HRES Conference

Climate Change

In New York's Hudson Valley

How Can Local Government and Community Leaders Prepare?

Monday, 4 December, 2006

Poughkeepsie Grand Hotel

Poughkeepsie, NY

Program and Abstracts

In Cooperation with:

- Cornell University
- Dutchess County Department of Planning and Development
- Hudson River National Estuarine Research Reserve
- Hudson River Sloop Clearwater
- Hudson River Valley Greenway
- Lamont-Doherty Earth Observatory of Columbia University
- Mohonk Preserve
- New York Planning Federation
- New York Sea Grant
- New York State Water Resources Institute at Cornell Univeristy
- The Northeast Regional Climate Center
- Orange County Department of Planning
- Putnam County Department of Planning, Development and Public Transportation
- Rapport, Meyers, Whitbeck, Shaw, and Rodenhausen, LLP
- Riverkeeper
- Scenic Hudson
- Sustainable Hudson Valley
- Rockland Municipal Planning Federation
- Rockland County Planning Department
- The Nature Conservancy
- United States Geological Survey (USGS)
- Westchester County

Hudson River Environmental Society

Hudson River Estuary

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Hudson River Environmental Society
Stephen O. Wilson, Executive Director
William Shaw, Chairman of the Board

Disclaimer

This Conference was designed to provide a forum for the presentation of a compilation of efforts underway in the Hudson River Estuary pertaining to the subject of climate change in the region.

The Hudson River Environmental Society (HRES) was founded in 1970 as a nonprofit membership organization to foster research on the Hudson River environment and related coastal areas, to provide a forum for communication and cooperation among researchers, and to make the results of environmental research available and accessible to concerned citizens and public officials.

HRES works to facilitate and coordinate research in the physical, biological and social sciences; environmental engineering, resource management; urban and regional planning; and other disciplines in the Hudson River region. Equally important, HRES serves as a dynamic channel of communication within the research community.
www.hres.org

The DEC Climate Change Policy Office and the Hudson River Estuary Program have organized a one-day conference for local decision-makers to explore the issues surrounding climate change in the Hudson Valley. The goals of this conference are to present the latest scientific findings on existing and potential future impacts of climate change on human and natural communities, and provide local leaders with insights that may help them plan for and manage these impacts. The speakers will cover existing and potential future effects on:

- Water supplies
- Landscape
- Agriculture
- Sewage treatment facilities
- Transportation infrastructure
- The river shoreline

This will be a first step in gathering our local expertise so that we can learn together.

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CONTENTS

Please Note: Papers in these proceedings are presented in order by conference appearance as scheduled at the time of printing.

The Hudson River Environmental Society wishes to thank the following organizations for providing co-sponsorship of this event, without which this program would not be possible.

The **New York State Department of Environmental Conservation** exists to:"conserve, improve, and protect New York State's natural resources and environment, and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well being.

The Department of Environmental Conservation's **Hudson River Estuary Program** is a unique regional partnership designed to restore and conserve the Hudson River's extraordinary natural heritage, clean up pollution, and promote public use and enjoyment of the Hudson River through programs founded in science and carried out in ways that support the quality of life of the Valley's citizens. The Estuary Program works closely with state, federal, and local partners to restore the Hudson to its full potential.

Additionally, HRES, NYS DEC and the Hudson River Estuary Program wish to extend their thanks and gratitude to the following organizations for their support of this program

Cornell University
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United States Geological Survey (USGS)
Westchester County

PROGRAM

9:00 ***Welcome***

Denise M. Sheehan
Commissioner
New York State Department of Environmental Conservation

Morning Session: Climate Change Impacts in the Hudson Valley

9:15 ***Introduction***

Frances Dunwell
Hudson River Estuary Coordinator
New York State Department of Environmental Conservation

9:30 ***What is Climate Change?***

Art DeGaetano
Director and Associate Professor
Northeast Regional Climate Center
Cornell Univeristy

10:00 ***Climate Change in the Northeast: Past, Present and Future***

Cameron P. Wake
Research Associate Professor
Climate Change Research Center
University of New Hampshire

10:30 BREAK

10:45 **Panel Presentation: *What are the Likely Impacts of Climate Change in the Hudson Valley?***

Moderator: David VanLuven, Hudson River Estuary Landscape Director, The Nature Conservancy

Impacts on Hudson Valley Water Supplies

Douglas A. Burns, Hydrologist
United States Geological Survey

Impacts on Landscape and Land Use

Gary Kleppel, Professor of Biological Science
University at Albany

Impacts on Agriculture and Invasive Species

David Wolfe, Professor of Plant Ecology
Cornell University

Impacts on Sewage Treatment Facilities and Transportation Infrastructure

Klaus Jacob, Senior Research Scientist
Lamont-Doherty Earth Observatory, Columbia University

Impacts on Hudson River Shoreline and Tidal Wetlands

Betsy Blair, Director
New York State Department of Environmental Conservation
Hudson River National Estuarine Research Reserve

12:30 **Lunch Keynote:**
Carbon Down, Profits Up: How the Business Community is Moving to Address Climate Change Issues and Improving the Bottom Line in the Process.

