead to more summer-time drying, increasing the incidence of drought. The occurrence of droughts lasting 3-6 months is projected to increase by almost threefold.

In contrast, agriculture could benefit by an extended growing season. Under a higher emission scenario, the growing season could be extended by as much as 6 weeks with first frosts not occurring until well into November, or even December, along the coast. The last freeze would be in March instead of April or May.

It is hard to believe that a child born today, in his or her lifetime, could see such profound changes in our climate. In a human lifetime, our familiar climate with 4 distinct seasons of winter snows, spring thaws and maple sugaring, warm, pleasant summers and crisp, cool colorful falls could radically change. Gone will be the colorful falls, and winter snows to be replaced by very hot and humid summers. Fall and winter will be mild and rainy with a much warmer and earlier spring. Rainfall patterns would be more erratic, leading to increasing

P. Van Patten

Source: Union of Concerned Scientists (<http://www.climate-choices.org/>) which is adapted from *Climate Change in the U.S. Northeast* (PDF): A report of the Northeast Climate Impacts Assessment (NECIA), October 2006.



Will New England be the “new South Carolina” by 2090? If we continue our energy-consuming patterns, very possibly.

instances of flooding and droughts. Such changes would be the most the human species has had to encounter since the end of the last ice age around 10,000 years ago! If you believe the climate models, this will occur under a high emission scenario. Even lower emission scenarios still have pronounced warming of around 5 degrees F which would make southern New England’s climate more like North Carolina and Virginia instead of South Carolina.

Will there be some benefits to climate change? Longer growing seasons could benefit agriculture. Imagine growing two crops of tomatoes in a summer season! Recreation could shift away from winter sports to summer recreation. Maybe the beaches of Southern New England will become more sought after vacation destinations with warmer water temperatures and hotter summers. Of course, this is only true if the sea levels don’t rise too much. Warmer and mild winters could make southern New England a popular winter destination for the snow-birds of central Canada. Can you imagine that?!

*David J. Nicosia is a Warning Coordination Meteorologist for NOAA’s National Weather Service in Binghamton NY.*

# Landmark Climate Change Nuisance Case is Headed to the Supreme Court

Niki L. Pace, J.D., LL.M.

This past fall, a lawsuit brought by eight states, including Connecticut, finds itself in the forefront of U.S. climate change litigation. Through the lawsuit, the plaintiffs (collectively States) want to force several power companies to reduce their greenhouse gas emissions, arguing that the emissions contributed to the public nuisance of global warming. The case, *Connecticut v. American Electric Power*, is one of three common law climate change lawsuits working their way through the U.S. judicial system. And it happens to be the first of the three to make its way to the U.S. Supreme Court. Last year, the U.S. Court of Appeals for the Second Circuit reversed a lower court's dismissal of the case, a decision that would allow the case to move beyond the preliminary stages. This August, defendant power companies appealed the Second Circuit's decision to the Supreme Court. This article provides an overview of the case history and the two primary issues being raised – political question and standing.

## Background

*Connecticut v. AEP* is the consolidation of two similar lawsuits (one brought by a group of eight states and the city of New York, the other by three land trusts) filed against six electric power companies who own and operate coal-fired power plants across the United States. The States argue that climate change is causing detrimental effects to human health and natural resources and that the six companies are the “five largest emitters of carbon dioxide in the United States and ... among the largest in the world.” The States assert that impacts of climate change, exacerbated by the power companies' actions, are harming the environment, residents, and property of the states and will cost them billions of dollars; the harms will accelerate over the upcoming decades if no action is taken. The States seek to force the power companies to cap and reduce their carbon dioxide emissions.

In 2005, the power companies successfully argued that the case was precluded from judicial review because the issue of cap and trade was a political question and the case was dismissed by the district court. The States appealed this decision to the Second Circuit. In 2009, the Second Circuit reversed the lower court decision and ruled the matter was *not*

precluded by the political question doctrine and the parties had standing to bring their action. Now, in 2010, the matter has been appealed further to the U.S. Supreme Court.

While the Supreme Court has yet to grant review of the case, a variety of interests have filed briefs with the Court including the U.S. Solicitor General, on behalf of the Tennessee Valley Authority (a named defendant), a group of law professors, the Association of International Automobile Manufacturers, and the U.S. Chamber of Commerce. The briefing period was scheduled to end November 3 with a decision on whether or not the Supreme Court will hear the appeal sometime thereafter.



American Electric Power

## Political Question Doctrine

So what is the political question doctrine and why does it matter? The political question doctrine applies when another branch of the government is better suited to resolve a particular issue. However, just because a case has political implications does not mean that the court cannot hear the matter. According to the district court, balancing those interests would necessitate the type of initial policy determination that should first be conducted by the elected branches (Congress and the President).

Without delving into the detailed analysis of the court, the Second Circuit disagreed with the holding of the district court. Particularly, the Second Circuit focused on the long history of judicial review in common law nuisance actions and noted that “where a case appears to be an ordinary tort suit” a nonjudicial policy determination is not required. As observed by the Second Circuit, “Nowhere in their complaints do plaintiffs ask the court to fashion a comprehensive and far-reaching solution to global climate change, a task that arguably falls within the purview of the political branches. Instead, they seek to limit emissions from six domestic coal-fired electricity plants on the ground that such emissions constitute

a public nuisance that they allege has caused, is causing and will continue to cause them injury.”

**Standing**

Where the court determines that the PQD does not preclude review of the states’ claims, the court must explore whether the plaintiffs have “standing” to bring their lawsuit. In environmental cases, a plaintiff must demonstrate that she has suffered a particularized injury which is fairly traceable to the defendant’s actions and redressable by the court. Not only can states sue for harms to the state itself, states can also sue in its *parens patriae* capacity. *Parens patriae* literally means “parent of the country” and refers to states’ ability to sue on behalf of harms to its citizenry much like a parent might sue on behalf of a minor child.

