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The Record

VOL. 33, NO. 07

NEWS AND IDEAS FOR THE COLUMBIA COMMUNITY

JANUARY 24, 2008



HEATING UP: THE BROAD REACH OF COLUMBIA'S CLIMATE SCIENCE

JOERG SCHAEFER

Melting ice: New Zealand's Tasman Glacier—the largest glacier of the country's Southern Alps—has dramatically retreated in the last 150 years due to warming. Photo taken by Lamont-Doherty research scientist Joerg Schaefer, whose research focuses on the time scales for retreat of glaciers.

Manhattanville Rezoning Approved

By Record Staff

By a 35-to-5 margin, the New York City Council approved Columbia's proposed rezoning of the former manufacturing area of Manhattanville on Dec. 19, the most essential step in the city's rigorous Uniform Land Use Review Procedure known as ULURP. Six council members abstained from the vote.

President Lee C. Bollinger said he was "thankful and appreciative" for the council's strong support, which recognizes the crucial role universities can play in a city's intellectual and economic growth. He expressed gratitude to

Sustainable urban design and green building will be a key element of Columbia's long-term campus growth.

the many local elected officials who supported Columbia's proposal as an important development for West Harlem and New York City's future, including Council Speaker Christine Quinn, local Council Members Robert Jackson and Inez Dickens, as well as Mayor Michael Bloomberg, U.S. Rep. Charles Rangel and Borough President Scott Stringer.

Council Member Robert Jackson of Harlem said, "This revitalization will make sure that Harlem is as relevant in the future as it was in the past."

Council Member Inez Dickens, who also represents Harlem, noted that Columbia had revised its plan in order to allay community concerns. "The result is a proposal that will allow Columbia to grow while helping ensure the continued health of the Harlem community," she said.

Expanding into the Manhattanville area is central not only to the University's future, Bollinger has said, but also to preserving New York's role as a place

continued on page 4

University Launches New Climate Center

By Clare Oh

Columbia University has established its first center focused on bringing together the scientists, engineers, public health experts, foreign policy specialists and others who are working on the pressing challenges of climate change.

The Columbia Climate Center, part of the Earth Institute but encompassing other parts of the University, is an outgrowth of Columbia's leadership in earth and environmental sciences, said its director, Peter Schlosser.

"Climate research has always been a strong part of Columbia and can be traced all the way back to the early work of the Lamont-Doherty Earth Observatory," said Schlosser, who is also the Vinton Professor of Earth and Environmental Engineering and Applied Science in the department of earth and environmental sciences. "The Columbia Climate Center builds on these contributions to move toward a solution-oriented approach to a problem that is so multidimensional."

The center's goals are to advance scientific knowledge about climate change; analyze policy; and put forward solutions to real-world problems. A key challenge, and one familiar to academia, will be getting out the message, both to educate the public and influence policymakers. On Jan. 31, the center will host a discussion on climate

change showcasing the interdisciplinary expertise at Columbia as part of Focus the Nation, a nationwide day to raise the profile of climate change in the United States.

"We aim to improve the pathways of communication so that the results of our research reach both decision makers and society at large," said Mary-Elena Carr, the center's associate director and a biological oceanographer who comes to Columbia from NASA's Jet Propulsion Laboratory.

Both Schlosser and Carr emphasize the interdisciplinary nature of the center and its mission; they note that its success depends on close collaboration among experts from different disciplines, research centers and programs across the University.

"None of the existing climate-related centers at Columbia can address the entire spectrum of climate impacts, yet each center plays a key role," Schlosser said.

By the end of this year, Schlosser and Carr hope to make the center the hub for climate-related science at Columbia.

Five years from now, Schlosser said, "we hope to have established projects in which we have channeled innovative fundamental research into specific strategies ready for implementation."



ON CAMPUS



EILEEN BARROSO

DISCOUNT TIX FOR PLAYS AND FLICKS

In other words, Columbia students, faculty and staff need not travel below 115th street to buy discount tickets to New York City cultural events. Starting Jan. 28, tickets to theater, art exhibits, concerts at Lincoln Center, movies and campus events will be available to those with a valid CUID at the new Ticket and Information Center (TIC) in Lerner Hall. The booth, sponsored by the Office of the Provost with support from Columbia College and Student Services, is created and managed by the Arts Initiative at Columbia and also will offer a free service to help campus organizers manage their own ticket sales and RSVP lists. All events will be listed at www.tic.columbia.edu, in the Arts Initiative's weekly e-newsletter and on the booth's video screens. The Ticket and Information Center is open from noon to 9:00 p.m. Monday through Saturday, 3:00 to 9:00 p.m. on Sunday. CU Arts Initiative staffers from left: Rudy Scala, Anne Fenton, Chad Miller and Caralyn Spector.

MILESTONES

WILLIAM V. HARRIS, the William R. Shepherd Professor of History, has received the Andrew W. Mellon Foundation Distinguished Achievement Award. Amounting to as much as \$1.5 million for a three-year period, the award honors three scholars this year for their significant contributions to "humanistic inquiry." Harris was recognized for his studies of ancient Rome and Greece. He directs Columbia's Center for the Ancient Mediterranean, which brings together faculty and students interested in the cultures of the region.



PEDRO A. SANCHEZ, director of the Tropical Agriculture and Rural Environment Program at the Earth Institute and co-chair of the Millennium Project Hunger Task Force, is the 2008 recipient of the Charles A. Black Award, bestowed annually by the Council for Agricultural Science and Technology. The award honors achievements by a scientist or engineer who specializes in the agricultural, environmental or food sectors.

Effective Feb. 1, **ZOHAR GOSHEN**, professor of business law at Columbia Law School, will take over as chairman of the Israel Securities Authority—the country's equivalent to the U.S. Securities and Exchange Commission. Goshen, who also directs the Law School's program on Israeli legal studies, is an expert on corporate and securities law. He will remain on the faculty at the Law School while taking on this new role.



MARTHA HOOVEN is the new vice dean for administration at Columbia's College of Physicians and Surgeons. Hooven, previously associate chair for administration for the department of medicine at the University of California at San Francisco, will oversee a staff of 29 in various departments, institutes and centers within P&S.

GRANTS & GIFTS

WHO GAVE IT: The Mellon Foundation
HOW MUCH: \$6 million
WHO GOT IT: Arts and Sciences
WHAT FOR: Doctoral student fellowships
HOW WILL IT BE USED: To create an endowment to fund summer and travel fellowships as well as scholar research grants for graduate students in Arts and Sciences departments

WHO GAVE IT: Empire State Stem Cell Board
HOW MUCH: \$2.5 million
WHO GOT IT: Stem cell researchers from Columbia University Medical Center, the Morningside campus and colleagues at the New York State Psychiatric Institute
WHAT FOR: To support Columbia researchers who are actively involved in work with adult, embryonic and other forms of stem cells to better understand and treat diseases such as diabetes, Parkinson's and amyotrophic lateral sclerosis (ALS). The Empire State Stem Cell Board was created by Gov. Eliot Spitzer and the state legislature to manage the \$600 million allocated for stem cell research in this year's state budget.

WHO GAVE IT: National Institute of Environmental Health Sciences
HOW MUCH: \$10.4 million
WHO GOT IT: Columbia Center for Children's Environmental Health at the Mailman School of Public Health
WHAT FOR: To study environmental factors in childhood asthma and conduct further research on how prenatal and early postnatal exposure to widespread contaminants in the air alters lung development and the immune system to produce asthma. The grant will fund four studies on asthma vulnerability among inner-city children to urban air pollution, new air sampling technology, genes and asthma, and air pollution and asthma medicine.

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TheRecord Staff:

Editor: **Bridget O'Brian**
 Designer: **Nicoletta Barolini**
 Senior Writer: **Melanie A. Farmer**
 University Photographer: **Eileen Barroso**

Contact The Record:
 t: 212-854-2391
 f: 212-678-4817

e: curecord@columbia.edu

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David M. Stone
 Executive Vice President
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curecord@columbia.edu

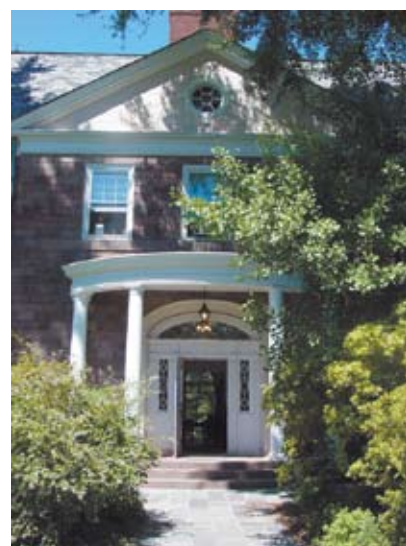
Why on Earth...?

Dear Alma's Owl,
 Why is Lamont-Doherty Earth
 Observatory's campus located in
 Palisades, N.Y.?

—Campus Commuter

Dear Commuter,
 The short answer: to keep Lamont's founder, visionary geophysicist Maurice "Doc" Ewing, from getting poached by the Massachusetts Institute of Technology.

Ewing, whose research on oceans is credited with saving lives and naval assets during World War II, was offered a professorship at Columbia toward the end of the war. He and his students moved into Schermerhorn Hall and, in a scenario familiar to anyone who has taught on the Morningside campus, quickly ran out of



Thomas Lamont's former weekend home, now part of the Lamont-Doherty Earth Observatory.

space. According to J. Lamar Worzel, a one-time Ewing student who later became associate director of Lamont, the scientists requested more space, and even went so far as to design themselves a new building,

**ASK ALMA'S OWL**

which would go next to Schermerhorn.

