The Earth Institute
AT COLUMBIA UNIVERSITY

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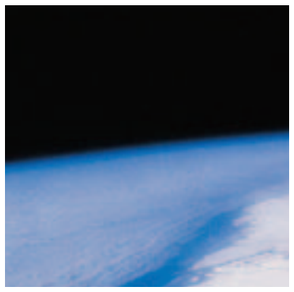
ANNUAL DONOR REPORT 2008

The Earth Institute at Columbia University

The Earth Institute at Columbia University is leading the way to a sustainable Earth by mobilizing the sciences, education and public policy. Research in our 32 centers and programs transcends traditional disciplines to address many of the world's challenges—from climate change to global water scarcity, from public health to natural disasters. Our academic programs are shaping a new generation of leaders.



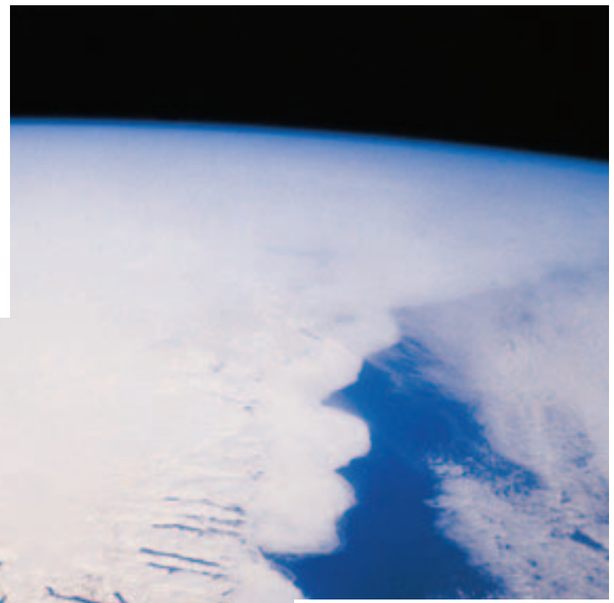


Photo: David Wentworth

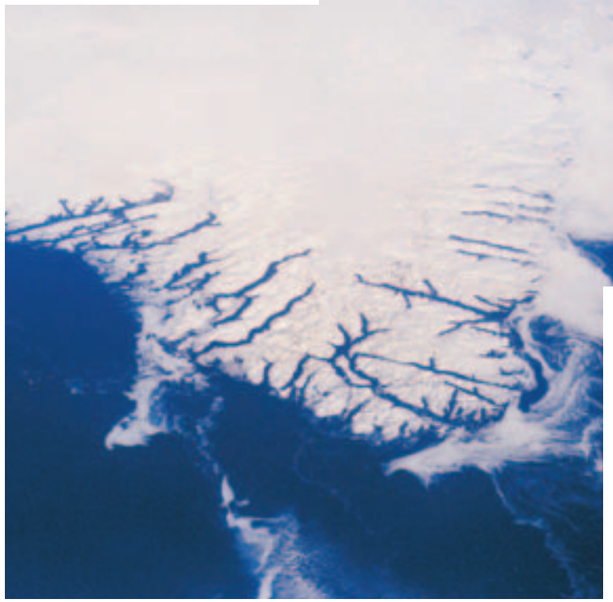
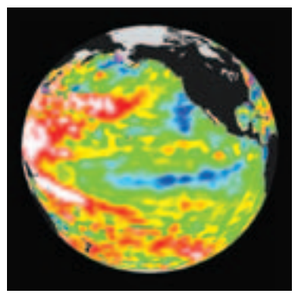


Photo: Peter Freed



FROM THE PRESIDENT OF COLUMBIA UNIVERSITY

The Earth Institute is constantly developing strategies and projects that channel innovative research into specific programs ready for implementation.

Photo: Eileen Barroso

As much as we cherish the contemplative spaces of our university, we also have profound respect for those in our community who translate knowledge derived here into instruments for improving life around the world. It was precisely the sense of urgency in identifying and formulating solutions to global crises that served as the impetus for the creation of the Earth Institute at Columbia University.

Any sustained effort by Columbia's scientific community to address these issues would not be possible, however, without the support and commitment of those who share a sense of responsibility for the daunting problems confronting our planet. During the past year, the work of the Earth Institute has been advanced through the incredible generosity of foundations and individual donors such as the Bill & Melinda Gates Foundation, Gerry Lenfest, and the Institute's professors, students and fellows.

Since its inception, the Earth Institute has helped galvanize Columbia's broader mission to shape the impact of globalization on our planet. By fostering intense dialogue between scientists from multiple disciplines, it has also expanded opportunities to innovate and then implement robust solutions to two of the most pressing problems of our time: global climate change and acute poverty. In an ever-more interdependent world community, we are confronted with a moral and ethical responsibility to mitigate—and one day erase—the severe poverty, disease and environmental degradation that threaten so many societies.

The Earth Institute is constantly developing strategies and projects that channel innovative research into specific programs ready for implementation. Among other issues, this year the Earth Institute examined climate change, increasing water scarcity, and how these changes affect local economies, health issues, agriculture and water sustainability around the world. Some of the phenomena investigated have included the melting of glaciers; the influence of climate change on the oceans, their currents, and air-sea exchange; changing patterns of drought and flooding and their impact on agriculture; the spread of disease; and improving methods of water sustainability and management.

The need for continued progress is stronger than ever at this urgent moment for our planet, and your support of the Earth Institute at Columbia University has a direct and meaningful impact. Under Jeffrey Sachs' strong leadership, the Earth Institute will, with the help of donors, partners, and friends, remain at the vanguard of this monumental challenge.

Sincerely,

Lee C. Bollinger

FROM THE DIRECTOR OF THE EARTH INSTITUTE

As our exciting work continues to move forward in the area of sustainable development, we remain committed to solving the world's most pressing needs.

The defining challenge of the 21st century will be to understand that we all share a common fate on a crowded planet. There are currently 6.7 billion people living in an interconnected global economy, producing an astounding $65 trillion of output each year. Continuing on our current course, the world is likely to experience growing conflicts, intensifying environmental catastrophes, and downturns in living standards caused by interlocking crises of energy, water, food and violent conflict.

In the past 20 years world leaders have achieved some important successes, confronting these great challenges with considerable public support, which can provide a foothold for a sustainable future. We have adopted a global treaty for climate change, pledged to protect biodiversity, and committed globally to fighting the encroachment of deserts in today's conflict-ridden drylands of Africa, the Middle East and Asia. And the world has adopted the Millennium Development Goals to cut extreme poverty, hunger and disease by 2015. The challenge is to turn those fragile and unfulfilled global commitments into real solutions.

This year, among the many challenges the Earth Institute worked to solve were scarcity of fresh water and climate change. The PepsiCo Foundation supported our work on water sustainability in four countries, and a project funded by the JM Eagle Corporation enabled our team of water specialists to plan and install a piped water system that will enhance distribution of fresh water in our Millennium Village site in Potou, Senegal. Thanks to a generous gift from the Comer Science and Education Foundation, we were able to build the Gary C. Comer Geochemistry Building, which provided us with a new home for our state-of-the-art work in earth science.

The heroic labors of scientists such as climate expert Wallace Broecker illuminate the risks and repercussions of the vast consumption of fossil fuels the world now faces as well as the choices our global society must make in order to ensure the well-being of future generations.

The Earth Institute is training the next generation of thought and practice leaders who will help guide our fate and our understanding of how we live in the 21st century, with all the stresses and strains it presents.

As our exciting work continues to move forward in the area of sustainable development, we remain committed to solving the world's most pressing needs. The immense generosity, leadership and vision of our donors allow us to remain the world's leading academic center confronting the practical challenges of sustainable development.

Sincerely,

Jeffrey D. Sachs

Photo: Bruce Gilbert

Photo: Gary C. Comer

Climate Change: A Call to Action

There is no longer doubt that climate change is happening and that human activity is a primary cause. The need to take action is real.

For nearly six decades, Columbia University has played a leading role in understanding our planet's climate system. We stand now at the cutting edge of research to understand how human activity is affecting the planet's physical systems, and how we can act to reduce emissions of carbon dioxide, the main driver of human-induced climate change, before it is too late. The more we can understand our changing world, the more we can hope to design solutions for protecting the planet and humankind, particularly the most vulnerable.

In addition to performing ground-breaking research, the Earth Institute at Columbia University is committed to finding and communicating solutions to climate change and its effects. We are training a new generation of scientists and professionals who can make a difference in the world.

WARMING CLIMATE, VANISHING ICE

The geological canaries of climate change, glaciers and polar ice are showing distinct signs of decline. As global temperatures warm, the earth's ice is beginning to melt—in some places, far faster than models predicted just a few years ago—and sea levels are rising. The world has seen ice retreats and dramatic turns in climate before, but never as the result of human activity.

To better understand what is happening, our scientists are hunting for clues in the "climate archives" of the past and studying the behavior of modern-day ice sheets.

Ice Age Mysteries with Modern-Day Relevance

"Ongoing climate change doesn't tell us much by itself," says Joerg Schaefer, a geochemist at the **Lamont-Doherty Earth Observatory**. "But putting it in the context of historical change allows us to evaluate the changes properly." Reading the climate clues of the past helps us better understand present change and create more accurate models of future climate scenarios.