Another significant change to the legal landscape of climate change litigation occurred in 2007 with the Supreme Court’s decision in *Massachusetts v. EPA*, which directly addressed Article III standing. The case dealt with challenges by state parties against the Environmental Protection Agency (EPA) decision not to regulate greenhouse gas emissions under the Clean Air Act. Regarding standing, the Court found that Massachusetts’ loss of state-owned coastal property due to sea level rise was indeed a particularized injury. Although EPA’s contribution to climate change (by failing to regulate greenhouse gas emissions from cars) was quite small, EPA’s actions still contributed to Massachusetts’ harm. Because the Court could order EPA to regulate emissions, thereby slowing impacts of climate change, the matter was



U.S. Supreme Court

The U.S. Supreme Court in Washington, DC will soon hear a case involving electric power plants as a public nuisance, because of the greenhouse gases that they emit, particularly in burning coal.

redressable by the Court.

In analyzing standing in *Connecticut v. AEP*, the Second Circuit found the States satisfied standing as to both Article III proprietary standing and *parens patriae* standing. With regard to *parens patriae*, the court noted that the States alleged “that the injuries resulting from carbon dioxide emissions will affect virtually their entire population” and expressed doubt “that individually plaintiffs filing a private suit could achieve complete relief.” As to Article III standing, the Second Circuit found that the States suffered both future and current injuries as a result of the power companies’ actions. In particular, California (one of the states in this case) suffered declining water supplies and flooding resulting from earlier melting of the snowpack which injured property owned by California. Relying on the analysis in *Massachusetts v. EPA*, the harms were fairly traceable to the power companies’ greenhouse gas emissions and redressable by the court.

### The Appeal

Five of the six power companies have appealed the Second Circuit’s ruling to the Supreme Court. Their Petition for Writ of Certiorari (a formal request that the Supreme Court hear an appeal) raises three questions for consideration by the Supreme Court: 1) whether the states have standing; 2) whether there is a federal common law cause of action that is not preempted by the Clean Air Act; and 3) whether the matter is a non-justiciable political question. However, the brief that is attracting the most attention in the environmental community is that of the U.S. Solicitor General, filed on behalf of the Tennessee Valley Authority (the sixth named power company in the lawsuit).

Unlike AEP’s petition, TVA’s brief focuses on very narrow grounds. TVA argues that things have changed since this decision was issued – the EPA has begun the process of regulating GHGs under the CAA and some regulations may take effect as early as January 2011. Following TVA’s argument, even if the States have Article III standing, the Court should abstain from hearing the matter on grounds of prudential standing. While framed somewhat differently, the factual basis supporting this argument is similar to that raised regarding political question. Essentially, the TVA is saying that this is best left to the other branches of government. TVA further argues that because EPA has begun regulating greenhouse gas emissions under the Clean Air Act, the States no longer have a common

law claim. Their claims have been “displaced” by EPA’s recent actions.

### What Next?

How the Supreme Court will handle this case is relegated to pure speculation. Regardless, any decision – even the decision not to hear the appeal – will be significant. Should the court deny cert, allowing the Second Circuit opinion to stand, the case is headed back to the trial court and may eventually lead to an actual trial on the merits. Either way, the outcome of this case will directly impact the viability of future climate change tort actions including two similar actions (*Comer v. Murphy Oil* and *Native Village of Kivalina v. Exxon-Mobil*) in the Fifth Circuit and Ninth Circuit.

### Editor’s Note:

*After this article was accepted, the author wrote to say that on December 6, 2010 the Supreme Court made a decision to hear the case in the upcoming term.*

*The Court will consider issues of standing, political question, and preemption of federal common law by the Clean Air Act.*



### About the Author:

Niki L. Pace is Research Counsel for the Mississippi-Alabama Sea Grant Legal Program and an Adjunct Professor at the Univ. of Mississippi School of Law. She spends her free time traveling about with her yellow lab, Callie.

*Wrack Lines* welcomes your opinions and article submissions. E-mail to Peg Van Patten, editor, at [peg.vanpatten@uconn.edu](mailto:peg.vanpatten@uconn.edu). Include your full contact information, legibly written. The next issue will feature the amazing living things in Long Island Sound.

## Rising Seas, Stormy Skies Ahead

*Peg Van Patten*

As temperatures warm and ocean waters expand and rise in response, while polar ice continues to melt, sea-level rise will increasingly impact low-lying coastal areas. According to the NOAA State of the Climate Report for 2009, the past three decades have each been warmer than the three previous decades, a trend unprecedented in the historical record of the last 150 years. But what will rising seas mean specifically in Connecticut and the Long Island Sound region?

According to the U.S. E.P.A., sea levels have risen about 8 inches over the past century. Scientists have estimated that in the previous century, both sea level and the rate at which it has been rising have increased, but there is a great deal of uncertainty involved in predicting the future. Of course, sea level is commonly given relative to land and can be difficult to pinpoint because the land may be sinking or rising at the same time that sea waters go up or down. Connecticut and other parts of the Northeast are said to be sinking, because of adjustment effects from the end of the last glaciation.

Currently, Connecticut's sea level is rising at 0.1 inch per year in Bridgeport and 0.08 inches per year in New London, according to NOAA data. That's not too far from the NOAA estimate of mean global sea level rise, now 0.12 inches per year (about one and a quarter inches per decade). In 2007, the Intergovernmental Panel on Climate Change projected that global sea level would rise 7 to 23 inches by 2100. Some groups have suggested that this estimate is much too low, in part, because it does not take possible accelerated melting of the polar ice sheets into account. Estimates vary by the scenario used to model future greenhouse gas emissions, so there is a range of possibilities.

Because the Earth's shape is a geoid, not a perfect sphere, sea level rise is not evenly distributed. A 2009 Yale report indicates that the Long Island Sound

area is likely to experience higher rates of sea-level rise than others. Already, residents of New Haven are dealing with flooded basements.

In a worst-case scenario of some future century, if someday all the polar and land ice melted, sea level could rise as much as 70 meters (231 feet). (illustrated on page 10-11.) That hasn't happened since dinosaurs roamed the Earth. However, a rise of 1 to 5 feet by the middle of this century is consistent with some of the current model projections, if greenhouse gas emissions continue unabated at present rates. Coastal communities will need to adapt to rising seas and changing shorelines.