Then, in 1948, MIT came calling with the tempting offer for Ewing to establish his own geophysics research group and bring all his students. MIT even had an old estate in New Bedford, Mass., where the group could be housed. After touring the estate, Ewing came back and talked things over with then-Columbia President Dwight D. Eisenhower and Paul Kerr, chairman of the geology department. By coincidence, Columbia had just been offered a 135-acre estate on the Hudson River by the widow of financier Thomas Lamont. Eisenhower and Kerr offered the estate and set about raising \$200,000 from mining companies to provide the funding. The geologists, Worzel recalled in a memoir about Lamont's founding, were "thrilled that we would not have to contend with the vibrations from subways and trucks on Broadway."

—By Stacy Parker Aab

Send your questions for *Alma's Owl* to curecord@columbia.edu.

COLUMBIA

Leadership in Climate Change

By Ken Kostel

Sometimes, science develops in grand leaps of eureka moments, but often builds through the gradual accumulation of incremental advances and subtle refinements. Nowhere is this more evident than in the body of investigation known as “climate science.” And that’s where the dogged commitment of researchers across Columbia are making large and small advances every day in efforts to unlock the secrets of how the climate functions, how human action affects the planet, how our changing environment affects societies around the globe, and what to do about it.

The study of Earth’s climate is a vast collection of disciplines that draws upon the expertise of scientists from across the academic spectrum. At Columbia the notion of what is a climate scientist changes almost daily. A quick glance at the CVs of some of the major researchers, as well as the up-and-coming stars, bears this out.

James Hansen, director of the Goddard Institute for Space Studies, which is affiliated with Columbia’s Earth Institute, received his PhD from The University of Iowa in astrophysics and for several years published widely on the atmosphere of Venus. Only later did he turn his singular focus and careful study to the question of energy balances and greenhouse gases in our own atmosphere.

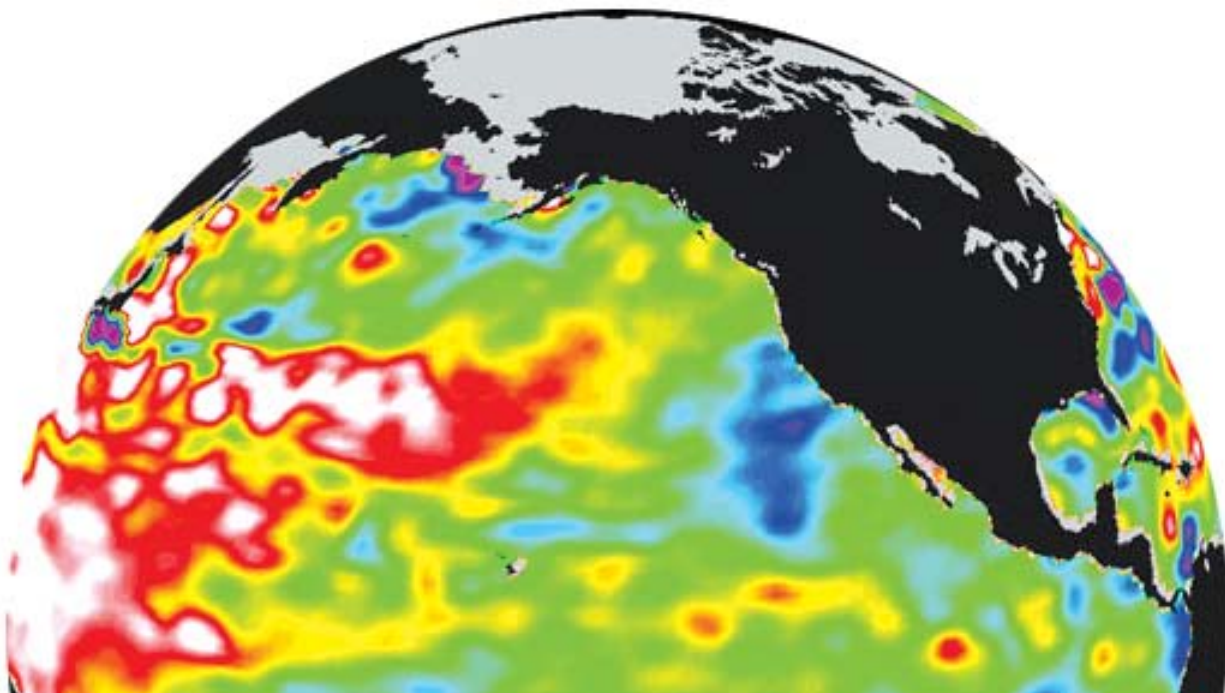
Mark Cane of Lamont-Doherty Earth Observatory and Stephen Zebiak, director-general of the International Research Institute for Climate and Society, well-known climatologists for their work in forecasting short-term climate variations in the tropics, did much of their graduate work in applied math. In 1985, they devised a simple numerical model relating wind speed and sea surface temperature that proved to be a remarkably good predictor of the El Niño phenomenon that periodically brings life-threatening weather changes to large parts of the developing world.

Even Columbia’s legendary seismologists—a group known more for their work studying earthquakes, volcanoes and thermonuclear detonations—are bringing their expertise to bear on the issues of climate change. Meredith Nettles and Göran Ekström of Lamont-Doherty recently discovered a connection between some curious seismic events along the coast of Greenland and the movement of glaciers that link the island’s vast ice sheet to areas of the North Atlantic, which are critical to Earth’s global ocean circulation.

Having led the way in studies to unlock how Earth’s climate works, how human action can affect it, and what the future of our climate might be, Columbia is beginning to play another, crucial role in the climate sciences. The next great step is to devise ways for humanity to mitigate our increasingly unavoidable impact on global systems such as the climate, the biosphere, and ocean circulation and to help societies learn to adapt to the changes. In this effort, the insight of social scientists and public health experts are also crucial to build on the foundation laid by those such as Doc Ewing and Wally Broecker, two of Lamont’s legendary founding scientists.

Today, in the cafeteria at Lamont and the hallways of Schererhorn, Pupin and even the law or business schools, more scholars are coming together formally and informally to trade ideas, often surprising one another with the similarity of the problems they address or the techniques they employ. The results can have lasting and far-reaching effects in how we look at our planet and in how quickly we address the complex and thorny questions that face us. Indeed, more than a dozen Columbia scientists have worked with the Intergovernmental Panel on Climate Change, which shared the 2007 Nobel Peace Prize with former Vice President Al Gore.

From the science of decision making to low-cost energy sources for Africa’s rural poor, to the demographics of those hardest hit by Hurricane Katrina, Columbia is focusing its extraordinary breadth of intellectual resources on expanding human understanding of our relationship to the planet. In the process, the University is also redefining what it means to be a climate scientist in an increasingly uncertain climate future.





LATEST FINDINGS: 2007 WAS SECOND HOTTEST YEAR ON RECORD

By Record Staff

Climateologists at the NASA Goddard Institute for Space Studies (GISS) at Columbia recently named 2007 the second warmest year in a century, tying with 1998 for that dubious distinction.

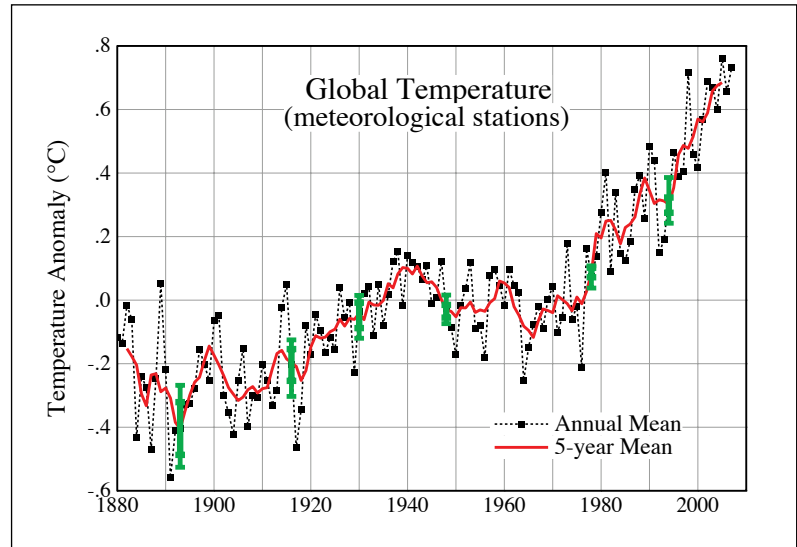
To measure average temperatures, Goddard Institute researchers used temperature data from weather stations on land, satellite measurements of sea ice temperature since 1982, and data from ships for earlier years.

The greatest warming in 2007 occurred in the Arctic and neighboring high-latitude regions. Global warming has a larger effect in polar areas, as the loss of snow and ice leads to more open water, which absorbs more sunlight and warmth. Snow and ice reflect sunlight; when they disappear, so too does their ability to deflect warming rays. The large Arctic warming anomaly of 2007 is consistent with observations of record-low levels of arctic sea ice in September 2007.

"As we predicted last year, 2007 was warmer than 2006, continuing the strong warming trend of the past 30 years that has been confidently attributed to the effect of increasing human-made greenhouse gases," said James Hansen, director of GISS.

The warmest year on record was 2005, according to GISS data. The eight warmest years in the GISS record have all occurred since 1998, and the 14 warmest years have occurred since 1990. Looking ahead, Hansen said that he doubts 2008 "will be a year with truly exceptional global mean temperature." But within a few years, he added, he expects to see a global temperature exceeding that of 2005 because of the overall global trend of warming temperatures.

The NASA Goddard Institute for Space Studies at Columbia is a laboratory of the Earth Sciences Division of NASA's Goddard Space Flight Center and a unit of the Columbia University Earth Institute.



Global temperature changes, in Centigrade. Mean temperature changes are about 0.57 degrees Celsius warmer than the mean for 1951 to 1980, continuing the strong warming trend of the past 30 years. GISS has attributed the change to the effect of more human-made greenhouse gases.

FIVE GROUPS, ONE GOAL: COLUMBIA CENTER LINKS NYC'S ENVIRONMENTAL RESEARCH INSTITUTIONS

By Donna Cornachio

If you go to the Web site for Columbia's Center for Environmental Research and Conservation (CERC), you'll find a photograph of Shahid Naeem, with a scarlet-and-blue bird known as a Crimson Rosella resting on his outstretched palm.