On the surfaces of rocks in Manhattan's Central Park, Schaefer and his team found clues to an Ice Age mystery—the retreat of the Laurentide ice sheet, which at its fullest extent about 20,000 years ago stretched from Greenland over Canada all the way south to New York City. Armed with a new tool called cosmogenic dating, the team was able to time the glacier's retreat with greater precision than would have previously been possible.

What has driven ice ages? How significant is the glacial retreat today? The collapse of land ice has dramatic implications for supplies of global drinking water and sea level rise and may speed up abruptly in response to slight climate shifts. Schaefer and others, including postdoctoral researcher Mike Kaplan, students and laboratory technicians, are addressing these questions through glacial studies on several continents.

Above right: Researcher Robin Bell filming a moulin, a hole through which surface water enters a glacier. *Far right:* Climate expert James Hansen speaking to a congressional global warming committee.

Photo: Ed Stockland

Restless Ice

Bound within the land-based ice sheets of Greenland and West Antarctica is enough water to raise global sea levels by 14 meters. There are worrisome indicators that some of this ice is becoming unstable.

Lamont-Doherty seismologists Goran Ekstrom and Meredith Nettles have observed a significant increase in the rate of earthquakes along the coast of Greenland. As ice moves toward the sea, it lurches powerfully enough to trigger measurable tremors. These earthquakes have more than doubled in frequency in the last decade, which suggests Greenland's ice is moving much faster than it used to.

In Antarctica, scientists Robin Bell and Michael Studinger have discovered rivers of ice and large freshwater lakes of free-flowing water beneath the ice sheet. These have implications for ice sheet stability, as liquid water can lubricate the movement of ice and accelerate the passage of ice sheets toward the sea.

Doug Martinson has observed the decay of ice along the western coast of Antarctica through his studies of the powerful Antarctic circumpolar current, which sweeps past the continent "like a freight train of hot coals." He found the water it delivers has been warming for over a decade, applying a tremendous degree of melting heat to the outer edge of the West Antarctic ice sheet.

Sea Level Rise

Ten percent of the world's population lives within 10 meters of sea level, indicates spatial analysis work done by the **Center for International Earth Science Information Network** (CIESIN) and others. As sea level rises, significant portions of major cities like New York and Kolkata, India, and entire regions of countries such as the Netherlands and Bangladesh could be at risk for flooding and storm surges. The world's poor will be especially vulnerable.

To help officials tackle the expensive challenge of protecting New York City from the effects of climate change, the **Center for Climate Systems Research** (CCSR) and the **NASA Goddard Institute for Space Studies** (GISS) have generated specific climate projections for the area. Without careful planning and action, predicted higher temperatures, sea level rise, enhanced storm surges and changing precipitation patterns in the coming decades could have significant effects on the city's ability to provide drinking water and manage storm water and waste water.

Approaching the Tipping Point

For James Hansen, director of NASA's Goddard Institute for Space Studies and an adjunct professor at Columbia, performing great research is not enough. Communicating the science and threat of climate change is a moral imperative.

Since his assertion in the journal *Science* in 1981 that global warming caused by increasing levels of carbon dioxide would happen much faster than predicted and his subsequent testimony before the U.S. Senate in 1988, Hansen has worked to bridge the gap between science and public policy.

Hansen has been making the case that scientists' habitual reticence, though sometimes appropriate, can also hinder their ability to communicate necessary information to policy-makers. For example, the predictions of global temperature and sea level rise made by the United Nations Intergovernmental Panel on Climate Change (IPCC) were conservative, and necessarily so, says Hansen.

However, they did not include the very real possibility that feedbacks such as the sudden melting of ice sheets and the increasing release of greenhouse gases from terrestrial and marine areas due to global warming could accelerate the steadier rate of warming and melting of ice the panel predicted.

"The earth is dangerously near a tipping point at which human-made greenhouse gases reach a level where major climate changes can proceed mostly under their own momentum."

Support from the Rockefeller Family Fund, the Flora Family Fund, the Charles Evans Hughes Memorial Foundation and Gerry Lenfest has been instrumental in allowing James Hansen to communicate to the public and decision makers through presentations, testimonies and papers at times when he must dissociate himself from his government position at the NASA Goddard Institute for Space Studies.

Photo: AP Photo/Susan Walsh

DYNAMIC OCEANS

Oceans cover nearly three quarters of the earth and play a vital role in shaping climate. They absorb carbon dioxide from the atmosphere and affect the weather patterns we feel on land. Although there is still more to learn about the way oceans behave, it is clear they are responding to anthropogenic climate change. Our scientists are helping unlock the secrets of our world's great waters.

Ocean Currents: Feeling the Effects of Human Activity

In the 1990s, Peter Schlosser, associate director and director of research at the Earth Institute, and his colleagues at the Lamont-Doherty Earth Observatory discovered an abrupt change in the Greenland Sea. The formation of bottomwater—dense, cold water that sinks rapidly from the surface to the bottom—had suddenly slowed.

It is possible that an increase in fresh water in the Greenland Sea from melting ice and other sources triggered the abrupt slowdown. Oceans are complex, and the group continues to track changes in the Arctic Ocean, which exchanges water with the Greenland Sea. "The feedbacks associated with rising temperatures and melting ice, such as the unexpected drop of the sea ice extent in the Arctic Ocean in 2007, could affect global circulation patterns," says Schlosser, "and need to be monitored."

In the North Atlantic, Bill Smethie is tracking the formation of part of the headwaters of the great conveyor belt, a global circulation pattern that is critical to the stability of the world's climate.

Off the coast of Antarctica, Arnold Gordon and colleagues are observing how frigid water plunges to great depths from the continental shelf and flows north to the equator and beyond. With global warming, this bottomwater and the dense water formed in the North Atlantic could slow down or stop being produced, which would impact ocean temperatures.

"Poking the Angry Climate Beast"

Since Wallace Broecker first began studying the world's oceans in the 1950s, he has made tremendous contributions to the study of our changing climate and influenced a generation of scientists.

Broecker's new book, *Fixing Climate*, which he wrote with science writer Robert Kunzig, tells the story of our evolving understanding of human-induced climate change, a story whose emergence and milestones are mirrored by Broecker's own career.

In 1975, Broecker warned that the short period of cooling the world was experiencing would soon come to an end, and increasing levels of carbon dioxide could lead to a pronounced global warming. A few years later, he went on to propose his now-famous idea of a "great conveyor belt" in the oceans, the powerful system of marine currents that distributes heat around the world and helps regulate Earth's climate.

Through studies of the climate record, Broecker observed that abrupt climate change has happened in the past and could happen again as a result of global warming. There are risks to "poking the angry climate beast with CO_2," says Broecker. "We're pouring CO_2 into a system that we don't really understand, and therefore prudence says that we have to be prepared to cut the flow."

Fixing Climate, like Broecker himself, does not focus on oceans alone, but covers many parts of climate science and emphasizes the importance of reducing carbon emissions. "If we are to avoid dangerously warming the planet, we need to figure out how to build the equivalent of a sewage system for carbon dioxide," write Broecker and Kunzig. Keeping our CO_2 emissions from further "polluting" the atmosphere will not be cheap or easy, but energy research is finding possibilities—and this gives Broecker hope.

▶ *Funding for* Fixing Climate *and for some of Wallace Broecker's recent work, as well as the lead gift toward the construction of a new geochemistry building on the Lamont-Doherty campus was provided by the Comer Science and Education Foundation and the late Gary Comer. Comer first contacted Broecker after he witnessed the melting of Arctic ice while navigating his yacht through the Northwest Passage above Canada.*

"We're pouring CO_2 into a system that we don't really understand, and therefore prudence says that we have to be prepared to cut the flow."

Photo: Torbjörn Andersson

Inhaling and Exhaling Carbon

Of all the carbon dioxide that humans emit into the atmosphere, about a quarter is absorbed by the oceans. If they continue to warm, their storage capacity could decrease.

"Think of a beer that's warm," says Lamont-Doherty researcher Taro Takahashi. "It fizzes quickly and loses its carbonation quickly, while a cold drink will stay bubbly longer."

For the better part of four decades, Takahashi has been mapping carbon dioxide concentrations in the global oceans to find out where they absorb carbon dioxide and where they release it. The picture is complex. Takahashi has collected several million data points since 1960 and is seeing that some ocean regions, like the northwestern Pacific, are absorbing more carbon dioxide than before, while others, such as those near Antarctica and around Iceland, are absorbing less.

Other scientists at Lamont have pioneered the direct measurement of the movement of carbon dioxide between the ocean and the atmosphere. On an expedition led by Lamont-Doherty scientist David Ho, a number of researchers braved the high winds and big waves of the Southern Ocean to learn more about the relationship between oceans and the large amount of carbon dioxide that remains in the atmosphere.

Photo: Alisa Frohman

Above: Yasemin Erboy, Columbia College class of 2009, studying atmospheric concentrations of a man-made gas with research scientist Bill Smethie. Each year a group of undergraduates from Columbia College and Barnard College spend their summers at the Lamont-Doherty Earth Observatory as Earth Interns, researching topics related to climate change, oceanography and many other aspects of life on Earth.