Chris Walker
United States Director
The Climate Group

Afternoon Session: Meeting the Challenge of Climate Change

1:30 ***Introduction***

Franz T. Litz
Climate Change Policy Coordinator
N.Y.S. Department of Environmental Conservation

1:45 ***What is New York City's Plan to Address Climate Change?***

Ariella Rosenberg
Senior Policy Advisor on Sustainability
New York City Mayor's Office

2:15 **Panel Presentation: *How are Communities Preparing for Climate Change?***

Moderator: Franz T. Litz, Climate Change Policy Coordinator, NYS Department of Environmental Conservation.

Westchester County

Robert Funicello
Director of Environmental Projects
Westchester County

Village of Irvington/Town of Greenburgh

Nicola Coddington
Energy Conservation Coordinator, Town of Greenburgh
Deputy Mayor, Village of Irvington

Guilford, Connecticut

Sidney Gale
President
Integrated Management Controls, Inc.

3:15 ***How Can Hudson Valley Communities Get Ahead of the Curve?***

Kim Lundgren
Director
Northeast Regional Capacity Center
ICLEI - Local Governments for Sustainability

3:45 ***How Can We Develop a Climate Change Strategy for the Hudson Valley?***

Lois A. New
Chief
Partnerships Section
Division of Water
New York State Department of Environmental Conservation

4:15 **Conference Synthesis and Wrap-Up**

Franz T. Litz
Climate Change Policy Coordinator
New York State Department of Environmental Conservation

Frances Dunwell
Hudson River Estuary Coordinator
New York State Department of Environmental Conservation

Introductory Speakers & Moderators

Denise M. Sheehan - *Welcome*
Commissioner
New York State Department of Environmental Conservation

Denise M. Sheehan, Commissioner, New York State Department of Environmental Conservation, 625 Broadway, Albany, NY 12233-1011, (518) 402-8543, dmsheeha@gw.dec.ny.state.us

Denise Sheehan was named Commissioner of the New York State Department of Environmental Conservation on November 29, 2005. She had served as Acting Commissioner since February 2005. Ms. Sheehan has 19 years of experience working in New York State government, and she has served in various capacities at DEC since 1998. Prior to becoming Commissioner, Ms. Sheehan held the position of Executive Deputy Commissioner for three years where she was responsible for overseeing the day-to-day operations of the Department and providing policy direction to the Department's senior staff.

Ms. Sheehan also formerly served as the Department's Assistant Commissioner for Administration, responsible for the Divisions of Operations, Management and Budget, Information Services, Environmental Permits, and Public Affairs and Education.

Prior to joining DEC, Ms. Sheehan worked at the NYS Division of the Budget for 11 years, where she was responsible for overseeing the budgets of the State's environmental, recreational, and energy agencies. In that capacity, she also worked on legislation to establish the 1996 Clean Water/Clean Air Bond Act and the Environmental Protection Fund.

In her capacity as DEC Commissioner, Ms. Sheehan serves on a variety of state boards and commissions, including the Environmental Facilities Corporation, where she serves as the Chairperson; the New York State Energy Research and Development Authority; Adirondack Park Agency; Olympic Regional Development Authority and the Hudson River Park Trust.

Ms. Sheehan earned a Master's degree in Public Administration from the Nelson A. Rockefeller College of Public Affairs and she holds a Bachelor of Science degree in Economics and Political Science from the State University of New York College at Oneonta. She is a life-long resident of New York's Capital Region, and enjoys outdoor recreational activities including fishing, hiking, camping and skiing throughout the state. She resides in Niskayuna, New York with her husband, Michael Miller.

Frances F. Dunwell - *Introduction*
Special Assistant and Hudson River Estuary Coordinator
NYS Department of Environmental Conservation

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Fran Dunwell is Hudson River Estuary Coordinator at the NYS Department of Environmental Conservation. She oversees the implementation of the $368.3 million Estuary Action Plan adopted by Governor Pataki in 1996 and recently updated. The Estuary Program's goal is to conserve and recover the tidal Hudson and the extraordinary natural heritage of its watershed through programs founded in science and implemented in ways that support the quality of life of the Valley's citizens. Dunwell also represents DEC's Commissioner on the Hudson River Valley Greenway and National Heritage Area Board of Directors and on the Hudson-Fulton-Champlain Quadricentenniel Commission. Dunwell has worked for 30 years as a river conservationist, and has written the award-winning book, *The Hudson River Highlands*. She has a Master's degree from the Yale School of Forestry and Environmental Management and a B.A. in anthropology from Kirkland College, now Hamilton. For more information on the program see www.dec.state.ny.us/website/hudson/hrep.html.

David VanLuven - *What are the Likely Impacts of Climate Change in the Hudson Valley?*
Hudson River Estuary Landscape Director
The Nature Conservancy

David VanLuven Hudson River Estuary Landscape Director, The Nature Conservancy - Eastern New York Chapter, 195 New Karner Road, Suite 201, Albany, NY 12205, (518) 690-7878, dvanluven@tnc.org

David VanLuven is the Hudson River Estuary Director for The Nature Conservancy, a nonprofit organization that preserves the plants, animals, and ecosystems representing the diversity of life on Earth by protecting the lands and waters they need to survive. Throughout his career as an environmental advocate, David has connected good science with sound policy to achieve community-sensitive conservation. He has a Bachelor's degree from Middlebury College (Vermont) with a double major in Religion and Arctic & Alpine Ecology, and a joint Master's degree from Tufts University (Boston) in Biology and Urban & Environmental Policy. His work has included research 130 miles north of the Arctic Circle and in California's Sierra Nevada Mountains, compilation of an atlas of significant habitats on Cape Cod, prescribed burning in a New Hampshire forest that needs fire to survive, and most recently navigating the political complexities of state governments as Director of the New York and New Hampshire Natural Heritage Programs.