It was taken in Lamington National Park in Queensland, Australia, where the bird has no natural predators, so the Crimson Rosella knows no fear and will approach anyone, naturalist or not. But it seems understandable that wildlife would be drawn to the soft-spoken Naeem, who studies how changes in the distribution of plants, animals and microbes affect how ecosystems function. Naeem chairs Columbia's department of ecology, evolution and environmental biology, and he is also the science director of CERC, a consortium of five world-renowned scientific institutions.

In addition to Columbia, CERC comprises the American Museum of Natural History, the New York Botanical Garden,

"I can't think of a more intellectually stimulating question: Are we ready to be the Earth's stewards?"

the Wildlife Conservation Society and the Wildlife Trust. (CERC, headquartered at Columbia, also is part of the Earth Institute.) The five institutions work together to teach and train students in ecology, evolution and the environment about the natural world, and they work collectively (and sometimes competitively) on research projects. CERC's research programs are currently running in over 60 countries.

Climate change tops the list of CERC's priorities. "We need to take a global view of climate change, not by trying to save one

species or one area, but by thinking of the problem on a global scale," Naeem explains. "The more poorly conserved our habitats are, the worse off we all are."

Naeem cites as an example the erosion of wetlands in Louisiana. Scientists estimate the state has lost more than one million acres of wetlands at the mouth of the Mississippi River, a crucial buffer zone that once protected the Louisiana coast and environs from hurricanes. Since the devastation caused by Katrina, "suddenly," Naeem says, "the conservation of wetlands takes on a new meaning."

Some methods of offsetting the effects of global warming on climate change focus on mitigation: using alternative energy; offering credits for carbon management, such as carbon capture and storage, which captures carbon dioxide from fossil fuel power plants and stores it instead of releasing it into the atmosphere; and buying hybrid cars.

What CERC is exploring involves adaptation rather than mitigation. "Maybe that means not building our houses so close to the shore," Naeem says. "Perhaps it involves planting trees differently—different species of trees, at different ages, at different intervals, to prevent the domino effect of trees being downed during big storms. Maybe it means preparing for some species like the Africanized honey bee and the fire ant to move north because of warming temperatures."

The goal of the CERC consortium is to build environmental leadership through its collective resources and to become a world leader in conservation education, training and research. It is a goal that keeps Naeem ever hopeful.

"I can't think of a more intellectually stimulating question: Are we ready to be the Earth's stewards? There's no repair manual to guide us. But I'm very excited by this new age. I do believe we have the capacity to retool and repair and manage the biosphere."



S. F. TJOSEM

Shahid Naeem studies the importance of biodiversity and travels extensively for his research. Naeem holds a Crimson Rosella in Lamington National Park, Australia, where wild parrots fearlessly approach visitors who offer them parrot food.



JAMES HANSEN

POSITION:

Director, NASA Goddard Institute for Space Studies (GISS)

Adjunct Professor, Earth and Environmental Sciences at Columbia University

LENGTH OF SERVICE:

Director of NASA Goddard Institute for Space Studies since 1981; Adjunct Professor since 1985

HISTORY:

Space Scientist, Goddard Institute for Space Studies

Manager, Planetary and Climate Programs at GISS

Interviewed by Bridget O'Brian

Long before Al Gore's Nobel Peace Prize, before the Kyoto Protocol, compact fluorescent light bulbs or hybrid cars, James Hansen was sounding the alarm on greenhouse gas emissions and bringing the world's attention to the issue of climate change.

It was August 1981 when the journal *Science* published Hansen's galvanizing paper, which concluded that carbon dioxide in the atmosphere would lead to global warming faster than prior predictions. Those 10 pages, riddled with equations, graphs and charts and bearing the bland title "Climate Impact of Increasing Atmospheric Carbon Dioxide," became the shot heard 'round the world in scientific circles. Its message has been reverberating ever since, ricocheting through the political landscape and becoming a clarion call for environmental activists and average citizens alike.

Hansen has taken more than his share of heat for his climate warnings. He has complained of being muzzled by presidential administrations, Democrat and Republican alike, who didn't appreciate his conclusions, as they contradicted the nation's energy policy. His 2006 battle on that score is the subject of a book published last month called *Censoring Science: Inside the Political Attack on Dr. James Hansen and the Truth of Global Warming*, by Mark Bowen.

Born and educated in the Midwest, Hansen lives and works on the Upper West Side, heading the NASA Goddard Space Institute for Space Studies, which is affiliated with Columbia. He also teaches earth and environmental sciences at the University.



ARNOLD ADLER

James Hansen testifying before the U.S. Senate, issuing his warning about global warming in 1988.



PHOTO COURTESY OF THE EARTH INSTITUTE

Q. *The 1981 analysis in the journal Science was one of the first public discussions about an increase in global temperature. Did you have any inkling how important your findings would be?*

A. The broad long-term implications were pretty obvious. I worked on it more than a year to get it into a shape that *Science* would accept, submitting it at least three times, each time cutting the length about 15%, finally getting it to a length they would accept, even though it was twice what the editor kept saying was their size limit. I also sent it to Walter Sullivan, *The New York Times* reporter, who wrote an article on the front page, which got me in trouble with some colleagues and [the Department of Energy.]

Q. *It seems that you were among the few scientists talking about climate change for a long time. What was it like to be out there alone?*

A. That's not true. There were a lot of scientists working on climate. There were different threads, different approaches. For example, global modeling along the lines that GFDL [Geophysical Fluid Dynamics Laboratory], NCAR [National Center for Atmospheric Research] and GISS pursued. There were paleo-climate studies of the history of the Earth's climate, and there were observations of on-going climate changes via satellites and other methods. But not as much interactions among these [researchers] as you would like. Now we have reached the point where you need to have your fingers into all of these if you want to develop insight quickly into how climate works and what the consequences of human forcings will be.

Q. *A forcing is described as a disruption created by outside action. What kind of forcing are you referring to here?*

A. A natural forcing is a change in the sun's brightness. The largest human-made forcing is change of the amount of greenhouse gases in the air, gases that absorb heat radiation and make the planet warmer.

Q. *Usually the media seizes on stories with doomsday scenarios. Why do you think it took so long for people to appreciate the danger of climate change?*

A. Well, business-as-usual is doomsday. But the things that need to be done to avoid business as usual have many other benefits... Unfortunately, if special interests prevent us from taking an energy path that does not put all the fossil fuel carbon dioxide into the air, we will get at least part of doomsday. I think that we still have time to avoid that, but just barely.

Q. *Were you surprised at the government's reaction to your findings?*

A. Well, not after my experience with DOE in 1981. They made it very clear that the government did not want to hear results that it did not want to hear.

Q. *There is so much talk about climate change these days. Is the conversation where it should be?*

A. No, far from it. The special interests, with financial interests that they feel would be threatened, have succeeded in muddying the waters so much that the sensible actions, which would solve the problem and have many other benefits, are not being taken. Unfortunately, this is because special interests in Washington have undue sway over politicians. We should have statesmen in Washington—instead we have politicians.

Q. *Did you ever consider leaving NASA to do research somewhere that would be more accepting of your conclusions?*

A. No, NASA is the perfect place, because it has the capability to get much of the most critical data—and a can-do attitude.

Q. *You've estimated that temperatures on Earth will be two to three degrees Celsius warmer at the end of the 21st century than they are now. That may not sound like a serious change to the layman. Can you explain why it is important?*

A. I do not think that global temperature will be two to three degrees Celsius warmer, because if it is, that is doomsday. I believe that it is still possible to wake people up, and we can move on to the world beyond fossil fuels. A warming that large would set us on a path toward sea level tens of meters higher, at least a few meters higher this century, with a continually changing coastline. That would be catastrophic. It would also spell the end for a substantial fraction of species on the planet.

Q. *Do you have specific solutions to reduce greenhouse gas emissions?*

A. The phase-out of coal use over the next 25 years, except where carbon dioxide is captured, by itself would keep carbon dioxide below 425 parts per million, and warming less than one degree Celsius. That's not enough, but it's a large fraction of the solution.

Q. *Can individual actions can make a difference, or is climate change the kind of problem that can be solved only through government action?*