Pushing the boundaries of climate science is only part of the approach to tackling the challenge of climate change. At the Earth Institute, we are working to communicate what we know, understand how people make decisions in the face of environmental uncertainty and facilitate action-oriented dialogue among multiple stakeholders.

Decision Making under Climate Uncertainty

How convinced are you that global warming is happening? If global warming is happening, do you think it is caused mostly by human activities? These and other questions were posed by the Earth Institute's **Center for Research on Environmental Decisions** (CRED) in a recent survey of 1,000 New York City residents.

CRED seeks the answers to questions like these to get at the heart of how individuals and groups make decisions under climate uncertainty and how that decision making happens in the face of environmental risk. Their research has suggested that firsthand experience of both gradual climate warming and extreme weather events associated with climate change plays a greater role in the public's response. This suggests policy-makers need to make the threat of climate change more personal and immediate in order to inspire action.

The message is getting through to New Yorkers. The majority of those surveyed felt humans were responsible for climate change and needed to do something about it. "Recent vivid and memorable media coverage of climate change impacts in Alaska, Florida, the American Southwest and other locations close to home have brought global warming onto the radar screen of the residents of New York, elevating it to a risk worth worrying about," says Elke Weber, director of CRED.

Forging Consensus on Climate Change

Through the **Global Roundtable on Climate Change** (GROCC), we are forging international consensus on climate change among high-level stakeholders from the private sector, international governments and nongovernmental organizations.

Early in 2007, the Roundtable released "The Path to Climate Sustainability: A Joint Statement by the Global Roundtable on Climate Change," which highlights the importance of increased energy efficiency and the need to use alternative energy sources and deploy technologies to capture and store carbon dioxide. The statement was endorsed by 108 companies from around the world and by 138 individual leaders from business, civil society, government and research institutions; and it was introduced at the United Nations Climate Change Conference in Bali, Indonesia, at the end of 2007.

GROCC's several hundred participants have regularly convened at the Earth Institute. Working groups are conducting projects such as reducing emissions from deforestation in developing countries, solar-powered LED lighting solutions and the sequestration of carbon in basalt deposits.

The new **Columbia Climate Center** will coordinate climate science work at the University, propose climate change mitigation and adaptation strategies, and improve communication between scientists and decision makers. Read more in the Climate Center profile on page 28.

Training a New Generation of Climate Leaders

There is a great need in the world for professionals who understand the link between climate and society and can lead the way toward mitigating and adapting to the effects of climate change. The **Master of Arts Program in Climate and Society** gives students the knowledge and skills to meet this acute need.

Arame Tall

Throughout her time at Columbia, Arame Tall was committed to returning home to Senegal and making a difference. She could see the change in herself as a result of the Master of Arts Program in Climate and Society. "A year ago I was as clueless about climate issues as the average person you would meet on the street," she says.

Just weeks after graduation, Arame was back in Senegal, giving a presentation on the use of climate risk management tools to a group of disaster managers at the Red Cross Federation. "They left with a better understanding of how they can use the tools developed at IRI [International Research Institute for Climate and Society] and other academic centers to improve the quality of their interventions on the ground and save more lives," says Arame.

"Now they turn to me for guidance, expertise and advice," she says. "This is evidence of the tremendous amount of learning that I have undergone over the course of the past year at Columbia, one which has opened many doors for me."

"A year ago I was as clueless about climate issues as the average person you would meet on the street …. Now [people] turn to me for guidance, expertise and advice."

Photo: Bruce Gilbert

Photo: Arezou Raieghasem

Photo: Bruce Gilbert

Above left: Arame Tall was the 2007-2008 recipient of the Pulitzer Fellowship, funded by the Pulitzer Foundation. *Above right:* Kalpana Venkatasubramanian attended Columbia with scholarships funded by the MSST Family Foundation.

Kalpana Venkatasubramanian

While working as a research associate in India, Kalpana Venkatasubramanian began to read about climate change and realize its far-reaching impacts. "In India, it had yet to be taken up as a big issue, especially on the policy front. But I knew it was going to affect many aspects of our lives."

She saw the Master of Arts Program in Climate and Society as a way to supplement her experience in the social sciences with a scientific understanding of the way Earth's climate works. Like many of her classmates, some from scientific backgrounds and others from social science backgrounds, she felt she understood only part of the picture. "I felt if I learned more about the science part of climate issues and how climate impacts social life, I could integrate this into research, policy and action."

Kalpana saw the importance of outreach when she visited a school in Harlem. She and her classmates talked about climate change to a receptive group of kids. "The biggest challenge we face is getting the right information out to people," she says. "Communicating the climate change issue in such a way that people comprehend the direct as well as indirect impacts on their very lives and livelihoods is extremely important."

Kalpana plans to return to India, but she will maintain the connections she has made through her international classmates. "Climate change is a challenge that transcends borders," she says. "Facilitating the transfer of relevant knowledge, technology and resources across countries is crucial in the efforts to mitigate it."

"Communicating the climate change issue in such a way that people comprehend the direct as well as indirect impacts on their very lives and livelihoods is extremely important."

MEETING THE WORLD'S ENERGY NEEDS, REDUCING CARBON EMISSIONS

Photo: Sigfús Már Pétursson

When it comes to tackling the challenge of reducing carbon dioxide emissions, Earth Institute scientists and engineers think big. From exploring ways to capture and store carbon, to addressing issues of energy policy, we are pursuing strategies to meet the world's significant energy needs while keeping climate change at bay.

Why Carbon Capture and Sequestration?

"The world right now is running on roughly 85 percent fossil fuels," says Klaus Lackner, Ewing-Worzel Professor of Geophysics and director of the **Lenfest Center for Sustainable Energy**. "And consumption of these fuels invariably means CO_2 emissions." Atmospheric concentrations of CO_2, the main driver of climate change, may become dangerous at levels much lower than commonly believed. "If this is the case," says Lackner, "we are already in trouble."

This is where carbon capture and sequestration technologies come in. Given the need to continue using energy that generates carbon dioxide—coal, for instance—we need to find a cleaner way to produce it. Technologies to store and sequester carbon are not cheap and skeptics worry that they will just "create one problem by trying to solve another," says Lackner. "This reinforces the need for research; we need to not only come up with new technologies, but to understand what their impacts will be before we deploy them."

Storing Carbon Dioxide Beneath the Ocean Floor

Carbon dioxide is denser than water in the cold, high-pressure depths of the ocean, a key phenomenon behind research into the injection of excess carbon into suboceanic rock formations. Once injected, the carbon dioxide will be held in place by gravity. Several Lenfest Center researchers have established that there is great theoretical potential for extensive and long-term storage of carbon dioxide under the ocean. Their research is now focused on determining the long-term fate of carbon stored in this way and developing practical ways to apply this technology.

Above: Carbon dioxide produced by a geothermal energy plant in Iceland is part of a study to learn more about trapping the gas in basalt, a rock type found in many parts of the world.

Capturing Carbon Dioxide in Basalt

Many energy researchers are exploring ways to pack loose carbon dioxide into storage places in the ground as a way to dispose of it. Jürg Matter, a researcher affiliated with the Lamont-Doherty Earth Observatory, is looking for a more stable storage method.

At a geothermal energy plant in Iceland, Matter is studying how fast carbon dioxide will react with basalt—a rock type that reacts naturally with the gas and is found in many parts of the world—when it is injected into the ground. By 2009, he hopes the plant will be ready to start trapping a portion of its carbon dioxide emissions in the basalt near the plant.

Designing Advanced Zero Emission Power Plants

Graduate students supported by the Lenfest Center are focusing their efforts on the development of a technology roadmap for power plants that integrates sophisticated techniques to keep carbon dioxide out of the atmosphere. As part of this project, Xinxin Li, a Ph.D. student in earth and environmental engineering, interned with the Chinese Academy of Social Sciences during the summer of 2007 with the support of the MSST Foundation and researched the state of clean coal technology in China.

Atmospheric concentrations of CO_2, the main driver of climate change, may become dangerous at levels much lower than commonly believed. This is where carbon capture and sequestration technologies come in.

The Pursuit of Influential Energy Solutions

"It's only the second year of the Lenfest Center, but we have some brilliant minds here, and I believe we will be a leader in the field of sustainable energy."

When rising star Ah-Hyung Alissa Park was invited to come to Columbia University to give a seminar on her work in sustainable energy and the mineral sequestration of carbon dioxide, she knew she was being interviewed, but she did not know about the offer she would soon receive to be the Lenfest Junior Professor in Applied Climate Science.

She debated about taking a job outside of a chemical engineering department and about moving to the big city, but the last year has shown that Park, the Lenfest Center for Sustainable Energy where she is now associate director, and New York are a good match. "Being in New York City, particularly at Columbia University, makes my vision much bigger. It helps me see how my work impacts people and how we can influence advancements in science and technology as well as environmental decision making."