Sea level is measured in several ways. Modern tide gauges record the movement of the land to which instruments are attached and changes in local sea level. Sea-level rise estimates can then be made by subtracting the land elevation change component from the tide gauge data. In marshes, sediment elevation tables are used to measure accretion and erosion. However, variations in ocean circulation and other factors can cause fluctuations over decadal time periods. The most reliable sea level data are from tide gauges having records that date back 50 years or longer, which makes short-term estimates problematic.

Satellite altimetry is a newer, high technology tool used today. In this method, radar waves sent from the satellite bounce off the ocean surface and return. Measuring the time it takes for the radar signal to return gives a proxy indication of sea surface height.

Elevation changes of the land surface may also result from sediment compaction and extraction of liquids or gas below the surface, such as oil and water.

The horizontal distance that the water moves inland when it rises vertically depends on local topography. If the land is flat, a small rise in water height can go quite far inland; if the land is steep, such as a rocky cliff, obviously that's a different story. There are many



Coastal flooding is becoming more frequent as sea level rises and precipitation and consequent storm runoff increase, leaving towns and municipalities hefty bills for repairs.

variables, but one thing is certain: higher sea levels mean more hazards from flooding and storm surge, and retreating or vanishing wetlands and beaches.

Even the State's capitol, Hartford, is vulnerable to rising sea level, because it is situated on the Connecticut River and has low-lying areas. Flooding levels in a major storm event that happens on top of sea level rise, could range from 14 to 18 feet, putting coastal cities like Bridgeport, New Haven, and New London and major transportation routes at risk for huge economic damage from such an event.

Scientists will continue to improve the ways that they measure and predict sea level rise. In the meantime, we can try to emit fewer greenhouse gasses, the preferred action, or try to adapt by living in houseboats or floating houses as some Netherlanders do, but otherwise the strategy must be classic "fight or flight"—armor the shore in an attempt to hold back the sea (which may be futile, given accelerated coastal erosion) and fortify coastal bridges and other infrastructure, or migrate inland if possible.

### *About the Author:*

*Peg Van Patten edits and designs Wrack Lines. She also writes for NOAA's ClimateWatch Magazine.*

Elevation data source: the University of Connecticut, Center for Land Use Education and Research, and Connecticut Department of Environmental Protection. Imagery is from the USDA National Agricultural Imagery Program 2008.

Water



New York

New Milford

New Haven

Bridgeport

Stamford

## What if the po

If all the polar ice m  
sea level would rise by  
The coastline of Co  
significantly

Map courtesy of Elizabeth Doran and

This map depicts a worst-case scenario of what would happen if all of the world's ice melted. Sea level would be about 220 feet higher, inundating coastal cities and islands, and low-elevation areas. If such an event should occur, it will not likely be within our lifetimes.

Hartford

Rhode Island

Norwich

New London

Old Saybrook

### What if all the ice melted?

If all the ice melted, it is estimated that sea level would rise by 220 feet (67 meters). Coastal areas of Connecticut would be significantly changed.

and Kevin O'Brien, Connecticut DEP



10 5 0 10 Miles



10 5 0 10 Kilometers





# Long Island Sound and Climate Change – *What is Going to Happen?*

*Jennifer Pagach and Juliana Barrett*

Have you noticed any changes in Long Island Sound? Perhaps you notice warmer temperatures, fewer lobsters and more blue crabs? Were you one of the people who saw a manatee, seahorse, or tropical fish in the Sound this summer? The climate of Long Island Sound is already changing with both scientists and local homeowners taking note. Through Sentinel Monitoring of Climate Change, we hope to best track and manage these shifts including changes in physical features, habitat, species abundance and diversity. Sentinels are those species, systems and parameters specific to Long Island Sound that will or are already experiencing change due to climate related changes. For example, sentinels include finfish, lobster, salt marshes and associated species, eelgrass and harmful algal blooms. EPA’s Long Island Sound Study allocated funds for the development of a dynamic Sentinel Monitoring Strategy for Climate Change in Long Island Sound to answer questions we all have, like what will Long Island Sound (LIS) be like 50 or even 100 years from now? Will blue crabs completely replace lobsters? Will palm trees grow along our shores?

A core team of scientists and resource specialists from EPA’s Long Island Sound Study (LISS), Connecticut Department of Environmental Protection (DEP), the Connecticut



Juliana Barrett

*Habitat for many common wading birds such as these snowy egrets may change with sea level rise and other climate change-related impacts.*

Sea Grant Program, New York Department of Conservation, and New York Sea Grant are leading the strategic planning effort with funding provided by EPA. The team has established working groups of academics, managers and experts on the local, state, regional and federal levels to address relevant issues in both Connecticut and New York. The strategic plan will form the basis for a specially designed, long-term monitoring program to identify LIS resources that are most vulnerable to climate change and most critically in need of management. These efforts will ultimately enable us to develop appropriate adaptation strategies to protect the Sound’s biodiversity and significant natural resources.

“It might be a while before we see palm trees surviving New England winters outdoors, but we are already seeing shifts in species range and distribution” said Harry Yamalis, habitat restoration coordinator for Connecticut DEP’s Office of Long Island Sound Programs. “We need to quickly assess what is changing to date.” he added.

In 2008, a sentinel monitoring database of historic and current monitoring data was developed through a partnership between the Connecticut DEP and the University of Connecticut. Input from scientists involved in Long Island Sound research was sought to populate the database with the



Jen Pagach

Long Island Sound is the southernmost inshore limit of the American Lobster’s range. Most scientists agree that warmer water temperatures are a leading cause of the decline in the lobster populations in Long Island Sound that has been noted since 1998.



U.S.G.S.