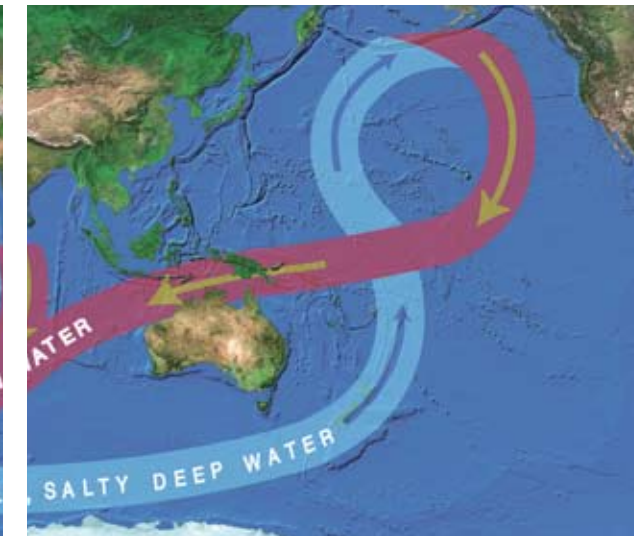
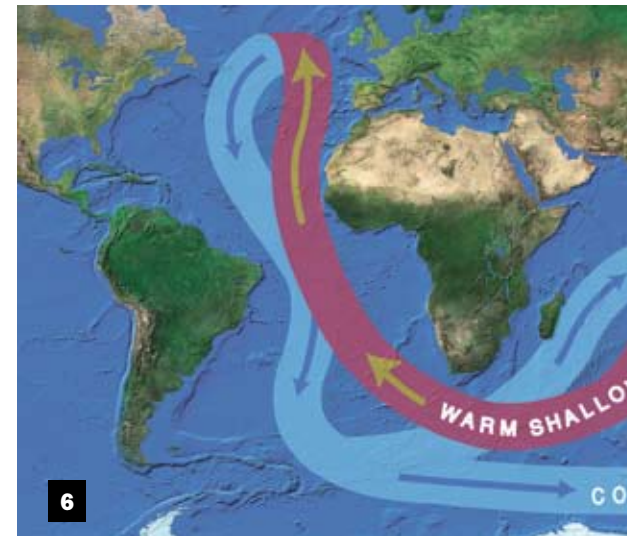
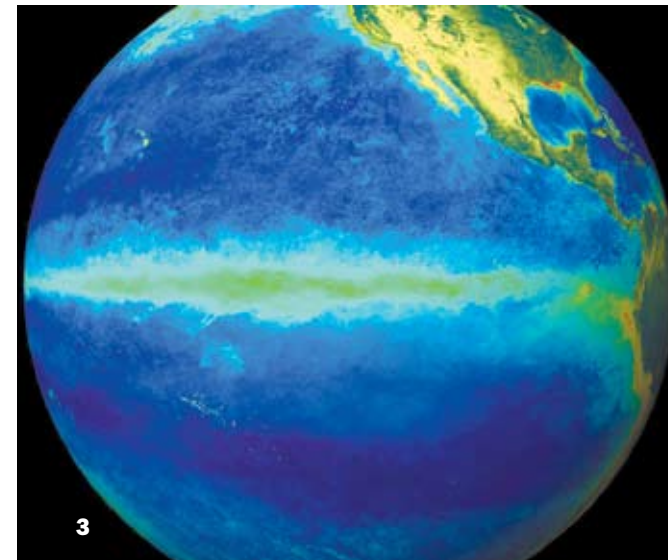
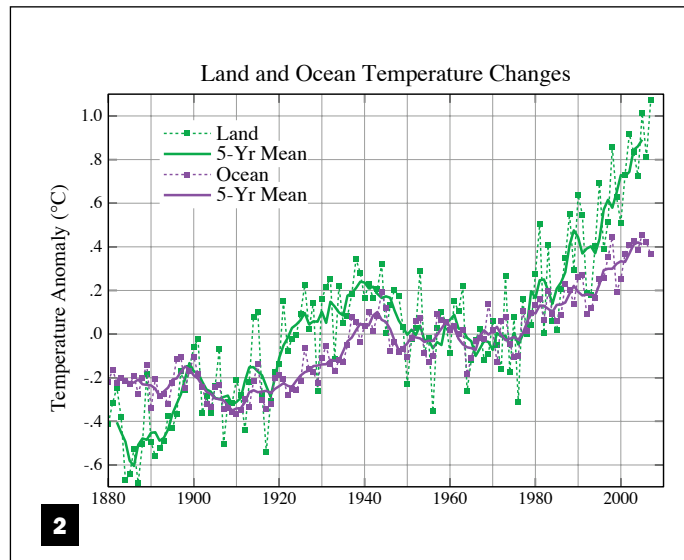
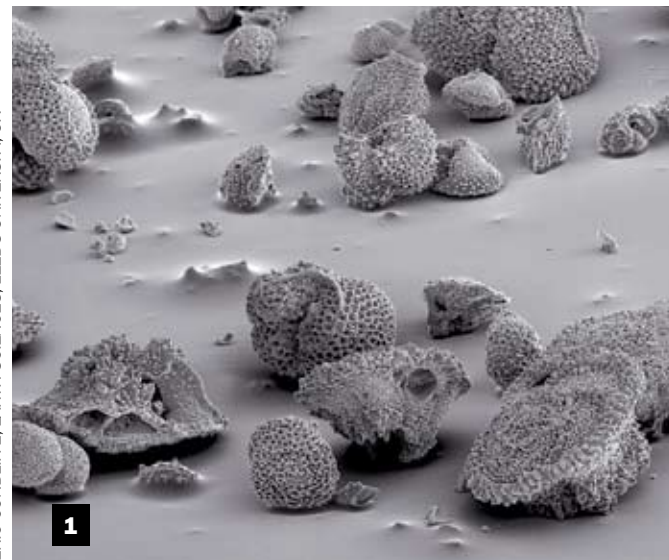
A. By far, the most important requirement is government leadership. What the individual can do is demand that. As long as we let people who are under the heavy thumb of special interests run the country, individual actions are meritorious, but they cannot solve the problem.

BREAKTHROUGHS IN CLIMATE SCIENCE

By Ken Kostel

When they think of climate, many people turn their eyes to the clouds or conjure up images of torrential rain and parched earth, of smokestacks and polar bears. A handful of scientists, especially those who led the way with early breakthroughs in our modern understanding of Earth's climate, turn their thoughts to the bottom of the ocean.

ERIC CONDILIFE, EARTH SCIENCES, LEEDS UNIVERSITY, UK



- 1 Foraminifera skeletons found in sediment cores provide scientists a means to date cores. Photo: Eric Condilife, Earth Sciences, Leeds University, UK
- 2 Annual and five-year running mean temperature changes for the land (green) and ocean (purple). Graph: Courtesy of GISS
- 3 The path of El Niño. Photo: Courtesy of The Earth Institute
- 4,5 Arctic work being done via aircraft surveys by Lamont scientists.
- 6 Broecker's conveyor belt. Photo: Courtesy of The Earth Institute
- 7 Wally Broecker. Photo: Courtesy of The Earth Institute.

THE CORE OF THE ISSUE

In 1947, two years before founding what would later become the Lamont-Doherty Earth Observatory, Columbia geophysicist Maurice "Doc" Ewing set sail for the mid-Atlantic Ridge out in the Atlantic Ocean. Along the way, he and his crew found a flat-topped seamount beneath 1,450 meters of water north of Bermuda and "decided to work it." Using a device known as a Stetson corer, Ewing and the crew brought up a narrow cylinder of muddy ocean sediment. (This first core was an inch and a half in diameter; most samples in the repository now measure two and a half to five inches.) It was the first deep ocean core Ewing ever collected and he immediately recognized the usefulness of sediment cores to his work studying the formation and evolution of the ocean floor. For years afterward scientists on Columbia research vessels had standing orders to collect at least one core a day, wherever they were or whatever they were doing. "A core a day keeps Doc happy," was their mantra. Since Columbia-run vessels stayed at sea virtually year-round (and because just about everyone feared an unhappy Ewing), the University gradually amassed one of the world's most comprehensive archives of rock and sediment samples. The samples, taken from every major world ocean and sea, totalling nearly 45 miles of core.

THE CLIMATIC SEESAW

The cores proved to be a storehouse of data that still provide a window on the Earth's past—and future. The idea that Earth periodically plunged into lengthy ice ages was little more than 100 years old when Ewing gathered his first core. Theories describing these sudden changes were based on terrestrial rock records, which were often incomplete or difficult to interpret. In the hands of Lamont's growing geochemistry group, particularly a young graduate student named Wally Broecker, the ocean sediment cores began to tell their own story. Using new techniques such as radio-carbon dating, developed and refined partly at Lamont-Doherty, Broecker and other Lamont geochemists were able to date the remains of microscopic shelled animals known as foraminifera found in layers of mud back to nearly 50,000 years and determined that the last ice age abruptly ended some 11,000 years ago. The ratio of oxygen isotopes in the shells also pointed to the same conclusion: the earth's temperature seesawed between cold glacial and temperate interglacial periods for hundreds of thousands of years. But the real surprise was that the climate seemed to hover in one state for long periods before shifting precipitously. It was, as Broecker wrote in his 1957 doctoral thesis, as if Earth was capable of just two stable climate states. What mechanism drove such a complete switchover?

IN SEARCH OF A PACEMAKER

Part of the answer came from earlier work by a Serbian mathematician named Milutin Milankovich, who in 1938 published one of the first numerical climate models. It was based on the theory that regular variations in Earth's orbit can affect how much sunlight reaches the planet's surface during the summer, which could explain why polar ice caps advanced and retreated periodically. Milankovich made his calculation of summertime sunlight using 65 degrees north, a latitude at which Lamont scientists later collected cores in the North Atlantic, and they very quickly saw a link between the Milankovich Cycles, as they became known, and ocean temperature. From fossilized coral in Bermuda, Broecker also found evidence of fluctuations in the Earth's sea level that linked closely to the Milankovich Cycles. Later, in 1976, Lamont's John Hays and John Imbrie, together with Nicholas Shackleton of Cambridge University, examined cores from the opposite end of the Atlantic, that reflected 500,000 years of geologic history. They found such a close fit to the Milankovitch Cycles that they described orbital variations as the "pacemaker" of Earth's climate.

THE CONVEYOR BELT

Today, it is understood that a host of planetary systems play a role in stabilizing the climate and contributing to its abrupt changes. Interactions between the oceans and the atmosphere suck carbon dioxide from air near the water's surface, while ocean currents carry dissolved greenhouse gases deep below the surface, where they remain for centuries, and distribute heat around the globe, a system first identified by Broecker as the great "ocean conveyor belt." It also became apparent that transitions between glacial and interglacial periods were anything but smooth. In the early 1990s, a Lamont geologist who spent most of his career on projects in the Rocky Mountains looked at a North Atlantic core and saw something surprisingly familiar—grains of rock stained red by iron oxides. Gerard Bond concluded that grains originating on land must have been carried to sea by armadas of icebergs sweeping into the North Atlantic, as often as every 1,500 years as the climate emerged from the last ice age. These could have pumped enough fresh water into the North Atlantic to disrupt ocean circulation and reverse the planet's warming trend. Such temperamental actions have prompted Broecker to describe the climate system as "an angry beast." Human action, he added, such as increasing carbon dioxide emissions, is tantamount to poking the beast with sticks.