Park's current research is on the clean synthesis of hydrogen and liquid fuels from carbon-containing substances like coal and biomass—solid municipal waste or industrial waste, for instance—in a way that reduces the release of carbon dioxide into the atmosphere. "It's only the second year of the Lenfest Center," says Park, "but we have some brilliant minds here, and I believe we will be a leader in the field of sustainable energy and specifically carbon capture and storage."

When Park first told her parents about her decision to pursue advanced studies in chemical engineering instead of medicine, they encouraged her to reconsider. "I really want you to do something that's good for people," Park's mother told her. She saw medicine as the best way to do that.

Now, years later, Park's mother has changed her mind about her daughter's profession. She has seen news stories about global warming and has realized the importance of what Park and her colleagues at the Lenfest Center do. Their work is not just about academic pursuits; it is about improving people's lives.

Funding for the endowed professorship that Alissa Park holds and the Lenfest Center for Sustainable Energy was provided by Gerry Lenfest and the Lenfest Foundation.

Photo: Bruce Gilbert

Global Water: The Emerging Crisis of the 21st Century

The distribution and availability of water are defining features of life. As populations increase and global temperatures rise due to human-induced climate change, we will see more frequent droughts and floods and an increasing scarcity of fresh water. These changes will have tremendous implications for human health, global food security and the peace and well-being of society in general.

Our sense of urgency has never been greater. At the Earth Institute, we are studying the world's significant weather patterns and their effects on the world's population. From the cities and villages of Africa to the river basins of the United States and Asia, we are working to better understand the global water crisis and find effective strategies to minimize human hardship.

Photo: Pedro C. Sanchez

SHIFTING PATTERNS OF WATER AVAILABILITY

Photo: Tobias Siegfried

Earth Institute researchers are working to obtain a better understanding of the way human-induced climate change is shifting patterns of drought and water availability and the effects these shifts will have on human health and vulnerable populations.

Mapping the Asian Monsoon

The Asian monsoon system plays a significant role in large-scale climate variability over much of the globe and has a direct connection to the amount of water available for drinking and agriculture in India and many other parts of Asia. Scientists at the Tree-Ring Lab at the **Lamont-Doherty Earth Observatory** have entered the last year of a five-year effort to reconstruct the past behavior of the monsoon through the use of tree-ring analysis.

In areas where there are distinct seasons, like the monsoon-affected regions of Asia, the severity and cadence of these seasons is recorded in the width and other characteristics of tree rings. "Tree-ring records provide absolutely dated, quantitative estimates of past climate on a year-by-year time scale," says Ed Cook, director of the Tree-Ring Lab.

Understanding how the monsoon has behaved over the last many hundred years will help scientists address the urgent need to predict its future behavior—and impacts felt by almost half of the world's population—on annual, decadal and longer time scales.

Photo: Nicole Davi

Left: By reading the characteristics of tree-ring cores in Asia, scientists can reconstruct the history of the region's monsoons and better understand a climate system that affects nearly half the world's population.

Threats to the World's Drylands

Research into the history of drought in the southwestern United States has led Lamont-Doherty scientists to the conclusion that, just as humans are able to drive large-scale climate change through the production of greenhouse gases, they may also be able to increase the severity and occurrence of natural events such as drought.

Using computer models to simulate the 1930s Dust Bowl on the Great Plains of the United States, climate modelers Richard Seager and Benjamin Cook have found that dust raised by intensive agriculture amplified a natural decline in rainfall, turning an ordinary drying cycle into an agricultural collapse.

Hard-pressed farmers and herders in places like China and Africa's Sahel region may be repeating the experience, degrading marginal lands in order to feed themselves in the short term. "If subtropical regions become drier in the coming years as a result of climate change, this, in combination with the pressure from rising population and demand for food, could lead to a similar cycle of drought, dust storms and more drought. The lesson of the Dust Bowl is there to be learned," says Seager.

Water, Climate and Human Health

Among the world's most vulnerable populations, fluctuating cycles of water abundance and scarcity can have direct impacts on human health. Heavy rains and flooding can lead to the spread of illnesses such as diarrhea and malaria. Droughts can result in health issues due in part to the lack of clean water.

Research at the **International Research Institute for Climate and Society** (IRI) is leading to a greater understanding of the connection between climate and infectious diseases like malaria and meningitis. In the summer of 2008, IRI teamed up with the Center for International Earth Science Information Network (CIESIN) and the Mailman School of Public Health at Columbia University to hold an intensive two-week workshop on "Climate Information for Public Health" that was attended by 13 professionals from nine countries.

The **Millennium Cities Initiative** is carrying out water and sanitation needs assessments in seven cities in Africa, with generous support from a $1.9 million challenge grant from the Tides Foundation. The research, conducted primarily by Columbia graduate students, will help municipal, regional and national governments, development partners and urban stakeholders work toward the Millennium Development Goals—eight globally endorsed targets that seek to help the world's poor.

Facilitating Action, Convening the World's Great Minds

Every year, the Earth Institute holds hundreds of seminars, conferences and events at Columbia University and around the world to facilitate dialogue between the world's most influential and innovative thinkers and practitioners in academic, nonprofit, corporate and government spheres.

From the biannual State of the Planet conference to the select events listed below, the Earth Institute hosts and co-hosts events that lead to the tackling of many of the world's problems.

The Growing Climate Crisis in the Drylands

November 2007, Dubai

To address the dramatic effects climate change will have on the world's drylands—specifically the Sahel, the Middle East and Central Asia—and the lack of a sufficient global response, HRH Princess Haya of Dubai and the Earth Institute co-hosted this conference under the auspices of the Global Humanitarian Forum.

Climate Knowledge for Global Health

March 2008, New York City

Co-organized by two Earth Institute centers, the Center for Global Health and Economic Development (CGHED) and the International Research Institute for Climate and Society (IRI), this conference convened more than 70 high-level experts from public health agencies, private institutions and corporations to brainstorm about ways to overcome the challenges that climate change poses to global health.

Photo: Daniel Yeow

Right: Professionals from nine countries attended a summer workshop on using climate information for public health.

Photo: Pedro C. Sanchez

Although the long-term effects of increasing temperatures and extremes of floods and drought on agriculture may be widespread, the developing world will be particularly vulnerable. Researchers at the Earth Institute are finding ways to help people escape from the trap of poverty and prepare themselves for the uncertainties of weather that will result from climate change.

Protecting Small Farmers in Africa

In rain-fed regions where groundwater stores are not sufficient or accessible, drought can have devastating effects on crop production and other agricultural activities. Even in good years, the fear of drought can keep productivity low because farmers are conditioned to be wary of investing too much money in improved seeds, fertilizers or equipment.

The International Research Institute for Climate and Society (IRI) is working with partners in Africa to help protect farmers in the Millennium Villages and in Malawi against periodic, crop-destroying droughts through an innovative application of agricultural insurance. Traditional insurance arrangements pay farmers for lost crops. Index insurance compensates farmers when rainfall drops below a set of predetermined trigger points.

In June 2008, IRI and Swiss Re jointly hosted a high-level roundtable on the use of index insurance for poverty reduction at the annual meeting of the Global Humanitarian Forum in Geneva.

Improving Crop Yields in Poor Areas

Through the **Millennium Villages** project in Africa, researchers from the Earth Institute are considering the threat of climate change as part of a larger effort to help villagers help themselves out of economic distress.

When it comes to agriculture, "one of the best ways to adapt to climate change is to have a situation in which crop yields are higher," says Pedro Sanchez, head of the Millennium Villages project. Work in the Villages has shown that crop yields could be three times as high as standard predictions for the region. "So if droughts happen," says Sanchez, and damage local crops, "they could reduce the amount of corn, but production would not drop as low if it was already higher than it is now."

▶ *The Bill & Melinda Gates Foundation has supported the Earth Institute's scientific work in agriculture, nutrition, energy, water, health, environment and information technology in order to inform policy and practice for achieving the Millennium Development Goals.*

Left: We are finding ways to help people lift themselves out of poverty and adapt to the effects of a changing climate through initiatives like the Millennium Villages project and others.

Building Future Thought Leaders

The **Earth Institute Fellows Program** gives highly qualified postdoctoral scholars the opportunity to research critical issues of sustainable development facing the world today, such as the effects of climate change on agriculture and the growing scarcity of fresh water. The program is an important component of the Earth Institute's strategy to enrich the overall quality and depth of scholarship in the field of sustainable development.

Tobias Siegfried

Earth Institute fellow Tobias Siegfried has focused the last 10 years of his doctoral and postdoctoral research on the management of scarce water resources in the face of changing climate conditions and increasing population pressures.

"Focusing on water scarcity narrows down my work geographically to places where there's not enough rainfall to sustain livelihoods—drylands in Africa, parts of India, the Middle East and Central Asia," says Siegfried. "These are places where increasing demand, often for irrigated agriculture, makes it important to carefully manage what water there is to not deplete or degrade the resources."

In India, for example, Siegfried is looking at situations where small farmers rely on groundwater as a backup for breaks in the monsoon rains, but can run into trouble when groundwater is depleted locally due to ongoing water mining.

With a Ph.D. in environmental science and master's degrees in environmental physics and international relations, Siegfried is well-equipped for the interdisciplinary approach of the Earth Institute. "There are many people out there pursuing a narrow focus when it comes to allocating water to meet demand," he says.