Ilya, a manatee who came north up the Atlantic Coast as far as Long Island Sound. These events could increase with warming.

type of data collected and dates. This database now has information from researchers in Connecticut and New York and includes information on water quality monitoring, fish trawls and shellfish harvests. The long-term goal is to develop a comprehensive web page that will document ongoing research (as well as capture historic data) and serve as a resource for investigators, resource managers and the public. Data from past and present research is necessary to help identify trends related to climate change on the regional, Sound-wide and local levels. For example, fisheries biologists from the Connecticut DEP are seeing more fish species more commonly found in mid-Atlantic waters here in Long Island Sound as water temperatures within the Sound increase.

“In Long Island Sound this year we have seen multiple tropical fish species such as parrot fish, lookdown and on November 7 we got a video of a small mola mola,” Matt Lyman reports. A mola mola or ocean sunfish is the largest bony fish in the world, and primarily feeds on jellyfish.

In addition to identifying a process for data collection and synthesis, the strategic plan will help identify data and monitoring gaps that may be important in the context of climate change.

As the first step in the development of the strategic plan, a list of sentinels for Long Island Sound was developed. For each sentinel (34 have been identified to date), the workgroups have identified what factors are causing or could cause change, what monitoring questions need to be addressed for that sentinel, what is the “sentinel indice” or what exactly needs to be measured and what data have already been collected.

For example, if the sentinel is acidification of Long Island Sound waters (the process of becoming more acidic), the cause of this acidification is that with more carbon dioxide in the atmosphere the world’s oceans are absorbing more of this compound. This changes the water chemistry causing



J. Pagach

Judy Preston

Changes are happening in wetland ecosystems surrounding Long Island Sound.

it to become more acidic. The monitoring question we can ask is, “Is there an increase in the hydrogen ion concentration in the waters of Long Island Sound?” and, we can measure the pH of the waters to determine this. We can also look at the thickness of crustacean shells. Some species such as oysters, clams and mussels develop thinner shells as the pH decreases while other species, such as crabs and lobsters develop thicker shells.

Sentinel monitoring, like climate change, is very much a dynamic process. Our list of 34 sentinels is likely to change as scientists collect and analyze data and we may need to change the questions that are asked. We do not know what species will show up next. By looking at the physical, chemical and biological factors that may change as our climate changes, and then relating those changes to habitats and ecosystems, we will have a better idea what those species may be. By involving folks like you who know about and care for the Sound, this program will promote education, awareness and participation in climate change adaptation issues, and will inform management decisions on adaptation planning. As the Long Island Sound estuary changes, so too, will the management needs and our methods for protecting and preserving this vital estuary, palm trees or not.

### About the Authors

Jennifer Pagach works for the Connecticut Department of Environmental Protection’s Office of Long Island Sound Programs. She is also an adjunct professor of science and engineering. Juliana Barrett is a coastal habitat specialist for the Connecticut Sea Grant College Program at the University of Connecticut.



## An Interview with Andrew Revkin

Bob Wyss

When Andrew Revkin announced in late 2009 that he was leaving his reporting position at the *New York Times* he earned both praise and denunciation. The small but concerted band of climate skeptics contend that Revkin is an alarmist whose reporting has inaccurately conveyed the science of climate. But many in the science community had come to admire Revkin's reporting and felt he was the foremost journalist writing about climate change. The late highly respected Stanford University climate scientist Stephen H. Schneider said: "You have been the most significant person of record on the climate problem for decades." Revkin has had a long career covering science, environment and most recently climate, for *Science Digest*, the *Los Angeles Times*, *Discover* magazine and beginning in 1995 for the *New York Times*. He resigned to become a senior fellow at Pace University while continuing with his *Times* blog, Dot Earth. In November, Revkin spoke at the University of Connecticut's Edwin Way Teale Lecture Series. Afterwards, Bob Wyss, an associate professor of journalism and a longtime environmental writer, interviewed Revkin. Here are edited excerpts of that interview.



S. Ebbin

Andrew Revkin

**Q** - Andy, is there a way to engage the public on climate change, and who is going to do it?

**A** - I think there is, and it is to get to the root of the story, which is that we don't have the energy menu we need to have a smooth ride in this century as human appetites and numbers crest. We just don't have that and that is non-controversial. For most people, if you talk about energy, you can get a lot of traction and it is a forward-looking situation. We need new energy choices. America, for generations, has been a great innovation engine and it could be again if we get engaged on this.

**Q** - You are not very optimistic about a political solution. Why are you pessimistic?

**A** - It is clear that no matter which party runs Congress we are not going to have a serious discussion on Greenhouse Gas restrictions that are powerful enough to shift people on how they invest in energy choices. The politics of coal is really powerful. The problem is that we do not have alternatives that are as cheap as coal. On the international level, I have been watching the treaty talks for literally 20 years and there too I see a lot of talk and not a lot of action. Even where rich countries are obligated to help the poor and vulnerable ones, there is hardly any money that has flowed. You are going to see this ongoing fight between the north and the south and I don't see any action there.

**Q** - What then is the solution?

**A** - It has to be a broad stroke and a sense that energy is the new American imperative and that has to be felt from the classroom to the White House to the board room and the laboratory. How you build that sense? I would like to think it could be built by a leader, by a President. That would require a leader willing to jump outside of political advisers. (President Barack) Obama has not shown that willingness so far.

**Q** - What should scientists be doing about communicating climate change?

**A** - I think that there is an opportunity and a responsibility for most scientists, who are educators, to build that out a little bit further, to create another ring outside of the classroom. They need to be engaged with the community and perhaps online with a Facebook page or a blog.

**Q** - It seems as scientists get more involved in public policy issues, their credibility diminishes. There is a risk out there, isn't there?

**A** - There are risks out there. There are fields of science that are not controversy laden and there are fields that are tough, such as endangered species, energy and climate, where the terrain is trickier, but there are ways for scientists to engage. I think the best way is for scientists to speak about the science that they do in one sentence and to speak about the implications and their feelings about energy and climate in a very different sentence.

*Interview with Andrew Revkin continued*

**Q** - Where is the scientific community, is it entering this other ring?

**A** - Slowly. It is happening.

**Q** - How would you rate the role of journalism in communicating climate change?

**A** - It is a tough issue to convey in a newspaper, or on TV, because it is not something that is simple. The risks are not simple, the connections between things are not simple, nor is the energy security angle. Then of course, specialized journalism is imploding. The *Times* was already a refuge for endangered species, meaning science writers within the media, because so many science sections in newspapers have gone away. So that is a big problem.