THE ULTIMATE WILDCARD

Even as research sheds light on Earth's past, it also helps predict our climate future. In the mid-1980s, Lamont's Mark Cane and his student Steve Zebiak used a simple mathematical model to predict that the El Niño warming trend in the waters of the eastern tropical Pacific Ocean would occur a year later than originally forecast. El Niño, and its opposite phenomenon La Niña, were known to cause widespread, often violent changes in global weather patterns. Even a few months' warming can help farmers in developing nations decide what and when to plant, or help public health specialists predict when diseases such as malaria might break out. Others at Columbia specialize in looking even further ahead and factoring the ultimate wild card—human activity—into the climate equation. The Goddard Institute for Space Studies in 1992 successfully predicted the magnitude of cooling that gas and ash from the Philippines' Mt. Pinatubo had on the global climate. Modelers there also have shown that the warming potential of increasing carbon dioxide and other greenhouse gases in the atmosphere currently far outweigh the cooling effects of smog and other human emissions. The continued pace of the human factor has caused many scientists to warn of an approaching "tipping point" in Earth's climate—when we may push the system out of equilibrium. If so, future scientists may look at early 21st century sediment cores and wonder why such a severe reversal of climate fortune had to happen at all.



RESEARCH

RAINFOREST NATIONS

By Melanie A. Farmer

What began as a student thesis project is now well on its way to amending the Kyoto Protocol.

When Kevin Conrad was a student in the global Executive MBA program at Columbia Business School, together with three fellow group members, he wrote a thesis on how developing countries could make money from their tropical forests—without cutting them down. Raised in Papua New Guinea, Conrad knew the government there had turned down a \$70 million offer from the World Bank to end logging. The Pacific island nation reaps millions every year from logging its rainforests, and giving that revenue up wouldn't make economic sense, he said.

But Conrad also knew that under the Kyoto Protocol, member countries that exceed their emission quotas are able to buy extra credits from other countries. In his proposal, developing countries could sell carbon credits to larger nations, and use that money to offset money lost if they gave up such activities as logging. The Kyoto Protocol currently does not allow this, but that's what Conrad hopes to change.

"We can't talk seriously about climate change if we ignore the role of deforestation in climate change," says Conrad, citing a widely used statistic that deforestation accounts for 20 percent of all global carbon emissions annually.

Conrad turned to several faculty members for help, particularly his academic advisor, Geoffrey Heal. Heal is the Paul Garrett Professor on Public Policy and Business Responsibility, and his specialty is the costs and benefits of environmental conservation. He is currently looking into the dwindling bee population and the detrimental effect it is having on agriculture. His book *Nature and the Marketplace* discusses the need to modify the Kyoto Protocol and give local carbon credits in order to keep forests intact.

After Conrad's graduation in 2005, he and Heal cofounded the Coalition for Rainforest Nations, an organization composed of developing countries that support and promote their goal of

eliminating deforestation. Conrad, who didn't set out to be an environmentalist, used to be an investment banker with Putnam Investments and Salomon Brothers (now known as Smith Barney). He calls his shift to climate change "quite serendipitous."

Conrad, who knows Prime Minister Sir Michael Somare, said he presented his solution to Papua New Guinea's leader and gained the nation's support. A few months later, he gained Columbia's, too. Based within the business school, the coalition's advisory boards consist of several influential Columbia professors, including Nobel Laureate Joseph Stiglitz, Jeffrey Sachs, director of the Earth Institute, and Don Melnick, professor of ecology, evolution and environmental biology.

At the 2007 United Nations Climate Change Conference held in Bali in December, the coalition received unanimous support for its proposal. The idea is expected to be implemented in 2012 in conjunction with a revised version of the Kyoto Protocol. Papua New Guinea and Costa Rica are considered the founding participant nations but have since been joined by over 30 tropical countries, including Chile, Bolivia, Peru and others.

The concept has been approved, but now comes the hard part: finding alternate revenue to offset deforestation for these developing nations. Heal and Conrad will be working on this part of the proposal. "We need to figure out a way to pay developing countries for the global ecological services of these rainforests," says Conrad. "The international community needs to prove to these developing countries that these new revenue streams will not only sustain them in the short-term but for decades to come."



Geoffrey Heal

DO WE HAVE YOUR ATTENTION NOW?

By Stacy Parker Aab

Global warming has been described as one of the greatest threats to humanity. So why isn't it a high priority for most people?

Elke Weber and her coinvestigators at Columbia University's Center for Research on Environmental Decisions (CRED) are studying this very question as they examine human perceptions of climate change. Weber, the Jerome A. Chazen Professor of International Business and a professor of psychology, researches decision making under risk and uncertainty, exploring what it takes to set off our internal crisis alarm and spur us into action.

The major problem, she says, is that human brains are not wired to immediately react to threats that seem far off. "One of the largest challenges we face with global warming, or saving for our pensions in old age, is the time distance, and the discount rate that we use," says Weber. She defines discount rate as how much less delayed risks or benefits are worth to us compared to immediate ones. Delayed risks fail to set off any alarms, she says, because "our decision-making systems evolved in a time when most risks were immediate."

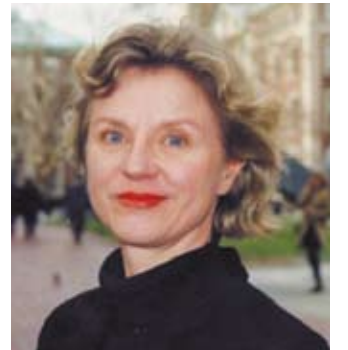
In her 2006 paper "Why Global Warming Doesn't Scare Us (Yet)," published in *Climatic Change*, Weber suggests that the way global warming risk is typically presented—in an abstract and statistical way—fails to elicit feelings of concern. "Emotional reactions really guide our actions," she says. "Engineers, climatologists and technocrats in this world can do all the calculations they want, but when it comes to public reaction, [people] are guided by older brain structures—our reptilian brain."

Weber suggests that leaders who want to shape public opinion should consider ways to make

environmental risk appear more immediate and specific, an approach that is not without risk. "There's something called the 'finite pool of worry,' the notion that we can only deal with so much bad news at a time," says Weber. "Engaging emotional appeals work in the short term because they capture our attention, but then our attention will shift to something else. Using such appeals in a cautious and controlled way is what CRED is trying to contribute to."

CRED was started in 2004, but Weber conducted her first global warming study in the late 1980s in east central Illinois on farmers' reactions to climate change. She was then asked to serve on the advisory committee on Human Dimensions in Global Change for the National Academy of Sciences. From these experiences, Weber realized that her research could illuminate decision-making processes regarding what many consider to be the critical crisis of our time.

Weber is not holding her breath that humanity will band together and tackle global warming any time soon, but she does see positive developments, such as churches in the United States getting involved. "They're reframing the question from an economic one with cost/benefit calculations into a moral and ethical one," she said. "An ethical rule gives the impetus to change one's behavior initially, and then after awhile, the new behavior becomes automatic. What would Jesus drive? Probably not an SUV."



Elke Weber

WATCHING ICE MELT

By Melanie A. Farmer

In fall 2002, Stephanie Pfirman, chair of Barnard's department of environmental science, introduced Exploring the Poles, a course for first-year students in which they read and discuss literature from early 20th-century polar explorations. It was a new way of teaching environmental science, she said, an effort to draw in students who might not otherwise realize their interest in the subject. To boost such interest, Pfirman added an interactive incentive—she sent students on their own simulated expeditions.

The class divides into three teams, each of which must navigate a ship through actual ice conditions for a different year. "Students get competitive," Pfirman said. "It has a game aspect to it, but at the same time, they're learning about decision making and uncertainty."

Dealing with uncertainty, of course, is a big component in any research or teaching having to do with climate change, and it is something Pfirman—who is also an adjunct research scientist at Lamont-Doherty—contends with in her own work.

Pfirman tracks sea ice, following it from where it forms at the edge of the Arctic and studying what happens to it over the years it takes to drift thousands of miles away, typically east of Greenland. Pollution from Russia and the northern hemisphere, for example, can deposit contaminants such as PCBs (polychlorinated biphenyls) and lead in the ice. When it melts, says Pfirman, the contaminants are released into productive fishing grounds.

Pfirman's concern is the vulnerability of the Arctic marginal ice zone, where as much as half the growth of algae in the region can occur within two weeks in spring. "It's just completely loaded with organic matter," she says, "and that forms the base of the food chain that organisms live on for much of the year." A simple shift, from either contamination or climate change, can have a

dramatic impact on the entire ecosystem.

"What is going to happen when you have potentially more industrialization in the north, and more tourism and more ships and traffic?" Pfirman asks.

Pfirman began working in the Arctic in the 1980s as a doctoral student at the Massachusetts Institute of Technology. Given the choice of several locations where she could work on sediment transport in the ocean, she chose the Arctic. While on an expedition there in 1987 she saw sea ice covered in mud. It turned out that the mud was traveling down from Siberia, getting trapped and frozen in the ice and releasing sediments once it melted.

In addition to running Barnard's environmental science department, Pfirman served as the first chair of the National Science Foundation's Advisory Committee for Environmental Research and Education, and oversaw an NSF 10-year outlook for environmental research and education, released in 2003.

Now that there's so much more knowledge about climate change and its effects, Pfirman says it is more important than ever to get local communities involved. "For the first time we actually have a pretty good prediction of how things may play out," she says. "What that means is that people now have the knowledge but also have the responsibility to do something about it."



Stephanie Pfirman



SUSTAINABLE CITY: STUDYING NEW YORK'S CLIMATE FUTURE

By Candace Taylor

Columbia scientists have studied thousands of ecosystems worldwide as they assess the effects of global warming, but some of their most comprehensive work takes place far from polar ice caps or tropical rain forests.