"We look at the big picture and draw on concepts from systems management, economics, game theory and political science to come up with tools to study allocation outcomes in imperfect political and economic environments."

During his time at the Earth Institute, Siegfried has worked with researchers at the new Columbia Water Center, the International Research Institute for Climate and Society, and the School of International and Public Affairs, where he is an adjunct assistant professor.

"There are many people out there pursuing a narrow focus when it comes to allocating water to meet demand. We look at the big picture."

Photo: Bruce Gilbert

Photo: Bruce Gilbert

Above: Tobias Siegfried and Brenda Lin were two of 16 postdoctoral researchers in the Earth Institute Fellows Program in the 2007-2008 academic year.

Brenda Lin

An ecologist by training, Brenda Lin came to the Earth Institute Fellows Program with a Ph.D. in resource ecology and management from the University of Michigan. Lin was drawn to the Earth Institute's multidisciplinary approach and the emphasis its researchers place on using science to address complex problems of climate change and sustainable development.

"I didn't want my work to just be in a paper that would contribute to theory," says Lin. "I wanted my work to be applicable to sustainable development and to contribute to real-world projects."

During her time at the Earth Institute, Lin has worked on several interdisciplinary projects addressing the vulnerability of agriculture due to climate change. With Walter Baethgen at the International Research Institute for Climate and Society, she modeled cropping systems in water-stressed regions of Brazil to find ways farmers could improve their production. Now she is studying how farmers can protect their crops from extreme climate events like hurricanes.

Reflecting on her time as an Earth Institute fellow, Lin says, "I've learned so much here—I've learned how people across disciplines think and how to work with them, how different institutions work, and gained a better understanding of how to make my work more applicable.

"But perhaps the biggest thing that I've gained from this program is colleagues for life. In a sector where cohesion can be difficult, the Earth Institute Fellows Program is building collaborations across disciplines and institutions for the next generation of sustainable development professionals."

MANAGING A LIMITED RESOURCE

Photo: Pedro C. Sanchez

Identifying strategies to manage water resources in real-world settings and improve access to water is a crucial part of our response to an emerging global crisis. Many parts of the world are facing increasingly limited stores of fresh water due to shifting rainfall patterns, increasing population pressures, and the degradation of existing water resources.

Water Politics

Where there is water scarcity, there is tension. In the western United States, a region currently facing its seventh consecutive year of severe drought, populations continue to grow, leaving watersheds under increasing strain. Tanya Heikkila, associate director of the **Columbia Water Center**, and several Columbia graduate students have spent countless hours over the last three years working on a database of western water conflicts in conjunction with their counterparts at the University of Arizona.

"Water is fundamental to life. We have to share it and provide universal access," says Heikkila. She hopes to build a better understanding of how institutions can address inevitable conflicts over water, particularly in transboundary settings, and adapt to changes in water availability and competing water needs.

In the Middle East, water has long been a source of conflict. Although the last few years have not been as dry as the ones preceding them and times have been comparatively peaceful in the region, the work of doctoral student Rana Samuels suggests this could change. Her climate models show rainfall could drop to zero in some areas by the middle of this century. The Abraham's Well project, initiated through the Columbia Water Center and the **Center for the Study of Science and Religion**, is building a forum for Palestinian and Israeli academics and water scientists to discuss water issues in a nonpartisan environment.

Photo: Brett Gleitsmann

Improving Water Sustainability

A landmark project to address global water scarcity through local action in India, China, Brazil and Mali is underway at the Columbia Water Center. By using private and public strategies, the Water Center hopes to improve rural livelihoods and sustained access to water by promoting the efficient use of water in agriculture and helping communities deal with uncertainties such as climate change and market shifts.

In the Ceará region of northeastern Brazil, where drought is a recurring phenomenon, the focus of the project has been on using sophisticated climate-based forecasting systems to determine rainfall patterns. Like many parts of the world that feel the effects of El Niño/La Niña events, there is a direct correlation between ocean surface temperatures off the coast of northeastern Brazil, the amount of rain that falls on land, and the amount of water flowing in streams and rivers in a three- to six-month period.

Experts at the Columbia Water Center and the International Research Institute for Climate and Society (IRI) are exploring ways these streamflow predictions can be used to manage reservoirs and water use at a watershed scale to mitigate the devastating effects of drought.

Providing Access to Water

Periodic water stress threatens the health and stability of communities around the world. Through the Millennium Villages project in Africa, Earth Institute engineers are bringing improved water and sanitation infrastructure to impoverished populations living in arid regions, where access to water is unreliable and often requires a long, daily trek.

In Potou, Senegal, an existing water pipeline system was not adequately serving the community's needs. Vijay Modi, a professor of mechanical engineering who works with the Columbia Water Center, has led the effort to significantly improve the distribution of water in the area.

With the shipping help of JM Eagle, which donated and delivered 110 kilometers of PVC piping to Senegal, the work of the Earth Institute team will result in nearly 95 percent of Potou being covered by a piped water system, more than double the previous extent.

In Koraro, Ethiopia, sporadic rainfall and sparsely populated communities are just two of many serious challenges to finding safe and reliable sources of water for residents. Earth Institute experts are helping villagers devise sustainable, long-lasting solutions by "retraining" the landscape and recharging aquifers so that when it does rain, water can be more effectively gathered and stored.

Left: Access to fresh water for drinking and agriculture is an increasing challenge in many parts of the world and we are finding solutions.

Photo: Esther Ebrahimian

"Water is fundamental to life. We have to share it and provide universal access."
— Tanya Heikkila

Water Security in Asia

Water security is a dominant concern in Asia, especially in densely populated arid regions subject to highly variable rainfall. Continuing population growth and the prospect of an uncertain future climate are exacerbating this problem.

Through the support and guidance of the Asian Development Bank, Earth Institute researchers are finding that challenges such as drying rivers and groundwater depletion and the emerging food crisis, can be addressed through strategic investments in initiatives to manage the risks associated with extremes in drought and rain.

The early stages of this research have begun in India, where overtaxed water resources have diminished buffering capacity for times of drought or low rainfall and where agricultural productivity is frequently connected to the quality of rains in a particular monsoon season. Researchers have collected data to assemble baseline scenarios of local economies, groundwater and surface water resources, and rainfall patterns.

The new **Columbia Water Center** is working to improve our understanding of the global water crisis and create innovative solutions to the water problems affecting many parts of the world. Read more in the Water Center profile on page 26.

Inside the Earth Institute

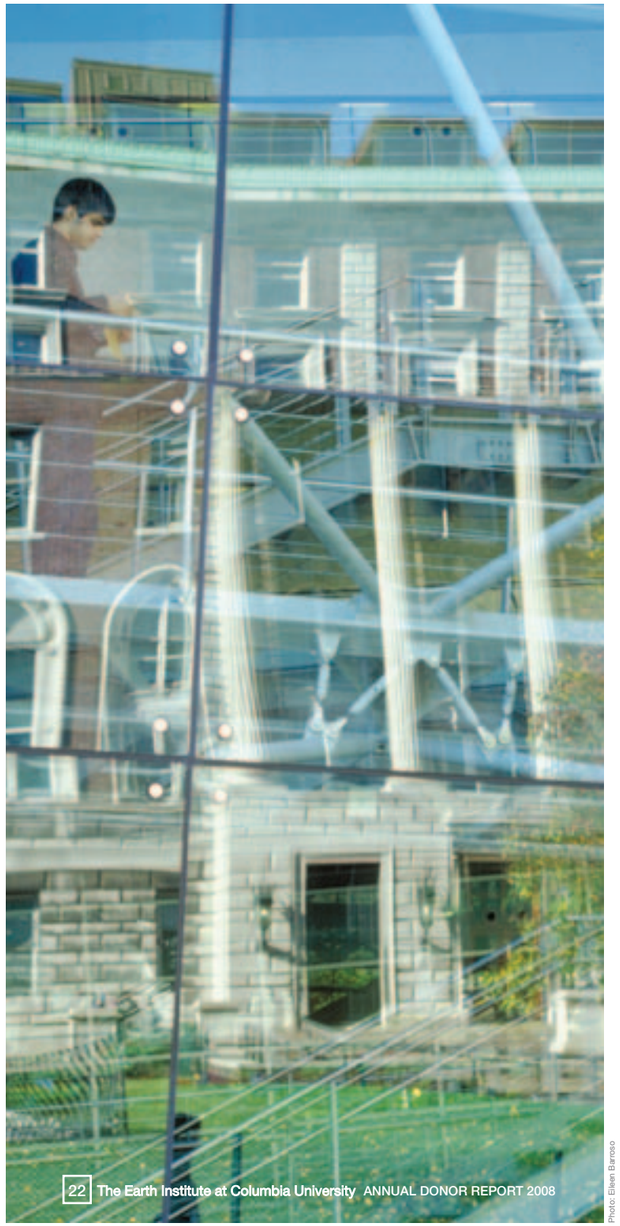


Photo: Eileen Barroso

Photo: Bob Handelman

Photo: David Wentworth

Photo: Eileen Barroso

RESEARCH CENTERS AND PROGRAMS

The Earth Institute's overarching goal is to help achieve sustainable development through scientific research, education and the practical application of knowledge to solving real-world challenges. The Institute is composed of 32 research centers and programs that house over 850 scientists, postdoctoral fellows and students.