Franz T. Litz - *How are Communities Preparing for Climate Change?*
Climate Change Policy Coordinator
New York State Department of Environmental Conservation

Franz T. Litz, New York State Department of Environmental Conservation Climate Change Policy Office, 625 Broadway, 14th Floor, Albany, NY 12233-1010, (518) 402-8547, ftlitz@gw.dec.state.ny.us

Franz T. Litz is the Climate Change Policy Coordinator for the New York State Department of Environmental Conservation, a position he has held since 2003. In that capacity, Franz serves as the chief policy advisor on climate change issues to New York's Commissioner of Environmental Conservation. He also heads the agency's executive-level climate change office.

Franz has served as New York's principal representative to the Regional Greenhouse Gas Initiative (RGGI), an effort by 8 Northeast states to implement the first flexible, market-based cap-and-trade program for carbon dioxide in the United States. Since RGGI began, Franz has chaired the group of state staff representatives conducting the RGGI discussions. As chair, Franz has been instrumental in bringing the states to consensus around RGGI decisions. He facilitated the multi-state RGGI staff meetings, served as the principal author of the Memorandum of Understanding that was executed by the region's governors in December 2005, and a principal drafter of the RGGI model rule-the set of rules for the RGGI carbon trading program.

Franz is a member of the Advisory Board of The Climate Group, a worldwide non-profit organization dedicated to spotlighting positive action on climate change by businesses and governments. He is a participant in a number of ongoing climate change policy initiatives, including the Earth Institute's Global Roundtable on Climate Change, and the Center for Clean Air Policy's National Climate Change Dialogue. Franz has also been invited to be a member of the Expert Working Group on Emissions Trading of the International Network for Environmental Compliance and Enforcement (INECE). In early 2006, Franz was selected to study the European Union Emissions Trading Scheme in depth as part of the European Union Visitor's Program. Franz is a frequent contributor to and speaker at conferences on climate change policy and emission trading worldwide.

Prior to entering public service in New York in 2001, Franz practiced environmental law with Brown Rudnick, a large Boston law firm, where he represented both private and public clients on a wide range of environmental matters. He is a graduate of Boston College Law School, cum laude, where he served as Executive Editor of the Boston College Environmental Affairs Law Review, and a graduate of Union College, magna cum laude.

What is Climate Change?

Art DeGaetano
Northeast Regional Climate Center

ABSTRACT

The sun's energy, that is by far the main source of heat for earth, does not heat the earth's atmosphere directly but rather its energy passes through the atmosphere and heats the surface of Earth. The surface then heats the atmosphere from below. If the Earth did not lose heat to space, it would continue to grow warmer as energy is supplied from the sun. The Earth maintains a fairly constant temperature because it loses almost as much heat as it gains to space. Clouds along with carbon dioxide in the atmosphere prevent some of this heat from escaping and thus warm the Earth. Without these components in the atmosphere the temperature of the globe would be about 60°F colder than it is today.

Over the last century the concentration of greenhouse gases in the Earth's atmosphere has increased markedly. CO_2 levels in the atmosphere have not been this high for hundreds of thousands of years. In isolation, this change must result in a warming of the Earth's temperature. Over this same time period climate observations indicate that the global temperature has increased by about 1°F. Although changes in average precipitation have been small (on the order of 1-2%), rain gauge records show that the character of precipitation events has changed. Heavy rainfall events have become more frequent over the last half century.

It is unlikely that the emission of carbon dioxide into the Earth's atmosphere will slow in the near future. In fact, most projections indicate increased carbon dioxide emissions into the middle to late part of the 21st century. This continued increase will likely lead to additional increases in temperature, with most models projecting rises of between 1.5 and 5°C. Although the exact magnitude of changes in precipitation are uncertain, there is reason to believe that precipitation events will become more variable leading to increases in both the frequency of floods and droughts.

SPEAKER CONTACT INFORMATION

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Art Degaetano

Art DeGaetano is an Associate Professor in the Department of Earth and Atmospheric Sciences at Cornell. He is also the director of the federally-supported Northeast Regional Climate Center (NRCC). The NRCC's mission is to enhance the use and dissemination of climate information to a wide variety of sectors in the Northeast. Art has been at Cornell since 1991 serving as the center's Research Climatologist until 2001. His research deals with the use of climate information in decision making, the development of climate-based decision tools and observed climate variations during the past century. Prior to his arrival at Cornell Art was an Assistant Professor with the Meteorology Department at the South Dakota School of Mines and Technology in Rapid City. He received an interdisciplinary Ph.D. focusing on Climatology and Horticulture from Rutgers University in 1989.

Climate Change in the Northeast: Past, Present, and Future

Cameron P. Wake
Climate Change Research Center
University of New Hampshire

ABSTRACT

Climate changes. It always has and always will. What is unique today is that humans activities are also causing our climate to change.

We have investigated a number of indicators of climate change across the northeast United States, including annual and seasonal temperatures, extreme precipitation events, snowfall, snow-on-ground days, river flow, growing season, lake ice out dates, lilac bloom dates, sea surface temperatures, and sea level rise. All of these indicators show that the region has warmed over the last century, and that the rate of warming has increased over the last 30 years.