**Q** - What were you trying to do in developing your Dot Earth blog?

**A** - In October 2007, after months of brainstorming with some of our web people, I launched Dot Earth as an ongoing exploration of one question, which is, as we race towards a population of nine billion people, how do we do it with the fewest regrets. That's the framework. It is basically a way for readers to look over my shoulder as I explore questions. I am not spouting, most blogs these days are spouting. I do express my views sometimes, but I also express my view of uncertainty, when things are not clear, and for a chunk of readers, this is a useful thing. What I am thinking is that journalism is going to shift from the old mode of us handing out information from on high. I think the best role for journalists with specialized experience is to serve as a guide, not as a reporter. I feel sometimes like an experienced mountain guide after an avalanche. I have a general sense of where to step and where not to step and what's true and what's false and where the path is but I'm not going to tell you I know for sure. If you follow me, you probably have a decent chance at coming out OK.

**Q** - And obviously sustainability is an important element of the blog.

**A** - Yes, I was recently at a meeting of biologists which was called Sustain What? That is always the question. Sustainability as a word is utterly vague until you apply it to a specific issue—sustainable ecosystem, sustainable energy system, sustainable transportation system, sustainable lifestyle. Then you can kind of get an answer. So sustainability is a trait, and not a fact, and yes, that is really what it is all about.

**Q** - How sustainable is the blog?

**A** - That's up to the *New York Times* to figure out. I think it is, I think there is a business model for blogs. My readership is several hundred thousand unique visitors every month, which makes it the equivalent of a mid-size magazine. If someone can't figure out how to make money off of that, there is a problem.

**Q** - As you join this journey to a planet of nine billion people, you have indicated that you are optimistic about the future. Why are you?

**A** - I am optimistic overall because I see that when people have access to information, once kids have the opportunity to learn, then I have seen explosively flowering potential in humans. There is a guy who is from Zambia that I met at a population conference and he spent three minutes telling me his life story. It started in a rural village where his father sent him into town because he was worried that his kids were all going to die, because he had already lost several. He went to school, he was living with an uncle, and then he went to a university, then he got to a post graduate program and now he is one of the world's leading experts on population and development in Africa. It all happened because his father found a way to get him to a school. Every time I see or hear of something like that, I get excited. We have great innovative potential and there is a great deal of unrealized potential out there, and while there are a number of signs tracking in the wrong direction, there are many going in the right direction. As a UN report that I wrote about recently indicated, poverty is shrinking, education is expanding, fewer kids are dying, and the one thing that is not in that mix is the environment. How do we keep ecosystems thriving? It's a really big deal.

Bob Wyss teaches Journalism at the University of Connecticut. Prior to that, he was a reporter and editor for the *Providence Journal* for 28 years.

## Connecticut's Sea Grant Knauss Fellows- Coming and Going

*Peg Van Patten*

The National Sea Grant College Program Dean John A. Knauss Marine Policy Fellowship, established in 1979, provides a unique educational experience to students who have an interest in ocean, coastal and Great Lakes resources and in the national policy decisions affecting those resources. The program matches highly qualified graduate students with “hosts” in the legislative and executive branch of government located in the Washington, D.C. area, for a one year paid fellowship. The program is named in honor of one of Sea Grant's founders, former NOAA Administrator, John A. Knauss.

**Up and Coming:** Three candidates from Connecticut universities for the NOAA John A. Knauss Marine Policy Fellowship Program were endorsed by the Connecticut Sea Grant program and have been selected to serve in 2011. The fellowships allow young people just finishing graduate programs in college to gain valuable experience working in federal offices on policy issues.



Jamie Reinhardt

James (“Jamie”)Reinhardt, who is receiving a PhD from UConn Marine Sciences, will be the new Habitat Restoration Officer for the NOAA Coastal Habitat Restoration Program. He has specialized in studying benthic organisms (those that settle on the bottom, underwater), particularly invasive sea squirts. He received an Excellence in Research Award while at UConn.



Hui Cheng

Hui W. Cheng, who received a Masters degree in Environmental Studies from the Yale School of Forestry and Environmental Studies, will work in the National Ocean Service's Coastal and Estuarine Land Conservation Program. Hui brings to her new duties extensive experience in marine resources management experience in the Pacific and Pacific Northwest.



Henry Debey

Henry Debey, who also received a Masters degree from the Yale School of Forestry, will be the new Foreign Affairs Fellow at the NOAA National Marine Fisheries Service's Office of International Affairs. Henry is especially accomplished in marine policy and marine spatial planning, and has worked on these issues for Environmental Defense, and for the Alliance of Small States at the United Nations. Henry was a coral reef ecologist at a park in the Netherlands Antilles, and a research fellow in Bremen, Germany, so he is particularly suited for this position.

**Going...** Outgoing John A. Knauss Fellows who just finished their 2010 terms are Corey Ridings, and Terill Hollweg.

Corey Ridings, who has a Masters degree in Public Health from Yale University, served in the U.S. House of Representatives Subcommittee on Insular Affairs, Oceans and Wildlife. Her specialty is linking health and resource management.



Terill Hollweg

Terill Anne Hollweg earned her PhD in marine chemistry at the University of Connecticut by studying mercury cycling in the environment. She has been serving in the NOAA National Marine Fisheries Service Office of Habitat Conservation, Habitat Protection Division.

Did you know that 22% of 1500 NOAA employees responding to a survey are Sea Grant “alumni,” supported or trained by Sea Grant as students, fellows, interns, researchers, or employees? The same survey showed that 82% of NOAA Sea Grant alumni believe that the Sea Grant experience helped them get their NOAA job. These bright young people will have the experience of a lifetime to remember, and are helping to keep our nation strong.