Research Centers

- Lamont-Doherty Earth Observatory (LDEO)
- Columbia Climate Center
- Columbia Water Center
- Center for Rivers and Estuaries
- Center for Climate Systems Research (CCSR)
- Center for Environmental Research and Conservation (CERC)
- The Earth Engineering Center (EEC)
- Lenfest Center for Sustainable Energy (LCSE)
- The Center for Global Health and Economic Development (CGHED)
- The Center for National Health Development in Ethiopia (CNHDE)
- The Center on Globalization and Sustainable Development (CGSD)
- The Center for the Study of Science and Religion (CSSR)
- The Center for Sustainable Urban Development (CSUD)
- Center for International Earth Science Information Network (CIESIN)
- International Research Institute for Climate and Society (IRI)
- The Center for Hazards and Risk Research (CHRR)

Partnership Institutions

- The Black Rock Forest Consortium
- Center for Research on Environmental Decisions (CRED)
- Cooperative Institute for Climate Applications and Research (CICAR)
- NASA Goddard Institute for Space Studies (GISS)
- Laboratory of Populations

Earth Institute Programs

- The ADVANCE Program
- The Earth Clinic
- The Cross-Cutting Initiative (CCI)
- Urban Design Lab (UDL)
- The Program on Science, Technology, and Global Development
- The Global Roundtable on Climate Change (GROCC)
- Tropical Agriculture and Rural Environment Program
- Master of Public Administration in Environmental Science and Policy
- Master of Arts Program in Climate and Society
- Ph.D. in Sustainable Development

Partnership Programs

- Vale Columbia Center on Sustainable International Investment (CPII)

Photo: Office of University Publications

FURTHER INSIDE THE EARTH INSTITUTE

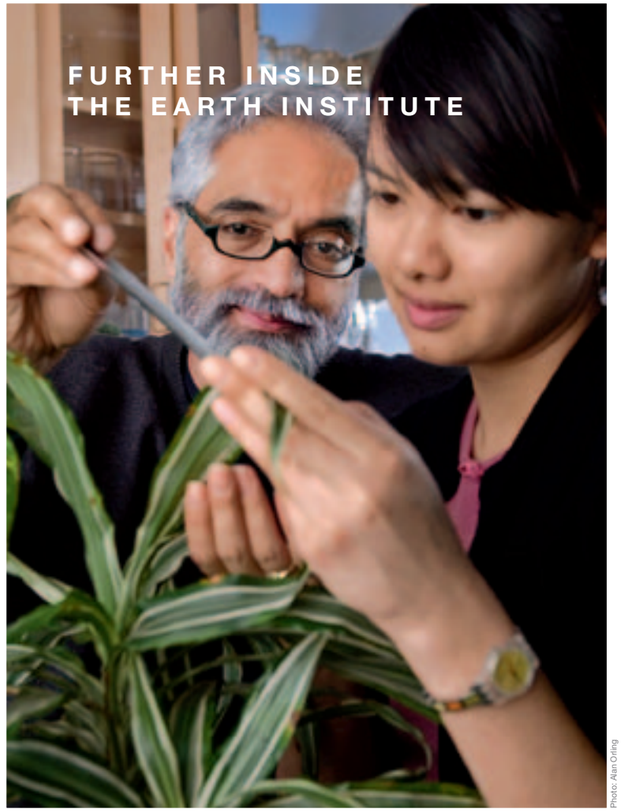


Photo: Alan Orling

In many ways, the Earth Institute is a lens to the world and the many issues that challenge humanity. From here in New York City, to countless international locations, we are conducting extensive and far-reaching work on many issues of sustainable development and our world's environment.

Nine cross-cutting themes—water; climate and society; energy; urbanization; hazards and risk; global health; poverty; ecosystems health and monitoring; and food, ecology and nutrition—run through the work of the hundreds of researchers, postdoctoral fellows and students at the Earth Institute.

Here are a few more highlights of the innovative projects we have conducted over the last year.

As our exciting work continues to move forward in the area of sustainable development, we remain committed to solving the world's most pressing needs.
— Jeffrey D. Sachs

Sustainable Development in Practice

As the main practice arm of the Earth Institute, the **Earth Clinic** supports projects designed to help developing countries and poor communities worldwide overcome economic and environmental problems. With generous support from donors such as Joe and Barbara Ellis, the Earth Clinic offers science-based assistance to address urgent issues of economic development, public health, energy systems, water management, agriculture and infrastructure.

One of last year's Earth Clinic projects included the Pilot Cook Stove Project, which aims to reduce human exposure to smoke from cooking fires in Ghana by providing clean-burning engineered cook stoves. This effort is designed to illuminate key uncertainties regarding the adoption of new cooking technologies and show the feasibility for larger-scale cook stove programs.

Season Smart, a project that received funding from donors such as the Countess Moira Charitable Foundation, aims to protect children throughout Africa by teaching community health workers to incorporate an understanding of how climate and seasons affect health and the spread of disease in their public health programs. A pilot program in Mali is teaching community health workers to advise families about how and when to focus on prevention of infectious disease transmission, in particular acute respiratory illness, diarrhea and malaria.

Intelligent Information

Work at the **Center for International Earth Science Information Network** (CIESIN) is based on the idea that high-quality information is key to understanding environmental issues and their connection to human activity. The recently released 2008/TerraViva!/SEDAC Viewer lets researchers and analysts overlay socioeconomic and environmental data onto world maps, integrating potentially hundreds of variables for enhanced understanding. One of the CIESIN data sets users can visualize is known as "The Human Footprint" and aims to measure the extent of human influence on Earth's surface.

An Increasingly Urban World

With more than half the world's population now living in urban areas and the rapid shift to urban living expected to continue, the **Center for Sustainable Urban Development** (CSUD) is working on the ground in Nairobi, Kenya and New York City to address the challenges of urbanization. In July 2007, CSUD worked with the Rockefeller Foundation on a month-long conference to address the many challenges of urbanization—drinking water, sanitation, shelter, climate change preparedness and development—that face low- and middle-income countries where urban growth will be the most pronounced.

Sustainable Urban Communities

With support from the Ford Foundation, the **Urban Design Lab** teamed up with the Center for Sustainable Urban Development and the community-based organization WE ACT for Environmental Justice to examine the potential impacts of PlaNYC 2030's proposed congestion pricing plan, which would discourage traffic from entering southern Manhattan. The team studied ways to mitigate the effects of an increased pollution and congestion load on Harlem and other parts of the city, such as designing "green" bus depots and distributing them equitably across more than one neighborhood, and developing a sustainable bus system that would help reduce noise and air pollution.

Ecology and Environmental Education, Columbia Grads and Low-Income City Schools

This year scientists and graduate students from the Earth Institute are working in New York City public schools and a school in the Dominican Republic to bring hands-on science to the classroom and get teachers and students into the field. Funded by a $3.1 million grant from the National Science Foundation, the Learning through Ecology and Environmental Field Studies (LEEFS) program supports Columbia graduate students who work in middle and high school classes in low-income city schools where they present their research, assist with inquiry-based teaching, tutor students and lead field trips. The program builds on existing relationships between NYC schools, the **Center for Environmental Research and Conservation** and the **Lamont-Doherty Earth Observatory**.

Issues of Global Health

Recognizing that improvements in public health and quality of life cannot occur in isolation, the Earth Institute works through the **Center for Global Health and Economic Development** on scaling up access to health care for the poor. Support from donors like the Bill & Melinda Gates Foundation, the McArthur Foundation, the Packard Foundation, and the Glaser Project Foundation, among many others, is critical to this work.

Among many ongoing health projects, several stand out. The Millennium Villages project has continued to provide basic health interventions to rural communities in sub-Saharan Africa. The Center for National Health Development in Ethiopia is helping create a new community health workers program and is advising 11 governments on scaling up the control of malaria and other tropical diseases. The Access project in Rwanda is applying business and management skills to public health systems to increase access to life-saving drugs and critical health services.

Photo: Bruce Gilbert

Left and right: In New York City and around the world, the Earth Institute is addressing global issues and teaching the next generation of leaders.

Photo: Bruce Gilbert

The sustainable management and distribution of water resources has emerged as a global challenge in the 21st century. Regions of every continent now experience periodic water stress in one form or another. The Columbia Water Center, a new initiative of the Earth Institute at Columbia University, was established in 2007 to lead intellectual inquiry into the assessment, prediction and solution of the emerging global water crisis.

Researchers at the Water Center are investigating and evaluating original solutions to water scarcity in some of the most challenging settings in the world, working with local partners to understand their unique needs and craft viable solutions. The Water Center also sponsors regular seminars on water issues and is developing water-related courses.

Upmanu Lall *Director, Columbia Water Center*

Photo: Bruce Gilbert

"Water scarcity is emerging as a global problem, with ramifications for food security, energy production and needs, and biodiversity. Strategies for managing risks due to changing climate, changing water use demographics and depleting groundwater resources are urgently needed," says Upmanu Lall.