We have also investigated future climate change in New England under two different greenhouse gas emission scenarios: one where we rely primarily on fossil fuels to generate our energy and a second where we develop a variety of renewable energy. The higher emissions scenario results in significant climate change in the northeast by 2100, including warmer temperatures (6.5 – 12.5^{o} F), many more heat waves, more frequent drought, significant reduction in snow-on-ground days and regional snow cover, more extreme precipitation events, and sea level rise. Conversely, the lower emissions scenario results in significantly less climate change. The future climate of the Northeast therefore depends fundamentally on the decisions we make now and in the near future regarding how we produce and use energy.

SPEAKER CONTACT INFORMATION

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Cameron P. Wake researches global climate and environmental change. He reconstructs climate change in the past through the collection and analysis of ice cores from around the world. Over the past 20 years he has been involved in research expeditions to Nepal, China, Pakistan, Kyrgyzstan, the Canadian Arctic, Greenland, and Antarctica. Currently he is leading research programs to develop ice core records from glaciers on the Tibetan Plateau and in the Canadian Arctic. Wake is also involved in the NOAA-funded AIRMAP (**A**tmospheric **I**nvestigation, **R**egional **M**odeling, **A**nalysis and **P**rediction) project, which seeks to improve understanding of New England's changing climate and air quality. In addition he leads a team that is investigating the links between air quality and human health in New England.

Dr. Wake received a B.Sc. in Geology (1984) from the University of Ottawa, an M.A. in Geography (1987) from Wilfrid Laurier University, and a Ph.D. in Geochemical Systems (1993) from the University of New Hampshire.

In addition to climate research at UNH, Dr. Wake serves on the board of the Kittery Land Trust and Seacoast Area Bicycle Routes, is an avid photographer, and spends his weekends living off the grid in a yurt in the mountains of western Maine.

Panel: What are the Likely Impacts of Climate Change on the Hudson Valley?

Impacts on Hudson Valley Water Supplies

Douglas A. Burns
U.S. Geological Survey

ABSTRACT

Trends in air temperature, precipitation, and runoff were examined from 1952 to 2005 for the Catskill Mountain region of New York, an area that encompasses part of the mid-Hudson River Valley. Climate change is important in the Catskills because New York City and several smaller cities and towns rely on the region for water supply. Air temperature has warmed in the region by 1.1° F since the 1950s accompanied by an increase in average precipitation of 5.5 inches. Most of the increase in precipitation has occurred during June through October. Stream runoff has increased by only about half as much as that of precipitation, partly due to increased evaporation and transpiration resulting from warmer air temperatures. Additionally, peak spring snowmelt has moved from early April in the 1950s to late March in the early 21st century. These trends in runoff suggest that water supply reservoirs in the region are filling to a greater extent in the summer and fall such that less unfilled capacity exists to hold runoff from spring snowmelt and rainfall. These changes in runoff patterns can potentially contribute to flooding downstream as was observed in April 2005 on the Esopus Creek and Neversink River. Human land use and development patterns also contribute to climate sensitivity in the Hudson Valley. For example, impermeable surfaces move rainfall rapidly to local streams, increasing stormflow peaks in suburban areas such as Westchester and Putnam Counties. Also, in Rockland County, a doubling of population since the 1960s accompanied by increases in water demand have increased the severity of moderate short-term drought during the past 40 years. An abundance of scientific evidence indicates that the Hudson Valley can expect a warmer and wetter climate in the 21st century, but that droughts will occasionally occur, and will be intensified in a warmer climate, especially in more developed parts of the region. These patterns of changing climate suggest the need for new research to determine whether assumptions used in water resources planning based on static conditions are still valid in a climate predicted to rapidly change in the next few decades.

SPEAKER CONTACT INFORMATION

Douglas A. Burns, Ph.D., Watersheds Research Section, U.S. Geological Survey, 425 Jordan Rd. Troy, New York 12180-8349, (518) 285-5662, daburns@usgs.gov

Douglas A. Burns has professional interests in the fields of biogeochemistry and hydrology. Specifically, he is interested in the effects of human activities and natural disturbances on water quality and quantity, and the cycling of nutrients and water through catchments. He has worked as a hydrologist with the U.S. Geological Survey in Troy, New York since 1987, and holds a Ph.D. in Water Resources Management from the SUNY College of Environmental Science and Forestry in Syracuse, NY. Doug currently serves as Director of the National Acid Precipitation Assessment Program, and is author of more than 50 scientific papers and reports.

Panel: What are the Likely Impacts of Climate Change on the Hudson Valley?

Impacts on Landscape and Land Use

Gary Kleppel
University at Albany

Abstract

The impacts of changing climate during the next several decades will be intimately linked to land use patterns. Increased severity and greater periodicity of storm events will likely to challenge the water storage capacity of the landscape. As land, particularly forested land, is cleared and hardened for development, terrestrial water-storage capacity will decline. In urbanized watersheds, both flood potential and water-loss will likely increase. Predicted, climate-induced sea level rise could impact coastal areas within the tidal portion of the Hudson River. Effects will be proportional to the extent of development and the ratio of permeable to impervious surfaces within the flood plain. Planning for local to regional responses to climate change should be begin immediately and must address storm water management and water storage issues at the landscape scale. Reductions in the spatial dimensions of urban development within watersheds should be accompanied by protection of forests and other permeable landscapes. Wetlands and other natural flood-mitigation and water retention systems should also be protected. Flood plains will be better suited for use as parks and greenways than for residential or commercial development.