New York City, it turns out, is an ideal place to examine the challenges cities face as temperatures climb across the globe. Part of a comprehensive 2001 national study on climate change—the first of its kind—the Metropolitan East Coast Regional Assessment (MEC) reported that the average temperature in the New York region had risen 2 degrees Fahrenheit



JASON LAMBERT

Skyline of Lower Manhattan, as seen from the top of the Brooklyn Bridge.

since 1900 due to greenhouse gases, and may climb by as much as 10 degrees by 2080, while the number of 90-degree-plus days a year increases from 14 to as many as 89. Sea levels will rise between two and three feet in the next century, the report predicted, while floods, droughts and intense hurricanes and Nor'Easters become more frequent.

Much of the city's infrastructure—already vulnerable to storm surges—will be threatened by rising seas and the accompanying climate variability, said MEC contributor Vivien Gornitz, a geologist and special research scientist with the NASA Goddard Institute for Space Studies and Columbia's Center for Climate Systems Research. Flood levels occurring every 100 years could come as often as every four years by 2080, the MEC report predicted, and Gornitz said she wishes developers in Coney Island, Brighton Beach and Lower Manhattan would pay heed. "There's a tremendous amount of development in a high-risk zone," she said.

Recently, researchers from Columbia have shared their expertise to help develop PlanNYC 2030, the city's blueprint for sustainability over the next two decades, including a stated goal of reducing global warming emissions 30 percent by 2017. In 2006, Mayor Bloomberg announced the creation of a partnership with the Earth Institute, in which Columbia's experts

provide the city with research and advice on environmental and climate change-related issues and ensure that the city's policies are based on up-to-date research.

Columbia faculty Cynthia Rosenzweig, Vivien Gornitz and others have made valuable contributions and "continue to be an asset to our office as we implement the plan," said Rohit T. Aggarwala, the city's director of long-term planning and sustainability, who himself holds four Columbia degrees—B.A., M.A., MBA, and a doctorate in history.

PlaNYC "puts New York City in the leadership of American cities," on this issue said Earth Institute Executive Director Steve Cohen.

Since many scientists believe global warming can be mitigated but not stopped, much of Columbia's post-MEC research is focused on adaptations to climate change. Klaus Jacob, a special research scientist at Columbia's Lamont-Doherty Earth Observatory, for example, is creating a 3-D map of the New York City subway system showing areas that are vulnerable to flooding, starting with Lower Manhattan below Canal Street—one of the city's lowest-lying neighborhoods.

In even the mildest type of hurricane, he said, "segments of all subway lines in the area below Canal Street will be flooded." As sea levels rise, flood risks will increase, said Jacob, who is currently writing grant proposals to expand the subway study and begin to determine ways to fix the system.

Green roofs are another climate change adaptation Columbia is helping to pioneer. In November, the University installed seedlings of the hardy plant sedum spurium on the roofs of buildings on 118th Street and 115th Street, and researchers will soon begin collecting data to measure their effect on local temperature and air quality, said Stuart Gaffin, a research scientist at the Center for Climate Systems Research.

Replacing heat-absorbing roofs with plants may decrease what is known as the "urban heat island" effect—the tendency for cities to be warmer than the surrounding suburbs.

The green roofs also are expected to reduce runoff, said Gaffin. That's good news for

"PlaNYC puts New York City in the leadership of American cities."

Gregory O'Mullan, an environmental microbiologist at Lamont-Doherty who studies the Hudson River. Runoff caused by even a small amount of rainfall—just over 1/10 of an inch—currently exceeds the capacity of the city's storm water drains, O'Mullan said, bringing untreated sewage into the city's waterways. The corresponding oxygen depletion—which will grow worse as water temperatures rise—kills wildlife, creates a fertile environment for pathogens and releases methane, a greenhouse gas.

Increasing the city's sewer capacity, O'Mullan said, is an expensive but necessary proposition.

"We can't be satisfied that the average condition looks OK," O'Mullan said. "We have to manage so we can respond to those extreme events."

COLUMBIA PEOPLE

Margaret Turrin

WHO SHE IS: Education Coordinator, Marine Geology and Geophysics Division at Lamont-Doherty Earth Observatory

YEARS AT COLUMBIA: 10 years

WHAT SHE DOES: Turrin works with faculty members connecting active science research to high school and middle school groups, community groups and the general public. Topics vary from polar science to Hudson River education to the environmental impacts of land use decisions. She also coordinates the activities such as the upcoming New York City International Polar Weekend (co-hosted by Lamont-Doherty) and works with teachers on science workshops and classroom visits.

A GOOD DAY ON THE JOB: Spending a day in field education or conducting training programs. Turrin's work with River Summer, a field course that explores the Hudson Watershed, is a highlight because "it uses a research vessel as a platform so we live and work from the boat ... and it can't get any better than that."

WHAT BROUGHT YOU TO COLUMBIA: Turrin moved from northern California 10 years ago, and has worked at Lamont-Doherty ever since. She attributes her love for field

work to her husband, a geologist, who introduced her to it in the early days of his own career.

BEST PART OF THE JOB: Working with teachers and students. "Teacher training is always fun. They are a great audience because they are already invested in learning about the subject ... and they always have something from their own experiences to add to the day so we all come away with something new to share."

MOST MEMORABLE MOMENT: Turrin can't narrow it to just one. "What I do have is memories of many amazing people I have met through organizing international and national workshops."

IN HER SPARE TIME: Turrin enjoys combining her volunteer work with fun outdoor activities such as taking hiking trips while mapping invasive plants or kayaking while also mapping submerged vegetation in the Hudson. Her growing interest in native plants has led her to cultivating a garden of her own, which she loves to tend to in her spare time.

—By Melanie A. Farmer





RESEARCH INSTITUTE HELPS RED CROSS FORECAST CLIMATE DISASTERS

By Francesco Fiordella

In early 2000, record rainfalls caused the worst flooding in 50 years in Mozambique. The deluge killed 700 people and forced half a million—27 percent of the country's population—to flee their homes.

The International Federation of Red Cross and Red Crescent Societies (IFRC), the world's largest humanitarian organization, responded in force, mobilizing thousands of volunteers to distribute supplies, administer first aid and help with rebuilding efforts.

And yet much of the damage and destruction could have been avoided if the organization had had the ability to gauge the severity of the storms and predict where the hardest hit areas would be, says Peter Rees, who runs the IFRC's operations support division.

Starting this year, Rees is hoping to be able to do just that, with help from the International Research Institute for Climate and Society, a division of Columbia's Earth Institute (IRI). By utilizing forecasts and climate and socioeconomic data, the IRI helps societies better respond to climate-related problems like floods, droughts and infectious diseases such as malaria.

"The gap we had in our process was in converting weather data into 'disaster potential,'" says Rees. The IRI can provide exactly this kind of expertise, and it is sorely needed, he says, because, according to a recent IFRC report, the number of weather-related disasters that occur each year has doubled since the early 1990s. Along with climate change, there have been changes in land use and population patterns, which means more people will be living in vulnerable locations.

Effective response to these disasters depends on knowing when and where to send aid. Since time and resources are

limited, determining which areas are likely to be hit first or hardest can mean the difference between life and death, money wasted or well-spent.

"The International Federation's methodology relied on an overwhelming collection of information from disparate sources, often without the benefit of expert interpretation," says IRI Director-General Stephen E. Zebiak. "Too much information can sometimes be an obstacle to quick, intelligent decision making."

"So we are going to provide a user-friendly way for them to assess risks more efficiently and effectively, by providing just the right amount and type of information needed to make operational decisions," says Zebiak.

For example, he says, IFRC managers will be able to look at a map of Southern Africa and not only get the weather forecast for the coming week but be able to put it in context. They'll be able to answer questions such as "Is the amount of rain predicted abnormal for this time of year? Is the ground already saturated from previous rains? Where are the largest concentrations of people? Which areas have the poorest infrastructure or lack adequate services such as hospitals, clinics and shelters?"

Some of the population and demographic data will come from the Center for International Earth Science Information Network, also part of the Earth Institute.

Rees believes the new tools will lead to a significant change in IFRC's operating model. "Today, we're an organization that primarily responds to disasters. Tomorrow, we'll hopefully be one that takes early action to mitigate destruction and suffering."



B. BANNON/UNHCR
CHRISTOPHER BLACK/IFRC

Top: Tens of thousands of Kenyans fled their villages after downpours caused intense flooding in 2006

Bottom: A community near Caia was slowly flooded by the rising Zambezi river, Mozambique.

VARYING DEGREES: COLUMBIA'S MANY PATHS OF STUDY

By Stacy Parker Aab

With degrees ranging from B.A.'s in Earth science to MPAs in environmental policy, Columbia University is training the next generation of scientists, advocates and policymakers who will take up the fight for an environmentally sustainable future.

Under the aegis of the Earth Institute, Columbia boasts one of the largest collections of environmental programs in the world, with 24 academic programs for undergraduate, graduate and post-graduate study.

"The work we're doing here is path-breaking," says Steven Cohen, director of the Master of Public Administration Program in Environmental Science and Policy at the School of International and Public Affairs and executive director of the Earth Institute at Columbia University. "We need people that are comfortable moving from science to politics to law to management and can essentially be the translators between those experts in all different fields. Our goal is to train the translators."

As issues of climate change, fossil-fuel dependence and sustainable development push to the top of policy agendas worldwide, Columbia students feel the time has come to specialize in these fields. "There is a need for professionals with deep science, policy and private-sector experience to design solutions to these problems," says Jonathan Battaglia, MPA candidate in environmental science and policy. He adds, "I didn't want to do an MBA, because I am interested in public sector issues. I believe there is important work to be done by

government, particularly in the environmental arena. [These issues] affect security, diplomacy and economic relationships between countries."

"Every generation has a monumental event that shapes its collective identity," says Andrew Miller, another MPA candidate in environmental science and policy. "This is my generation's moon-landing project." His "life goal," he added, is to help effect "the transition to renewable energy sources with sound policies and inspirational leadership and by bridging the gap between science and decision making."