"The Columbia Water Center is working on theoretical and field developments to meet this challenge. Improving water use efficiency in agriculture while improving rural economic returns is a major goal of our science and policy research."

Lall is Alan and Carol Silberstein Professor of Engineering in the Department of Earth and Environmental Engineering and the Department of Civil Engineering and Engineering Mechanics and is a senior research scientist at the International Research Institute for Climate and Society (IRI).

"Strategies for managing risks due to changing climate, changing water use demographics and depleting groundwater resources are urgently needed."

Tanya Heikkila *Associate Director, Columbia Water Center*

"In the face of climate change, rapid population growth and growing economies around the world," says Tanya Heikkila, "we face tremendous uncertainty over how best to use and allocate freshwater resources.

Photo: David Wentworth

"At the Columbia Water Center, we will conduct interdisciplinary research to understand how to manage water supplies locally, nationally and globally, as well as to devise institutions that will be adaptable to changing water supply and demand conditions."

Heikkila is an assistant professor in the School of International and Public Affairs who does research on collaborative and transboundary institutions for managing water resources.

Support for Water Initiatives

The Earth Institute has received significant donor support from individuals like Ceil and Michael Pulitzer and others like JM Eagle and the PepsiCo Foundation for our work on global water issues.

PepsiCo Foundation

A $6 million lead gift from the PepsiCo Foundation is supporting crucial work on water-related issues at the Earth Institute. The grant is an example of how private companies can be part of efforts to find globally relevant solutions to the growing challenge of water scarcity. The PepsiCo gift will fund water projects in critical settings like India, Brazil, China and Mali.

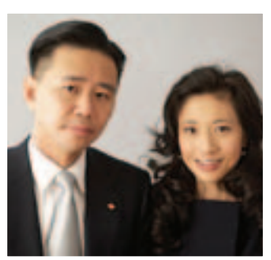
The PepsiCo Foundation's wish is to reverse the worldwide water crisis. "Without clean water, none of the other fundamentals leading to a healthy and prosperous life are possible," says Indra Nooyi, PepsiCo chairman, CEO and PepsiCo Foundation chairman. "We believe that the world water crisis is one of the most pressing challenges of our age. As a global food and beverage company, our success depends on being responsible stewards of this limited resource."

JM Eagle

JM Eagle, the world's largest manufacturer of plastic pipe, partnered with the Earth Institute to develop a sustainable system for transporting potable water throughout the Millennium Village cluster in Potou, Senegal, and in future sites in Ghana, Uganda, Mali and Rwanda. The water supply network in Potou, which features over 110 kilometers of high-strength PVC pressure pipe in various sizes, will provide drinking water to individual villages and improve public health.

Prior to JM Eagle's involvement, three tube wells in the region were used to supply four water towers in a 400-square-kilometer area that is home to 35,000 people. However, because that system only reached about one third of the individual communities, most residents did not have direct access to water due to the lack of a functioning distribution infrastructure.

Walter and Shirley Wang, owners of JM Eagle, see their involvement in this project as a responsibility as well as an opportunity to have a hands-on role in helping solve the water scarcity crisis in the region. They are also pleased that the products they produce will play an important part in improving lives.



Many communities in the developing world lack sufficient infrastructure to transport water and suffer as a result. JM Eagle hopes to change this.

INSIDE THE COLUMBIA CLIMATE CENTER

Photo: Bruce Gilbert

The case has been successfully made that anthropogenic climate change is real and society is now asking not for proof, but for solutions. The climate science community thus faces a new challenge: to provide strategies to minimize the negative impacts of ongoing and future change.

This requires advancing our knowledge of the impacts of climate change at many scales, understanding the institutions that will be responsible for implementing strategies of adaptation and mitigation, identifying the capacity to implement the technological and policy changes to carry out an array of solutions, and improving the scientific community's ability to communicate impacts and solutions to decision makers and to society at large.

To meet these challenges, the Earth Institute formed the Columbia Climate Center in 2007. The center integrates the many climate-related activities and research efforts throughout Columbia University, bringing together studies in the natural and physical sciences, in engineering, and in social and political science to improve humankind's capacity to understand, predict and respond to climate variability and change.

Peter Schlosser *Director, Columbia Climate Center*

Photo: Bruce Gilbert

"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. The Columbia Climate Center builds on these contributions to move toward a solution-oriented approach to a problem that is so multidimensional," says Schlosser.

Peter Schlosser is associate director and director of research at the Earth Institute, Vinton Professor at the School of Engineering and Applied Science, and a professor in the Department of Earth and Environmental Sciences.

"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."

Mary-Elena Carr *Associate Director, Columbia Climate Center*

Photo: Mark A. Ingila

"At the Columbia Climate Center we aim to improve the pathways of communication so that the results of our research reach both decision makers and society at large."

Oceanographer Mary-Elena Carr comes to Columbia after a research career at CalTech's Jet Propulsion Laboratory and two years at the National Science Foundation.

Centers, Departments and Programs Active in the Columbia Climate Center Include:

Lamont-Doherty Earth Observatory (LDEO) and the Department of Earth and Environmental Science (DEES) Climate-related research in oceanography, geochemistry and biology at LDEO and DEES focuses on the basic science and processes that determine climate conditions of the past, present and future.

International Research Institute for Climate and Society (IRI) IRI works to improve climate science and the delivery of climate information to decision makers, and to develop climate risk management strategies with the goal of enhancing the ability of developing nations to manage climate-related impacts.

Cooperative Institute for Climate Applications and Research (CICAR) A partnership between Columbia and the National Oceanic and Atmospheric Administration (NOAA), CICAR combines modern and paleoclimate data with Earth system models to study and predict climate variability and change.

NASA Goddard Institute for Space Studies (GISS) and Center for Climate Systems Research (CCSR) GISS and CCSR combine comprehensive global data sets, obtained mainly from spacecraft, with global models of the atmosphere, land and ocean to predict climate changes in the 21st century and to quantify climate sensitivity.

Center for Environmental Research and Conservation (CERC) A consortium that includes Columbia University, the American Museum of Natural History, the New York Botanical Garden, Wildlife Conservation Society and Wildlife Trust, CERC aims to build environmental leadership, stem the loss of biodiversity, and achieve environmental sustainability through research and education.

Lenfest Center for Sustainable Energy (LCSE) and Department of Earth and Environmental Engineering (DEEE) LCSE and DEEE seek to develop technologies and institutions to meet global needs for sustainable energy while reducing emissions of atmospheric greenhouse gases.

Mailman School of Public Health Climate-related research at Mailman examines the impacts of climate change on public health in urban and rural settings, including heat-related mortality and the spread of infectious diseases.

Center for Research on Environmental Decisions (CRED) CRED performs research in decision making by individuals and groups under climate uncertainty with the goal of improving decision-making processes and communication.

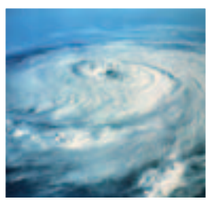
Global Roundtable on Climate Change (GROCC) GROCC brings together stakeholders from the private sector and international governmental and nongovernmental organizations to explore the scientific, technological and economic issues critical to shaping public policies on climate change.

Center for International Earth Science Information Network (CIESIN) At the intersection of the social, natural and information sciences, CIESIN applies its expertise in data management, spatial data integration and training, and interdisciplinary research to improve access to information and to serve the needs of scientists and decision makers.

Environmental Law Clinic The Environmental Law Clinic brings students together with local, regional and national organizations to solve critical environmental challenges facing the metropolitan region.

Master of Arts Program in Climate and Society The 12-month M.A. Program in Climate and Society trains professionals and academics to understand and manage the impacts of climate variability and change on society by taking an interdisciplinary problem-solving approach.

Timeline of Climate Research at Columbia University



1950s LDEO starts deep-sea sediment core collection for paleoclimate work.

1960s Paleoclimate research confirms the magnitude of past climate changes.

1970s CLIMAP program headquartered at LDEO campus produces maps of past ocean temperatures.

1980s
- Mark Cane and Steve Zebiak make first El Niño predictions.
- Wallace Broecker proposes conveyor belt concept that links ocean currents to climate change and suggests abrupt climate change is possible.
- James Hansen testifies on global warming in front of U.S. Senate.

1990s
- Columbia University founds the Earth Institute where climate is an important focus of sustainable development work.
- IRI founded to enhance society's ability to respond to the impacts of climate variability.
- CIESIN brings its capabilities in socioeconomic and environmental information to the Earth Institute.

2000s
- Links between climate and public health and ecology become active areas of research.
- LCSE founded to develop technologies and institutions for sustainable energy and carbon management.
- CRED founded to study decision making under climate uncertainty.
- GROCC founded to develop consensus regarding climate change among corporate and political stakeholders.
- Columbia Climate Center founded to integrate and coordinate climate research at Columbia University.