Corey Ridings

## Town of Groton Starts Planning for Climate Changes

*Syma A. Ebbin*

As international consensus on climate change science has coalesced and urgency over potential impacts has mounted, communities all over the world have been grappling with this new unprecedented threat. With little federal guidance over the past decade, states and municipalities have been left to ponder their own paths through a thicket of information, a deluge of media bites, and a hailstorm of opinions.

We are entering a time when climate change concern is reaching a tipping point in the policy process. A diverse array of climate change initiatives are underway, accompanied by an ever-increasing number of reports.

Businesses are jumping on the bandwagon, touting their “sustainable,” “green,” and “carbon-neutral” products and activities. Climate web sites and information portals are popping up like mushrooms after a hard rain. So the stage has been set to actually DO SOMETHING. The State of Connecticut has developed a Climate Change Action Plan, calling for reductions in greenhouse gas emissions, and working groups are developing adaptation strategies, but so far no policies have extended mandates to the cities and towns in Connecticut.

The Town of Groton, in southeastern Connecticut, has taken a first step by beginning to plan for climate change. But what’s a coastal town to do? In December, 2008, the Groton Town Council established a Task Force on Climate Change and Sustainable Community. Town Councilor and environmental lawyer Paulann Sheets took the lead in creating the task force and in pushing its charter through the town government. Paulann’s impetus to catalyze efforts around the issue of climate change within the town arose from her perception that “as a society we are at a tipping point, a point where we must do something.”

I first met Paulann about seven years ago at the annual meeting of the Connecticut Fund for the Environment (CFE). I had been working for that organization as their open space project coordinator and researcher. Although not a CFE staff attorney, Paulann had worked with them on several environmental cases, including cases involving effluent discharges of the pharmaceutical company Pfizer, Navy dredging



The development along Pine Island Bay in Groton, Connecticut, provides a good example of a coastal area that is vulnerable to climate change impacts and associated sea level rise. Note the area’s low elevation, and minimal setbacks. In the background is the Groton/New London Airport.

and spent fuel rod storage at the Millstone nuclear power plant. Paulann lives in Groton, as did I, we became friends and have since worked together on several projects.

The nine-member Task Force had a two-year charter from the Town Council, beginning in December 2008. Their mandate was to “identify the needs and opportunities to take action as individuals and as a town to avoid or reduce adverse impacts from climate change and rising energy costs while seizing economic opportunities created by them.” Specifically the Task Force set out to assess the carbon footprint of Groton, identify the future trajectory and impacts of sea level rise on the town, investigate other municipal efforts along the same lines, and to report back to the Town Council with a plan of action. They were given authority to hold public hearings, propose grant applications and make recommendations to the Town Council.

The Task Force members met at least monthly. Our first recommendation was that the town join ICLEI, an international organization of local governments. Next we urged the town to apply for a federal Energy Efficiency and Conservation Block grant from the Department of Energy. The Task Force assisted the town in preparing their application, which was successful and yielded a \$198,000 grant to conduct a carbon footprint analysis, and energy benchmarking of town

buildings. It also included money to hire a consultant to help develop an town-wide energy efficiency and conservation strategy, and initiate energy efficiency retrofits on two town buildings. In 2010, the town hired two summer interns from UConn to complete the carbon footprint and benchmarking exercises and report on their work.

Serendipitously, shortly after the Task Force was formed, the Connecticut Department of Environmental Protection, with ICLEI, applied for and received an EPA grant to work specifically with the Town of Groton on climate change adaptation. This group held a series of workshops in Groton, inviting a broad array of federal, state and local stakeholders to the table to discuss climate change impacts and adaptation strategies.

In the summer of 2010, the Task Force held a series of four public meetings to which were invited town residents, staff, appointed and elected officials, businesses and other groups to present their ideas on what Groton should do to mitigate and to adapt to climate change. More than 40 individuals spoke, presenting over a hundred ideas which ranged from incorporating low impact development techniques and Smart Growth principles, to using alternative energy sources and enhancing energy conservation. The ideas were entered into a spreadsheet and then the Task Force rated them on cost, performance and risk criteria. This information and its analysis will be included in the final report of the Task Force to the Town Council.

So quite a lot has been accomplished in a period just shy of two years. Still, Paulann Sheets would like to see that the Task Force has its charter extended by the Council so it can continue to plan for the future. At the same time, she sees the need to strengthen the group and provide it with some resources so it can engage more substantively with climate change issues as they arise. She'd like to see the town's education system get more involved in the future.

What's clear is that planning for climate change is a process that will never be completed. It will have to be an ongoing part of our community's fabric and future, for being resilient as a community means anticipating and being prepared for change, whatever those changes may be, and decreasing our vulnerabilities in a fair and equitable manner. Ultimately, resilience will not be about stability and recovery to some previous state of being, but rather about flexibility and adaptation, being able to reinvent ourselves in order to persist. Groton has taken an initial step in this direction, but this is one step in a journey that will never end.

Syma A. Ebbin is a Groton resident and Vice Chair of the Task Force. She is Connecticut Sea Grant's Research Coordinator.

## Sea Grant Coastal Management Fellow to Help Puerto Rico Assess Climate Change Variability

Kasey R. Jacobs, Connecticut Sea Grant's NOAA Coastal Management Fellow, has been placed with the Puerto Rico Coastal Zone Management Program in the Department of Natural and Environmental Resources under Director Ernesto L. Diaz. During the next two years, Jacobs will be coordinating the development of the Puerto Rico Coastal Hazards-Climate Change Vulnerability Assessment and Adaptation Strategy. She says she will use these methods:



Kasey Jacobs

(1) multi-stakeholder facilitation techniques to foster collaboration among 85 Puerto Rican experts; (2) spatial analyses using GIS and Remote Sensing to identify the most vulnerable coastal communities and ecosystems; (3) participatory risk assessments of key Puerto Rican economic and ecological assets; and (4) adaptation strategy identification, assessment, and prioritization.

Originally from Long Island, New York, Kasey completed her Bachelor of Science in Environmental Science Biology from Southampton College. In 2007 she moved to New Haven, Connecticut to work as Program Coordinator for Citizens Campaign for the Environment and later to attend graduate school at the Yale School of Forestry and Environmental Studies. For completion of her master's degree. Kasey conducted field research on climate adaptation and disaster risk reduction in West Sumatra, Indonesia and interned for Mercy Corps Indonesia.