Undergraduate environmental science major Hannah Lee (SEAS'09) has already played on the world stage of environmental policymaking, having recently returned from Bali, Indonesia,

where she served as one of 21 student delegates representing the United States at the UN Conference on Climate Change. As a delegate, Lee attended numerous Conference meetings and events, and plans to share what she learned with her fellow students. For those who may be considering careers in environmental science, Lee notes that just in the past two years, opportunities have blossomed in the field, and that

more people understand the urgency and breadth of these studies. "[Before] when I spoke of climate change, I especially recall people relating the topic to recycling options, garbage collections, the ozone, and even ranger services. Now, people do ask about those things, but in addition, ask about alternative energies, oil, water scarcity, droughts, and biodiversity."

"This is my generation's moon-landing project."

FOR MORE INFORMATION

The Earth Institute: www.earth.columbia.edu/

Lamont-Doherty Earth Observatory: www.ldeo.columbia.edu/

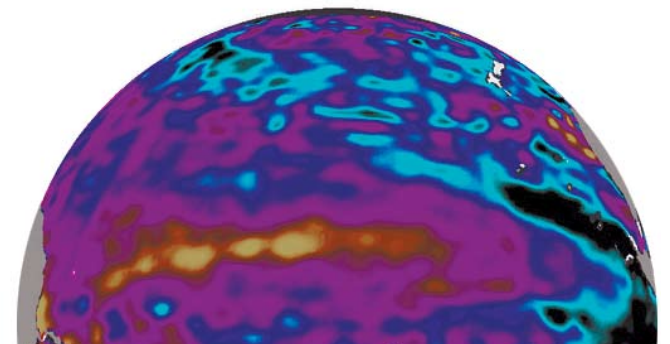
International Research Institute for Climate and Society: www.iri.columbia.edu

Center for Environmental Research and Conservation: www.cerc.columbia.edu/

Columbia University's Office of Environmental Stewardship: www.columbia.edu/cu/environment/

Next Generation Earth: www.nextgenerationearth.org/

From Columbia News: "2007 Was Earth's Second Warmest Year in a Century" www.columbia.edu/cu/news/08/01/giss.html



SENATE HEARS REPORTS

By Tom Matheuson



The University Senate heard from non-Senate committees overseeing policies on student sexual assault and socially responsible investing at its Dec. 13 meeting, as well as from a Senate leader, Paul Duby (Ten., SEAS), about current problems with effort reporting—Columbia's obligation to account to the federal government for the time its scientists allocate to their research grants.

Maura Bairley, who directs the Office of Sexual Violence Prevention and Response, gave the first report of the Presidential Advisory Committee on Sexual Assault, which the Senate created in 2006 and charged to report annually. Bairley focused on the challenge facing all campus efforts against sexual assault—the large gap between its actual frequency, as documented in national surveys and anecdotally, and the number of official incident reports. At Columbia, according to the latest National College Health Assessment survey, 3.1 percent of undergraduates (more than 150) experienced attempted sexual penetration against their will, whereas only five such incidents were reported under the federal Clery Act. Bairley outlined measures to reduce the gap, emphasizing prevention. She said five cases went to the Columbia disciplinary procedure last year, with four adjudications and two findings of policy violations.

Prof. Geoffrey Heal reviewed shareholder resolutions and special issues recently addressed by the Advisory Committee on Socially Responsible Investing. He said the trustees have accepted 97 percent of the ACSRI's recommendations on proxy votes since its creation in 2000, as well as a special proposal in 2006 to divest the stocks of companies with operations in the Sudan. Last year the committee chose the alternate path of engagement, dealing at length with Chevron over longstanding litigation about oil spills off the coast of Ecuador—"with little visible result," Heal said. This year the focus may be on Chevron's operations in Burma.

Executive Committee co-chair Paul Duby, speaking for himself, criticized the administration's campaign to require certification of effort reporting on all Columbia grants by January 15. He said the required on-line "course" on effort reporting was unduly alarming, with explicit warnings of criminal penalties for false statements, and confusing, with as much space devoted to frequently asked questions as to explanations. Duby also noted two unsolved puzzles: one is that 100 percent of research officers' time is allocated to grants, making it impossible to include any of the University tasks many of them perform; another is the difficulty of adjusting faculty effort: if a professor's time is divided 80-20 between grants and University duties, any additional University efforts will require a fourfold increase in grant effort to maintain the ratio. "Communication with faculty in this case was not what it ought to be," Duby said, adding that EVP for Research David Hirsh had declined to attend the present plenary but would meet with a small Senate group the following week.

In other business the Senate established the Institute on Religion, Culture and Public Life.

The Senate meets next on Friday, February 1. Anyone with a CUID is welcome. Most Senate documents are available at www.columbia.edu/cu/senate.

The above was submitted by Tom Matheuson, manager of the University Senate. His column is editorially independent of The Record. For more information about the Senate, go to www.columbia.edu/cu/senate.

RESEARCH

Emotional Intelligence for Smarties—Can Sensitivity Be Programmed?

By Robert E. Calem

Computers may be smart enough to beat the world's greatest chess player, but sometimes, most users would agree, they can seem awfully dumb.

One way to make them smarter—or at least more like us—may be to program them with emotional intelligence (EI), the skills that let a person recognize and respond appropriately to another's emotion.

That was the topic of "Technology with Emotional Intelligence," a talk presented on the Morningside campus last month by Rosalind W. Picard, the latest speaker in the Distinguished Lecture Series presented by the department of computer science.

Picard is founder and director of the Affective Computing Research Group at the Massachusetts Institute of Technology's Media Lab and codirector of the lab's Things That Think consortium of 35 companies.

With an eye toward commercial applications, Media Lab is working to instill EI in, for example, a PC used as a retail kiosk. But the group also envisions health sciences applications for technology with EI, such as using PCs to help autistic children.

As an example of a PC application lacking EI, Picard mentioned Microsoft's Clippy, the notorious cartoon paperclip that popped up on screen to help Microsoft Office users—but annoyed so many that the company ultimately discarded it.

Because the program did not recognize emotions, she explained, Clippy never got that it was annoying. Even after being dismissed with a click of the mouse, it would respond inappropriately by doing a "happy little dance" before disappearing from the screen, she said.

Today, sponsored by leading technology firms such as Hewlett-Packard, Picard and her team are working toward PCs and other gadgets that can recognize and respond when a user is agitated, confused or concentrating.

"The hard part is not how to make it express, but when to

make it express, and controlling that flow," Picard said.

While it is impossible for a machine to know exactly what a person is feeling, it is possible for it to observe changes in a person's behavior, expressions or physical attributes, and then to draw reasonable conclusions.

By adding pressure sensors to mice, for instance, Picard's team has shown that agitated or frustrated computer users squeeze the devices more tightly. And with the aid of a video camera, Media Lab scientists have developed special software that interprets users' head movements and facial expressions in real time.

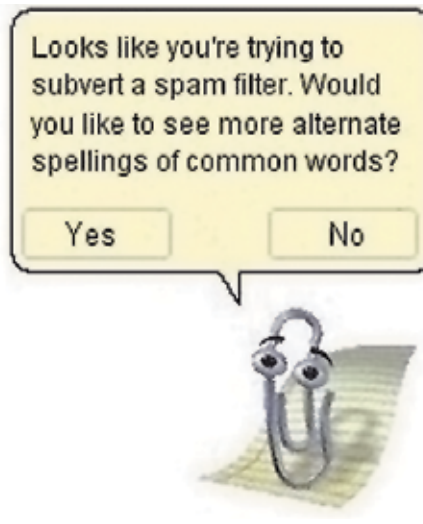
One result of their efforts: the world's first "articulated" home office computer that mirrors the user's posture (its display, mounted on hinges, is movable). The screen holds still while the user sits upright and concentrates, but when it detects bad posture, it shifts slightly to encourage the user to straighten up.

Since autistic people often have difficulty recognizing and predicting emotional expression in face-to-face interactions, EI-empowered technologies could help them overcome this disability, Picard explained.

Still, she warned, "Do not get the idea that computers are better at this than people."

She noted that a computer could mistake something as simple as needing to use the bathroom for frustration.

"Biological signals sometimes up your stress by getting your attention until you deal with them," she said.



Clippy never got that it was annoying.

A video of this and other lectures in the Distinguished Lecture Series is available online at: www.cs.columbia.edu/resources/video/2007/fall.