Speaker Contact Information

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Gary Kleppel is Professor of Biological Sciences and Director of the Biodiversity, Conservation and Policy Program at the University at Albany. Kleppel received a BA in Biology from the State University of New York in 1973, and a Ph.D. from Fordham University in 1979 where he studied the ecology of the Lower Hudson River Estuary. He did post doctoral work in oceanography at the University of Southern California has held faculty appointments at Nova Southeastern University in Fort Lauderdale and the University of South Carolina, where he was Chief Scientist of the NOAA funded Land Use-Coastal Ecosystems Study, an investigation of the impacts of urban sprawl in the Southeastern coastal zone, from 1994-2006. Currently Kleppel's interests include the impacts of urbanization on rural landscapes and large scale conservation of those landscapes.

Panel: What are the Likely Impacts of Climate Change on the Hudson Valley?

Impacts on Agriculture and Invasive Species

David Wolfe
Cornell University

Abstract

We know that the climate in the NE is changing, not only based on what the thermometers are telling us, but also based on observations of plants and other living things responding to the change (e.g., earlier bloom dates).

Climate change may bring new opportunities (e.g. new crop options), but also will pose new risks and challenges for farmers and land managers. Specifically:

- invasive insect, disease and weed pests are likely to benefit most from climate change, leading to increased pesticide and herbicide use;
- reductions in biodiversity are likely, because climate change will tend to favor aggressive invasives at the ex pense of endangered species that are poor at migrating and adapting to change;
- the fabric of our forests will be forever changed, with maple, beech, birch gradually replaced by oak, hickory, pine;
- several agriculture sectors that currently dominate the rural economy will be at risk, most notably the fragile dairy industry (dairy cow milk production is highly sensitive to heat stress).

A variety of ways in which farmers and land managers can adapt to climate change, and the costs and risks of various adaptation strategies will also be briefly discussed.

Speaker Contact Information:

David Wolfe, PhD., Professor of Plant Ecology, 68 Plant Science Building, Department of Horticulture, Cornell University, Ithaca, NY 14853, (607) 255-7888, dww5@cornell.edu

David W. Wolfe, Ph.D. is Professor of Plant Ecology in the Department of Horticulture at Cornell University and a member of Cornell's Biogeochemistry Program. He is a leading authority on the effects of climate change and rising atmospheric carbon dioxide on plants, soils, and ecosystems, with many peer-reviewed research publications and several book chapter reviews on the subject. His recent research documenting earlier spring bloom date of lilacs, apples, and grapes in the Northeast (International Journal of Biometeorology, 2005, vol. 39, pp. 303-309), received national media attention. Dr. Wolfe co-authored the agriculture and natural resources sector reports for a Northeast climate change impacts assessment in the late 1990's, and is currently one of several scientists working on a new assessment for the region, scheduled for public release in March 2007. He recently led a USDA-funded project to develop resource materials for agricultural educators (including a new website: www.climateandfarming.org).

Panel: What are the Likely Impacts of Climate Change on the Hudson Valley?

Impacts on Sewage Treatment Facilities and Transportation Infrastructure

Klaus Jacob
Lamont-Doherty Earth Observatory

ABSTRACT

Climate Change in the form of higher mean and extreme values of temperature and precipitation will make additional demands on the design, operation and maintenance of lifeline infrastructure systems. Such systems include transportation and sewage collection and wastewater treatment facilities. More frequent extreme storms, often associated with coastal and estuarine storm surges, especially when coinciding with high tide, can lead to interruption of operations, damage, and -in extreme cases- complete loss of facilities at vulnerable sites. Sea level rise in the Hudson River estuary of at least 2 to 3 feet during the 21st century will increase the frequency of such disruptive flooding events by factors of 3 to 10 in areas with tidal coast- or river-shorelines.

Adaptation measures include such options as lateral retreat to higher ground, in-place raising of structures and operations to higher elevations and, where necessary, regrading of gravity driven flow lines; or in some unavoidable instances "hardening" of structures by embankments, levees, sea walls and flood gates. These latter "hard" options are often effective only temporarily, and the former "soft" solutions are eventually unavoidable and ultimately more successful in many situations. Typical infrastructure systems have expected life times of at least a few decades to a century, the same time spans over which the climate changes become effective and need to be faced. Since these systems are capital intensive, early long-term planning, and climate-change-sensitive design and construction practices are essential to avoid excessive future retrofit costs and losses from destruction or loss of functionality with often severe economic consequences for the affected communities that own the vulnerable facilities. Insurance, if available at all for these facilities, will become ever more expensive and then disappear. Federal disaster relief aid will become ever more tight. Therefore, '*A penny of foresight is worth a buck of avoided future losses*' (the actual benefit/cost ratios for mitigation investments are on average closer to 4 to 1). In the recent past, when slower rates of climate change prevailed, foresight and mitigation have already proven to be cost effective. This proven cost effectiveness of risk mitigating investments will progressively improve further with time as the pace of predicted climate change increases.