Kasey's non-professional activities all seem to involve water. They include swimming, SCUBA diving, underwater photography, and when possible, figure skating. Currently she lives in San Juan and spends her free time making new friends, practicing speaking Spanish, and exploring local areas via mass transportation. Kasey hopes to begin teaching free swimming lessons in the spring to local *Puertorriquenos*. You can keep up with her by reading her blog at [www.kaseypuertorico.blogspot.com](http://www.kaseypuertorico.blogspot.com).

—Peg Van Patten

## Sea Grant Alumni - To *There* from *Here*

*Nancy C. Balcom*

With this column, I am continuing my journey to find out what has happened to the former students that Connecticut Sea Grant has supported in some manner or another over the years. This column is devoted to interns, those students who gain additional practical experience by working in their chosen field under the guidance of one or more mentors. As far as I can recall, I never held an internship myself, but I have worked with several interns over time and found those experiences quite rewarding.

In 1995, Connecticut Sea Grant began supporting the Yale-Sea Grant internship program. The goal of the program was to link academic research with management or policy challenges faced by coastal communities. Graduate students in the Yale School of Forestry and Environmental Studies, Center for Coastal and Watershed Systems (CCWS) were eligible to apply for competitively-awarded internships. The CCWS directors, with input from Sea Grant staff, reviewed the proposals and awarded internships several times a year. These internships typically lasted one or two semesters or a summer. Working with both faculty mentors and community partners, the interns conducted research and outreach projects that enabled them to gain practical experience related to the management of coastal resources or the development of coastal policies. The budgets for the individual internship projects were, to put it bluntly, quite cheap, typically two to three thousand dollars each. In return for the experience gained, the interns were required to present their projects in a seminar setting and submit a final report.

When I tallied the numbers, I was astonished to learn that 66 graduate students, mostly Masters students, were awarded Yale-Sea Grant internships between 1995 and 2010. Five of these former interns later became recipients of John A. Knauss Marine Policy Fellowships, the prestigious federal fellowship I described in the Spring/Summer 2010 issue of *Wrack Lines*. Today, *eighty percent* of these former Yale-Sea Grant interns have some tie to marine, aquatic or environmental science or policy in their careers as scientists, land use planners, journalists, environmental stewards, informal educators, K-12 teachers, university faculty, and resource managers for local, state or federal agencies, non-profit organizations or private businesses. Another fifteen percent are currently seeking additional degrees. While I am sure this success rate can be largely credited to their Yale education, I can't help but think the practical experience gained from their Yale-Sea Grant internships may have helped some of them forge their career paths. What makes me think this? I emailed them all a few questions, and some were able to take time out of their busy lives to answer me.

Sea Grant programs are funded by the National Oceanic and Atmospheric Administration (NOAA), under the U.S.

Department of Commerce, in partnership with colleges and universities in each of the coastal and Great Lake states. Nationally, the Sea Grant investment in research, fellowships and internships serves as an important means for training tomorrow's scientists, including those that will work for NOAA. I definitely see that link when I look at where our alumni are now. For example, three former Yale-Sea Grant interns work for NOAA directly.



David Casagrande

Marla Steinhoff (1999 intern) is a physical scientist in the NOAA National Ocean Service (NOS), Office of Response and Restoration; Ellen Clark (2000 intern) is currently Acting Deputy Director of the NOAA NOS Office of Operational Oceanographic Products and Services; and Sean Corson (2000 intern) is the Deputy Director of the Chesapeake Bay Office. A fourth also has ties to NOAA. Beth Bisson, who was an intern in 2004, is the Education Coordinator for Maine Sea Grant.

So, did these graduate student interns gain practical experience through their internships? According to David Casagrande, one of the first Yale-Sea Grant interns, the internship experience in 1995 contributed to his career by giving him "the confidence to think outside of the box". He said, "I'm firmly convinced that the only way to solve environmental problems is to be interdisciplinary—to combine the natural and social sciences to impact policy." Casagrande's Sea Grant internship to study how people interact with coastal wetlands in Connecticut gave him the freedom to do that for the first time. He used the restoration of an urban salt marsh as a case study of a value-based approach to management. "I've built on that experience to assemble teams of ecologists, climatologists, and social scientists from several universities in several different countries to develop policy-oriented research on issues ranging from how to conserve medicinal plants to human adaptation to climate change and rising sea level in Pacific Island communities", added Casagrande.

Currently an Associate Professor of Anthropology at Western Illinois University, Casagrande said, "I teach environmental studies and work on highly interdisciplinary research by collaborating in research teams. I study how people in different cultures interact with natural environments in order to determine how we can be sustainable on a global basis." I imagine that's quite an education in itself.

Ellen Clark held a Yale-Sea Grant internship in 2000. She is presently serving as Acting Deputy Director for the



Ellen Clark

NOAA Center for Operational Oceanographic Products and Services (CO-OPS), overseeing 130 oceanographers, engineers, and computer scientists. “My office provides the national infrastructure, science, and technical expertise to monitor, assess, and distribute tide, current, water level, and other coastal oceanographic products and services that support NOAA’s mission of environmental stewardship,

environmental assessment, and prediction”, she said. I checked out their website, <http://tidesandcurrents.noaa.gov/>, to see how they take vast amounts of oceanographic data and make it available in a format that is useful to someone like me. With just a click or two of my mouse, I could see a map showing sea level trends for the east coast of the U.S. or zoom into the port of New Haven and find out that at this very moment the water level at New Haven is 2.8 feet and rising, winds are from the north at 11 knots, with gusts to 13 knots, air temperature is 53°F, and water temperature is 60°F. Pretty cool, Ellen!