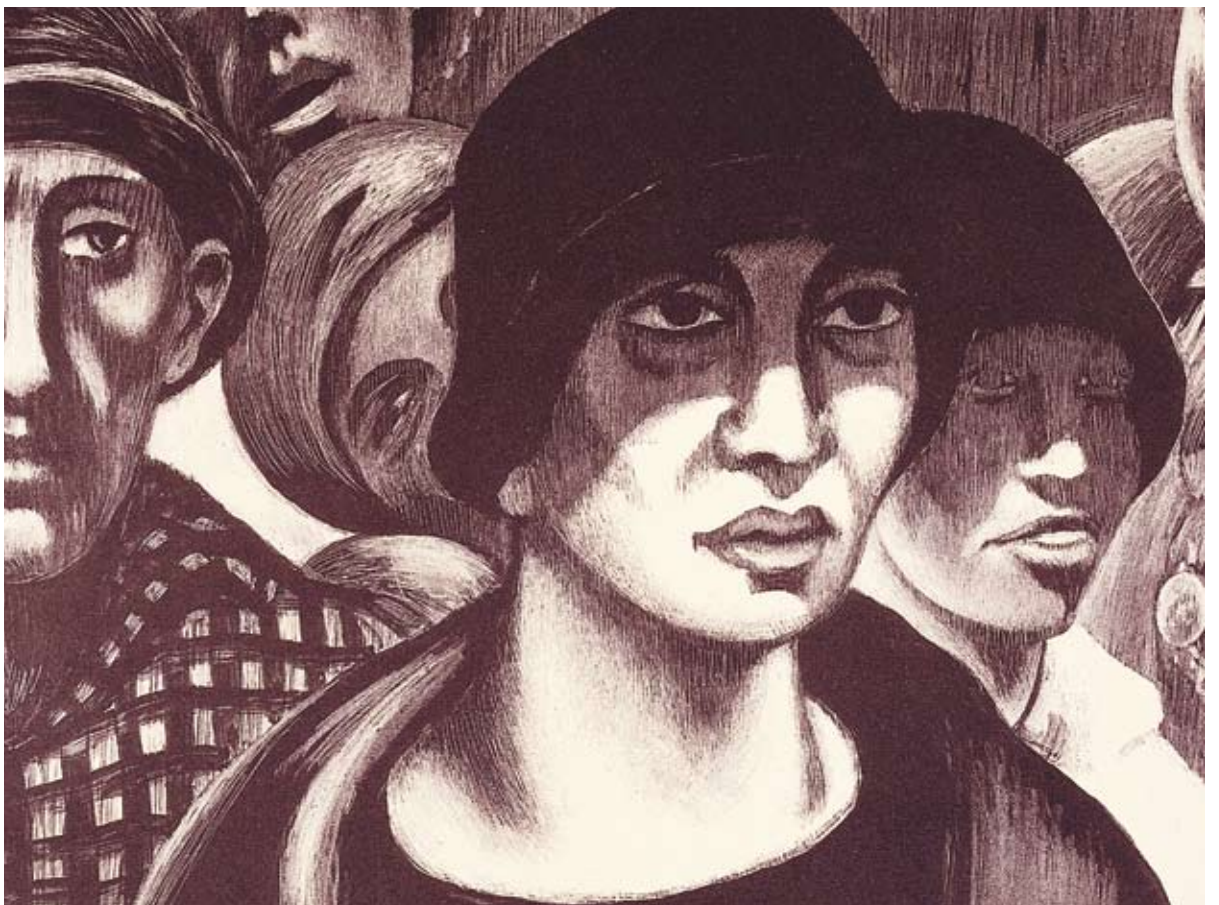
More information about emotional intelligence can be found at: www.answers.com/emotional+intelligence?cat=health.

ON EXHIBIT: WOMEN ARTISTS AND PRINTMAKING

Paths to the Press: Printmaking and American Women Artists, 1910-1960 is the first major exhibition to survey the contributions of women artists to American printmaking during the first half of the 20th century. The exhibition, at the Wallach Art Gallery on the 8th floor of Schermerhorn Hall, includes 100 works in a variety of print media by 80 artists, including Mary Cassatt, Louise Nevelson and Elizabeth Catlett, and runs from Jan. 23 to March 8. It has been organized by the Marianna Kistler Beach Museum of Art at Kansas State University, with support from Belverd and Marian Needles. Gallery hours are Wednesday through Saturday, 1:00 p.m. to 5:00 p.m. For further information, please call (212) 854-2877.

—By Record Staff

Mabel Dwight (1875-1955)
In the Crowd, ca. 1931
 Lithograph on cream wove paper; 235 x 297 mm
 Collection of Belverd and Marian Needles





DAVID WENTWORTH

MAKING SENSE OF SCIENCE

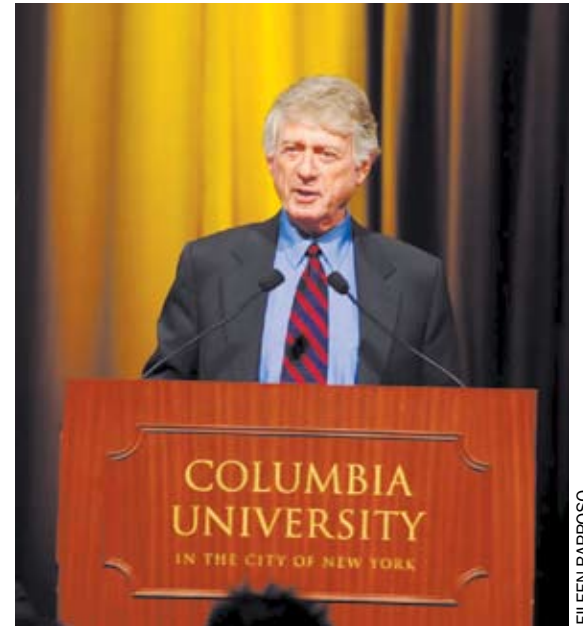
Children from The School at Columbia University, Columbia Secondary School and the Double Discovery Center witnessed explosions and demonstrations involving messy chemicals and strange odors at the first-ever "A Chemistry Feast for the Senses," an introduction to the world of chemistry. Nearly 300 kids and adults enjoyed demonstrations by Columbia chemists and participated in hands-on activities, like one that involved creating molecules from gum drops and toothpicks (pictured below). Cosponsors Columbia Science Connection, The School and Columbia Nanocenter hope this will turn into an annual event for kids and their families. At left: Columbia chemist **Tudor Spataru** burns the amount of energy (in the form of melted sugar) in a single gummy bear; Bottom left: Attendees react to the bright light and fog produced by a chemical reaction involving dry ice.



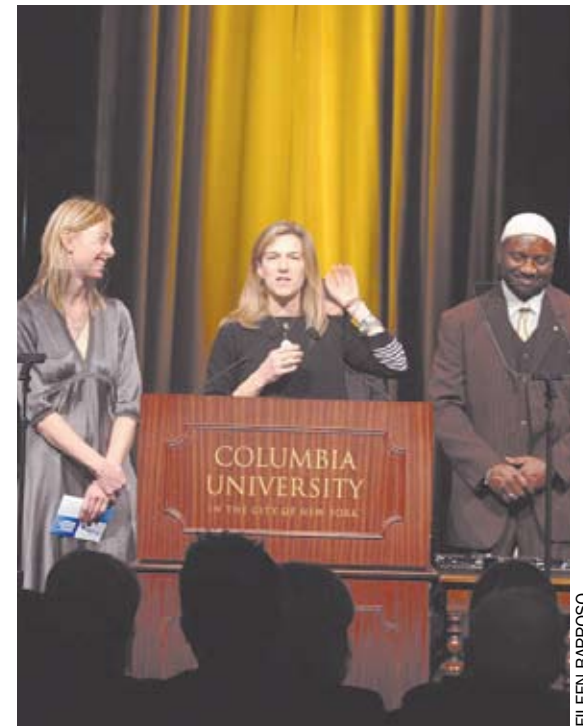
DAVID WENTWORTH



DAVID WENTWORTH



EILEEN BARROSO



EILEEN BARROSO



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COLUMBIA, NEW YORK SUPPORT SMALL BIZ

Small business owners gathered Jan. 10 for the official launch of a new mentoring program designed just for them. The one-year pilot program, a joint effort between Columbia and the New York City Department of Small Business Services (SBS), gives minority, women-owned and local businesses a chance to build capacity and earn contracting opportunities with Columbia. Twenty-two businesses will take a series of courses to learn about managing a full project, and upon completion, the University will designate a series of its own projects for which the participants will bid. Pictured from left to right: Small business participants **William Parrish** of Noble Strategy; **Bernadette Jeronimo** of JCF Electric; and **Jill Youngerman** of Noble Marketing Associates.

THE BEST IN BROADCAST

Darryl Hunt (directly above), the subject of HBO's *The Trials of Darryl Hunt*, stands alongside award-winning producers **Annie Sundberg** and **Ricki Stern** at the Jan. 16 Alfred I. duPont-Columbia Awards Ceremony. *The Trials of Darryl Hunt*, about Hunt's wrongful conviction and his 20-year imprisonment, was one of 13 winning programs recognized for outstanding broadcast journalism at the annual awards ceremony hosted this year by **Ted Koppel** (top photo). Koppel, former ABC News anchor, has received 12 duPont-Columbia Awards in his career. Recipients of the duPonts, administered by the Columbia's Graduate School of Journalism, receive silver batons designed by the late American architect Louis I. Kahn.

Manhattanville

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of both intellectual leadership and economic opportunity for a diversity of citizens. Columbia has significantly less space than its Ivy League peer institutions, many of which have their own extensive expansion plans in the decades ahead.

Over the next quarter century, Columbia plans to build 16 to 18 buildings, as part of an open campus with public green space, retail shops, restaurants and streetscapes designed to forge welcoming pedestrian links to the new Hudson River waterfront park. The Renzo Piano Building Workshop (RPBW), headed by the architect who designed the new headquarters of the *New York Times* and the acclaimed recent addition to the Morgan Library, is designing the first four buildings of the mixed-use community. The architect of record is local firm Davis Brody Bond Aedas who will be supported by Harlem architectural firm Body Lawson Associates. Skidmore, Owings & Merrill, who partnered with RPBW on the entire urban design effort, will continue to provide guidance and advice to Columbia.

An integral part of the agreement includes Columbia's "green building" commitment. The University has committed to using sustainable



WHAT ARE YOU LOOKING AT?

Hint: This bird did not fly south for the winter. Where is this bird's perch? Send answers to curecord@columbia.edu. First to e-mail the right answer wins a *Record* mug.

ANSWER TO LAST CHALLENGE: Subway tile art displayed at the 116th St./Broadway subway station.

Winner: Thomas Gaydos, visitor to campus.

design to meet the Leadership in Engineering and Environmental Design (LEED) Silver standards that include criteria for materials, energy and water efficiency, and indoor environmental quality for academic buildings and university housing. Columbia's master plan has been selected as a national pilot for its environmentally sustainable urban design incorporating open access to the public, mixed uses and green spaces. The University is also working in partnership with the organization Environmental Defense to develop a model approach to reducing emissions during construction of the new facilities, which will be especially important because of the high asthma rates in the neighborhood.

In addition, Columbia would place heating, cooling, truck delivery, parking and other services underground to ensure pedestrian-friendly and environmentally appealing streets and public spaces.

The first phase of construction will include new homes for Columbia Business School, School of the Arts, School of International and Public Affairs, and the Jerome L. Greene Science Center for the interdisciplinary Mind, Brain and Behavior Initiative, as well as a permanent site for the public Columbia Secondary School for Math, Science & Engineering.