SPEAKER CONTACT INFORMATION:

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Klaus H. Jacob is Special Research Scientist at the Lamont-Doherty Earth Observatory of Columbia University, where in 2001, after 33 years of basic geophysical research on 5 continents he retired from a full-time senior research position. He is now Adjunct Professor at the School of International and Public Affairs at Columbia University where he teaches disaster risk management. His areas of research include engineering, urban and land use planning, and risk management to achieve resilience to seismic and other natural hazards. He coauthored the geotechnical sections of the New York City and the national seismic building codes. He was the lead-author of the Tappan Zea Bridge seismic study, and of similar assessments of major East-River bridges in New York City. More recently his research has focused on how global climate change and related sea level rise affect the risks from coastal storm surges, flooding and inundation, primarily in coastal urban regions. He wrote the Infrastructure Chapter for the *Metropolitan East Coast* study on the *Impact of Climate Change and Sea Level Rise on New York City*. Dr. Jacob is currently serving on a committee of the National Academies' Transportation Research Board to advise federal agencies on how climate change impacts U.S. transportation. He also serves on the Multihazard Mitigation Council of the National Institute of Building Sciences to advise FEMA on risk mitigation strategies. Dr. Jacob has been chairman of the Technical Advisory Committee of the New York State Emergency Management Office (NYSEMO). He has testified before Congressional Committees on Hazard Mitigation Policies. Dr. Jacob has authored more than 150 scientific publications and book chapters. He is a member of the American Geophysical Union, the Seismological Society of America, the Earthquake Engineering Research Institute, the American Geological Institute, and the New York Academy of Sciences. He received a bachelor degree in physics and mathematics at the Technical University of Darmstadt, and a doctorate in geophysics from the University of Frankfurt, Germany.

Panel: What are the Likely Impacts of Climate Change on the Hudson Valley?

Impacts on Hudson River Shoreline and Tidal Wetlands

Elizabeth A.Blair
New York State Department of Environmental Conservation
Hudson River National Estuarine Research Reserve

ABSTRACT

The Hudson River Estuary's wetlands, aquatic vegetation, and natural shoreline help mitigate flooding, clean our water, and provide habitat for fish and other species, and recreational opportunities. Climate change is expected to cause a rise in sea levels and an increase in extreme weather that will threaten these aquatic resources and the services they provide. Climate change will likely increase habitat and shoreline inundation and displacement, enable the advancement of saline waters farther up the estuary, and increase coastal erosion and our vulnerability to storm damage and flooding. Although tidal wetlands are gaining elevation slowly as they accumulate sediment, it appears unlikely that Hudson River wetlands will be able to keep up, and their survival will depend on their ability to migrate shoreward. Bulk-heading and development along the shoreline has and will exacerbate the risk to communities and resources. Hudson River shoreline communities will need to plan wisely to insure that we don't lose the services these natural areas provide and a safe future for their residents.

SPEAKER CONTACT INFORMATION:

Elizabeth A. Blair, Director, Hudson River National Estuarine Research Reserve, Bard College Field Station, Annandale, NY 12504, (845) 758-7011, bablair@gw.dec.state.ny.us

Betsy Blair has worked on a variety of Hudson River programs for the New York State Department of Environmental Conservation since 1985. She manages the Hudson River National Estuarine Research Reserve, a network of sites dedicated to long-term research and education. Since 1992, as Hudson River Estuary Habitat Protection Manager, she has also overseen a variety of estuary-wide projects, including river bottom and submerged habitat mapping, habitat restoration, and the training of natural resource managers and decision-makers.

Previously she worked on resource policy issues, wetlands mapping, and forest ecosystem research. She also spent 6 months as a foreign fisheries observer on Japanese vessels in the Bering Sea. She has a Master of Forest Science from the Yale School of Forestry and Environmental Studies, and a Bachelor of Science in biology from Tufts University.

Throughout her career, Betsy has sought to bring science to bear on resource management challenges, and to find effective ways of communicating resource information, management needs and scientific findings. She is a member of the New York State Biodiversity Research Institute Scientific Working Group, and has served on the New York Sea Grant Program Advisory Committee and the Board of Advisors for the Cooperative Institute for Coastal and Estuarine Environmental Technology. In 2005 she was awarded the National Oceanic and Atmospheric Administration's Award for Excellence in Coastal and Ocean Resource Management.

Keynote

Carbon Down; Profits Up: How the Business Community is Moving to Address Climate Change Issues and Improving the Bottom Line in the Process

Chis Walker
The Climate Group

Abstract

Chris will be giving us a glimpse of the business case for reducing carbon emissions.

Speaker Contact Information

Chris Walker, Director U.S., The Climate Group, c/o 245 5th Avenue, Suite 2401, New York, NY 10016-8728

Current - US Director -The Climate Group (secondment from Swiss Re)
Serving as one of two US directors to operationalize the Climate Group in the US. Established the East Coast office in New York as well as leading US strategy and development. Concentrating on building US membership, convening dialogue leading to the low carbon economy as well as recruiting and implementing the Insurance and Financial Sector working groups.