NOAA is ripe with opportunities for individuals interested in ocean science and policy. Over the past ten years, Clark has held positions related to National Marine Sanctuaries, ocean and coastal resource management, and marine fisheries. According to Clark, the experience of working with state coastal managers to better understand their programs and policies for managing Harmful Algae Blooms opened her eyes to the complexities of coastal management and the wide array of challenges facing states. “The internship strengthened my interest in working to advance the conservation and sustainable use of coastal and ocean ecosystems through collaborative partnerships, strategies, and policies”, she said. “It also confirmed my commitment and desire to work for NOAA to help address these matters on a national scale in coordination with state and local partners.” Well said.

Shannon Heyck-Williams, an intern in 2000 as well, worked on a project to assess the costs and benefits of spraying pesticides to eliminate the West Nile mosquito vector in terms of ecological and human health risks. Today she works as a Government Relations Officer for the Pew Environment Group in Washington, D.C., providing political and policy advice on human health and industrial farming, conducting educational outreach to congressional offices and federal agencies, and analyzing and developing legislation and legislative strategies. Since graduating from Yale, she has worked as Senior Legislative Advisor for the National Environmental Trust, Earth Legacy Campaign Director for the Natural Resources Defense Council, and Research Assistant for the Senate Environment and Public Works Committee.

“My Yale-Sea Grant internship provided the opportunity for me to delve deeper into [my interests in environmental health] than I otherwise would have”, said Heyck-Williams.

The internship was an opportunity to research and write about a subject with real-world application, which very much appealed to her then and still does. “I continue to gravitate back to the environment and health nexus in my career”, she added.

A more recent graduate, Emily Levin was a Yale-Sea Grant intern in 2005. She is now a Planning Manager for Residential Energy Services at the Vermont Energy Investment Corporation, a nonprofit organization. “Specifically, I focus on strategic planning and program development for the existing homes and new construction services of Efficiency Vermont, Vermont’s statewide energy efficiency utility,” says Levin. Previously, she worked as the Restoration Program Manager for the Ipswich River Watershed Association in Ipswich, Massachusetts, working on a variety of projects to restore the river, with a focus on restoring natural flows and educating the community about low-water ways to maintain beautiful lawns and gardens.

Levin believes that the experience she gained in mapping water stress in the Salmon River watershed during her internship was directly relevant to her work for the watershed association, where she focused on water quantity and flow issues. Just like building a tower out of blocks, her job as a program manager for the watershed association gave her the management and planning experience that was required for her current position. “My internship was a very helpful step on my career path, and helped me to narrow down my interests and gain relevant experience”, Levin said.

I have truly enjoyed reading all the emails from these and other former interns. I can better appreciate how they made the most of a brief opportunity to gain some practical experience in their field of interest, and used it in combination with other educational experiences to launch themselves into their chosen careers. I think Casagrande expressed it well, saying “Since I was awarded my Sea Grant internship, I’ve gone on to study Tzeltal Mayan subsistence in Mexico, water policy in Phoenix, Arizona and how farmers along the Mississippi River adapt to flooding.” Thanks for sharing, folks.



Shannon Heyck-Williams



Emily Levin

*Nancy C. Balcom is a frequent contributor to Wrack Lines and a member of the Editorial Board. She is Associate Director for Connecticut Sea Grant as well as Extension Leader for the program.*

## ***Learn More About Climate Change! ...and pass it on***

Here are some very useful and reliable resources that are available on the Internet. Some give more in-depth information on subjects alluded to in this issue; others are broader in scope. Number Four, the Coastal Hazards Portal, allows you to visualize various sea level rise scenarios in your Connecticut town. These URLs were valid in December 2010.

- 1. State of Connecticut Climate Change website: <http://ctclimatechange.com/>**
- 2. State of Connecticut 2005. Climate Action Plan: <http://ctclimatechange.com/StateActionPlan.html>**
- 3. The Impacts of Climate Change on Connecticut Agriculture, Infrastructure, Natural Resources and Public Health: <http://ctclimatechange.com/wp-content/uploads/2010/05/Impacts-of-Climate-Change-on-CT-Ag-Infr-Nat-Res-and-Pub-Health-April-2010.pdf>**
- 4. State of Connecticut Coastal Hazards Portal and Visualization Tool: <http://depweb.dms.uconn.edu/>**
- 5. Coastal Hazards in Connecticut: The State of Knowledge and Management in 2009: [http://depweb.dms.uconn.edu/docs/CT\\_Coastal\\_Hazards.pdf](http://depweb.dms.uconn.edu/docs/CT_Coastal_Hazards.pdf)**
- 6. Bracing for Climate Change in the Constitution State: What Connecticut Could Face. Environmental Defense: [http://www.edf.org/documents/3503\\_ct-climate\\_es\\_09\\_view.pdf](http://www.edf.org/documents/3503_ct-climate_es_09_view.pdf)**
- 7. The Copenhagen Diagnosis, 2009: Updating the World on the Latest Climate Science: <http://www.copenhagendiagnosis.com/>**
- 8. Confronting Climate Change in the US Northeast: Science, Impacts and Solutions. 2007. Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge MA: Union of Concerned Scientists: <http://www.northeastclimateimpacts.org/>**
- 9. Clean Air-Cool Planet: Trends in Extreme Precipitation Events for the Northeastern United States 1948-2007: [http://www.carbonsolutionsne.org/resources/ne\\_climate\\_reports/pdf/2010\\_NortheastExtremePrecip.pdf](http://www.carbonsolutionsne.org/resources/ne_climate_reports/pdf/2010_NortheastExtremePrecip.pdf)**
- 10. Intergovernmental Panel on Climate Change (IPCC): <http://www.ipcc.ch/>**
- 11. US Global Change Research Program: <http://www.globalchange.gov>**
- 12. US EPA Climate Change website: <http://www.epa.gov/climatechange/>**
- 13. NOAA Climate Services: <http://www.climate.gov/>**
- 14. NOAA ClimateWatch magazine: <http://www.climatewatch.noaa.gov/>**

THE UNIVERSITY OF CONNECTICUT  
CONNECTICUT SEA GRANT  
1080 SHENNECOSSETT ROAD  
GROTON, CT 06340-6048

NONPROFIT ORG  
U.S. POSTAGE PAID  
PERMIT 3  
STORRS CT 06269