Previous - Swiss Re Financial Services Corporation
Head of Swiss Re's Sustainability Business Development, the unit charged with developing commercial applications to Swiss Re Sustainability commitments and in particular business opportunities in sustainability, ecosystem markets, emissions reductions and renewables. The unit examines business opportunities across a wide spectrum of financial service products including insurance, structured finance, third-party asset management and investments as well as the identification of risks to Swiss Re's (re)insurance and investment activities. He also serves as a North American Sustainability Officer and government affairs liaison on climate change/ GHG emissions issues. Initiatives:

- Oversaw the establishment an emissions trading capacity within Swiss Re
- Developed risk finance/transfer solutions to facilitate the development of renewable energy projects and the use of market mechanisms to reduce environmental/GHG impacts.
- Led the development of a European Clean Energy fund to finance energy efficiency and renewable projects throughout Europe.
- Conceived and developed ecosystem market pioneering "Footprint Neutral" program with UN Development Programme to assist corporate clients with complimentary to regulation carbon and "environmental footprint" commitments, project and corporate offset standards and credibility
- Led identification of the potential climate change exposure to Directors and Officers liability policies; achieved institutional acceptance for including issue in renewal/new business evaluation
- Organized and conducted five well attended and highly acclaimed "Reducing Greenhouse Gas Emissions" conferences in 2001 -2004.
- Published, lectures and frequently quoted on GHG/climate change risks and market mechanisms

While based at Swiss Re's Zurich headquarters, Mr. Walker created and advanced from concept to initiation the company's Greenhouse Gas Risk Solutions unit, specializing in Greenhouse Gas risk mitigation and opportunity innovation. In 2000, he created and led Swiss Re Group's worldwide GHG emissions market feasibility study determining the market facilitation role for Swiss Re.

An attorney, Mr. Walker, was appointed to the California Climate Change Advisory Commission, and is a member of Environmental Entrepreneurs (E2), on the board of advisors for Aura Renewables, New Energy Finance publication, the Panama Canal Watershed Business Plan project at Yale University and the Climate Change Futures Study with Harvard University/ UNDP.

He received his BA in Government from St. John's University, attended the Institute on Comparative Political and Economic Systems at Georgetown and is also a graduate of the St. John's School of Law. Prior to joining Swiss Re in 1996, he practiced law in New York and New Jersey.

What is New York City's Plan to Address Climate Change?

Ariella Rosenberg
New York City Mayor's Office

Abstract

Developing a sustainability agenda for a city of any size requires gathering facts, building consensus, and demonstrating leadership. The director of New York City's new Office of Long-term Planning and Sustainability will describe the approach New York City is taking towards the development of a sustainability and climate change agenda, as well as early insights from the process.

Speaker Contact Information

Ariella Rosenberg, Mayor's Office of Operations, 253 Broadway, 10FL, New York, NY 10007, (212) 788-1416, arosenberg@cityhall.nyc.gov

Ariella Rosenberg is Senior Policy Advisor on Sustainability to the NYC Deputy Mayor of Economic Development and Rebuilding. She is creating a Long-Term Sustainability Plan for the City of New York and helping to lead a Sustainability Advisory Board comprised of leading local environmentalists, community activists, the design sector, and business organizations. Prior to this, she worked in the Energy Division of the New York City Economic Development Corporation where she specialized in energy efficiency and sustainability. In this role she chaired both the Energy Working Group of the Mayor's Task Force on Sustainability and the Inter-agency Working Group of the New York City Energy Policy Task Force. Ms. Rosenberg has also worked as an urban planner in The Bronx for the New York City Department of City Planning and as an analyst at the energy, economic consulting firm PA Consulting Group (formerly PHB Hagler Bailly).

She received her Masters in City Planning from MIT where she concentrated on environmental policy and urban design and focused her thesis research on mainstreaming green building in NYC. She received her undergraduate degree from the University of Pennsylvania.

Panel: How are Communities Preparing for Climate Change?

Westchester County

Robert Funicello
Westchester County

Abstract

Westchester County has formed a task force with a diverse range of community stakeholders to produce a countywide action plan to reduce greenhouse gas emissions and promote sustainable development in Westchester. In his talk, Mr. Funicello will cover the main goals of the Task Force including producing an up to date inventory of the greenhouse gas emissions produced in Westchester County and setting new goals to reduce emissions over the next decade. He will also discuss some of the ways that Westchester County has already taken action to reduce greenhouse gas emissions and advance sustainability in the County.

Speaker Contact Information

Robert Funicello, Environmental Project Director, County of Westchester, 148 Martine Avenue, White Plains, NY 10601, (914) 813-5457, rff3@westchestergov.com

Robert Funicello was appointed to the newly created position of Westchester County Environmental Project Director in 1999. His responsibilities include working with the Westchester County Department of Environmental Facilities (DEF), which operates the County sanitary sewer treatment, solid waste to energy facilities and drinking water distribution systems, and with the Westchester County Airport operated by the Westchester County Department of Transportation. At both the Westchester County Airport and DEF he supervises the design, implementation and certification of an environmental management system independently certified to the ISO 14001 Standard.

Mr. Funicello is also responsible for special environmental projects for the County Executive, including serving as co-chair of the Climate Protection: Westchester Global Warming Task Force.

Prior to his employment with Westchester County he practiced law in New York, specializing in environmental, real estate and municipal law. He served as a Trustee of the Village of Mamaroneck from 1979 to 1985.

Panel: How are Communities Preparing for Climate Change?

Village of Irvington/Town of Greenburgh

Nicola Coddington
Village of Irvington/Town of Greenburgh

Abstract

Ms. Coddington's presentation will review measures the Town of Greenburgh has taken to reduce greenhouse gas emissions by promoting energy conservation/efficiency and renewable energy in the community and in its government operations. Highlights include the Town's groundbreaking 2002 legislation mandating energy efficiency in new residential construction. Ms. Coddington will share lessons learned, challenges, and plans for next steps.

Speaker Contact Information

Nicola Coddington, Energy Conservation Coordinator, Greenburgh Town Hall, 177 Hillside Ave., Greenburgh, NY 10607, (914) 993-1649, greenburghenergy@earthlink.net

Nicola Coddington is a consultant who has served as Energy Conservation Coordinator (part time) for the Town of Greenburgh since February 2003. Her responsibilities include community outreach regarding energy efficiency and renewable energy, promoting energy efficiency in Town operations, and recommending policies and actions to the Town Council. In addition, she has worked with several organizations to arrange conferences on energy efficiency and green building.

Nicola has lived for 14 years in the Village of Irvington, where she is a trustee, currently serving as Deputy Mayor. A graduate of Wellesley College, she has completed the Community Leadership Alliance Training Program of the Pace University Land Use Law Center.

Panel: How are Communities Preparing for Climate Change?

Guilford, Connecticut

Sidney Gale
Integrated Management Controls, Inc.

Abstract

Mr. Gale will discuss the efforts of the Town of Guilford, Connecticut over the past two years to understand and plan for the impacts of Climate Change. Using abnormal seasonal high tides as proxies of sea level rise, he will present lessons learned about possible impacts and suggest first steps to be taken by state and local governments in commencing coordinated efforts to plan and manage the impacts of climatic evolution.

Speaker Contact Information

Sidney F. Gale, Integrated Management Controls, 250 Flag Marsh Rd, Guilford, CT 06437, (203) 453-6100, sfgale@imcontrols.com

Sidney F. Gale, CPA, CIA, MBA, conducts a consulting practice focusing on business strategy, management controls and project management. He has served the Town of Guilford on its Economic Development, and Planning and Zoning Commissions, and chaired its Transportation Planning Committee. He has actively promoted sustainable growth strategies and strengthening of regional planning processes. During his leadership of the Town Center South Planning Committee, he convened a regional conference of municipal officials to explore the implications of Climate Change on land use policies relating to shoreline development.

How Can Hudson Valley Communities Get Ahead of the Curve?

Kim Lundgren
ICLEI-Local Governments for Sustainability

ABSTRACT

Ms. Lundgren's presentation will highlight the role that ICLEI-Local Governments for Sustainability plays in local climate protection initiatives. As the international association of local governments committed to sustainable development, ICLEI has a vast network of municipal expertise on successful measures to reduce greenhouse gas emissions and the costs associated with burning fossil fuels. Ms. Lundgren's presentation will provide a description of the benefits and tools ICLEI provides its members as well as some specific "best practice" examples from around the Northeastern portion of the United States.

SPEAKER CONTACT INFORMATION

Kim Lundgren, Director, Northeast Regional Capacity Center, ICLEI- Local Governments for Sustainability, USA, Boston City Hall, Room 805, One City Hall Plaza, Boston, MA 02201, (617) 635-3853, kim.lundgren@iclei.org

Kim Lundgren is the Director of the first Regional Capacity Center for ICLEI- Local Governments for Sustainability. In this role, she is responsible for supporting all ICLEI members and participants in the Cities for Climate Protection® Campaign within the nine state Northeast region on their various initiatives to reduce greenhouse gas emissions. Additionally, she manages the regional and individual state networks as well as various grant programs that are focused on Northeast communities and sustainability, including ICLEI's Transportation and Climate Change Project and the Massachusetts Municipal Clean Energy Initiative. Prior to joining ICLEI, Ms. Lundgren was the Director of the Energy and Environment Office for the City of Medford, MA. In this role, she was responsible for all energy efficiency and environmental initiatives in the City, related to reducing emissions of greenhouse gases and criteria air pollutants associated with municipal and community operations. Additionally, she developed and supervised programs related to wetlands conservation, open space preservation, and Stormwater management. And prior to her position in Medford, she worked on superfund sites as an environmental consultant for Tetra Tech, NUS, and Booz, Allen & Hamilton.

Discussion: How Can We Develop a Climate Change Strategy for the Hudson Valley?

Lois A. New
New York State Department of Environmental Conservation, Division of Water

Mrs. New will lead a discussion on the needs and concerns surrounding Climate Change in the Hudson River Valley

Speaker Contact Information

Lois New, New York State Department of Environmental Conservation, 625 Broadway, 4th Floor, Albany, NY 12233-3502, (518) 402-8239, lanew@gw.dec.state.ny.us

Lois New is Chief of the Policy and Partnerships Section, Division of Water, at the New York State Department of Environmental Conservation. Her major program responsibilities include fostering partnerships, setting program direction and providing funding to restore and protect watersheds. She has been instrumental in setting policy direction and making funding available for regional, county and local governments to implement the Stormwater Phase II program. She is a member of New York State's interdisciplinary team working on the Regional Greenhouse Gas Initiative (RGGI), an effort by the northeastern states to implement a flexible, market-based cap-and-trade program covering carbon dioxide emissions from power plants in the region. Through partnership activities and funding programs, she is helping to integrate climate change perspectives into ongoing activities of municipalities, planning boards, soil and water conservation districts, and special interest groups representing environmental, business and civic concerns. Throughout her career, Lois has facilitated development of new programs that integrate needs of multiple program areas, including air, water, waste management and preservation of natural resources. She now brings these connections and experience to work in the climate field. Lois has worked for the Department for 25 years and has a Bachelor's Degree in Biology and Environmental Science. She earned a Masters degree in Water Resource Management from the University of Wisconsin, Madison, with a specialization in Public Participation and Public Policy.

Notes