EDUCATIONAL PROGRAMS

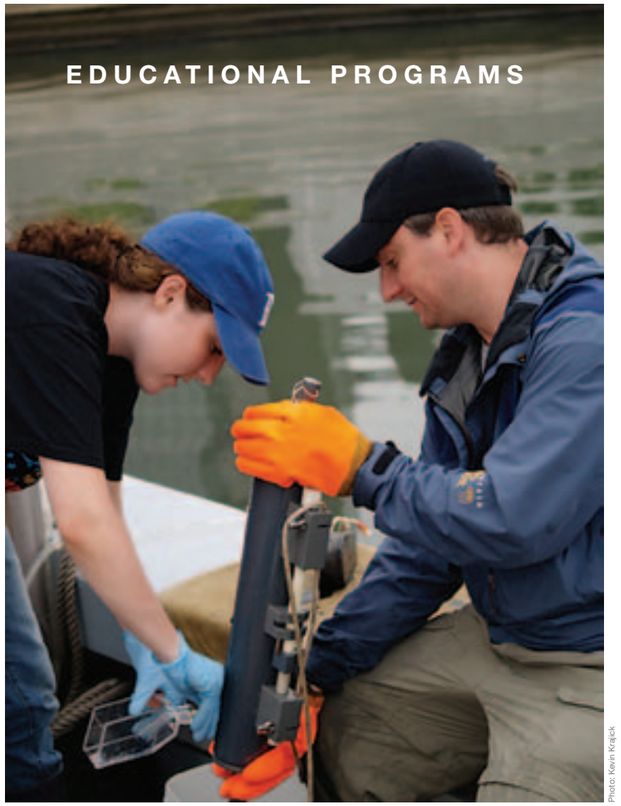


Photo: Kevin Krajick

The Earth Institute fosters a wide range of innovative undergraduate, master's and doctoral educational programs that are housed across multiple schools and departments at Columbia University. Currently, there are over 28 academic programs in environmental studies and sustainable development associated with the Earth Institute.

We are committed to training a new generation of professionals and academics in the field of sustainable development, giving them the intellectual and practical foundations to address many of the world's challenges such as climate change, global water, natural disasters and other critical issues.

"The Sustainable Development Ph.D. program has tremendously impacted my vision of the world. It's a place that gathers enthusiastic people who dream to make a difference in every corner of the globe."
— Aly Sanoh

Interdisciplinary Ph.D. in Sustainable Development

The interdisciplinary Ph.D. in Sustainable Development is offered by the Graduate School of Arts and Sciences in collaboration with the Earth Institute and is housed in the School of International and Public Affairs. The program welcomed its first class of six students—selected from a pool of 190 applicants—in 2004.

Marta Vicarelli, a current Ph.D. candidate, shared in the 2007 Nobel Peace Prize with the Intergovernmental Panel on Climate Change (IPCC) and Al Gore. Ph.D. candidate Aly Sanoh spent his first year working to help develop a costing model for national electrification schemes to meet the Millennium Development Goals in Senegal and Kenya. "The Sustainable Development Ph.D. program has tremendously impacted my vision of the world," says Aly. "It's a place that gathers enthusiastic people who dream to make a difference in every corner of the globe."

Master of Public Administration in Environmental Science and Policy

The Master of Public Administration in Environmental Science and Policy, housed in the School of International and Public Affairs, has more science courses than any other M.P.A. program currently offered in the United States. It trains students to be sophisticated public managers and policy-makers who can apply innovative, systems-based thinking to understanding and maintaining the health of Earth's interconnected ecological, institutional, economic and social systems. For each of the three semesters, students work collaboratively in hands-on workshop courses where they apply their coursework to real-world case studies. The increasingly popular program welcomed its first class in 2002 and has already graduated over 300 students.

Master of Arts Program in Climate and Society

The Master of Arts Program in Climate and Society, housed in Columbia University's Department of Earth and Environmental Sciences, is a unique 12-month interdisciplinary master's program that offers its students the opportunity to learn about climate issues from both the physical and social science perspectives. A summer internship program gives students the opportunity to gain practical experience. The program has graduated 76 students from all over the world. Graduates go on to pursue careers in nonprofit, public and private organizations.

New Undergraduate Special Concentration in Sustainable Development

A new undergraduate special concentration in sustainable development, housed in Columbia College and the School of General Studies, was launched in the fall of 2007. Within the curriculum are two new courses offered exclusively to students enrolled in the special concentration. The first of these courses, "Science of Sustainable Development," is designed to cover the elements of natural sciences necessary for students to gain an appreciation for the field of sustainable development and prepare them for more in-depth science courses. The second course, a client-based sustainable development workshop, focuses on methods of applied policy analysis.

Global Classroom Project

The Global Classroom project, launched in the spring of 2008, gives students around the world the opportunity to participate in interactive discussions with the top thinkers in the field of sustainable development without ever having to leave their classrooms. Through a combination of taped lectures and live, Web-based discussions, the inaugural, semester-long graduate course was taught at a dozen universities around the world, including the United States, Europe, Africa, South America, South Asia and East Asia.

An early initiative of the International Commission on Education for Sustainable Development Practice, the Global Classroom project is directed by the Earth Institute at Columbia University and supported by the John D. and Catherine T. MacArthur Foundation to help change the course of development education and create bold new leaders who can work to achieve a sustainable world.

Outside the Classroom

To supplement its academic offerings, the Earth Institute coordinates internships, research assistantships and travel grants for Columbia students to help them pursue practical work and research outside the classroom. From the laboratories and research sites of the Columbia campus to the Millennium Villages in Africa, students can enhance their understanding of the world through research and hands-on experience with a range of topics ranging from asteroid impacts to global health.

In addition, transportation grants for faculty make it possible to incorporate field trips into course curricula to get students out of the classroom and into the field where they can learn about the natural world in ways they cannot in Columbia's sophisticated urban setting.

▶ *Support from our many donors—such as the MSST Foundation and the Rockefeller Brothers Fund—is a critical part of our efforts to provide strong educational programs in sustainable development.*

Left and right: Students in the classroom and the field.

Photo: Eileen Barroso

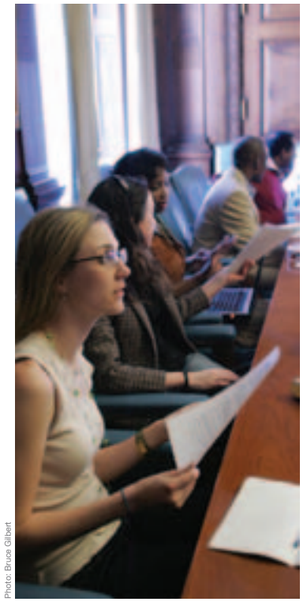


Photo: Bruce Gilbert

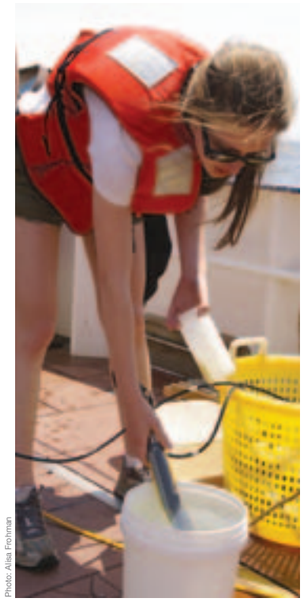


Photo: Alisa Frohman

Photo: Peter Freed

Photo: Alisa Frohman

Campaign Highlights

Photo: David Wentworth

Photo: Eileen Barroso

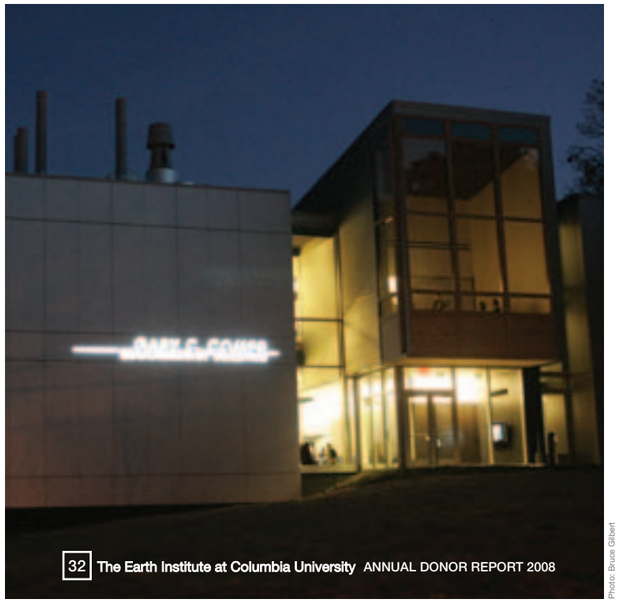


Photo: Bruce Gilbert

Photo: Renzo Piano Building Workshop, Architects/Skidmore Owings & Merrill, Urban Designers

REFLECTING ON THE YEAR'S SUCCESSES

As this report goes to print, we are more than 65 percent of the way toward our goal of $200 million for the Earth Institute Campaign, having recorded more than $32 million in gifts from individuals and private foundations over the past year.

We have established two new research centers—the Columbia Water Center and the Columbia Climate Center—as well as secured the long-term viability of the Lenfest Center for Sustainable Energy (LCSE). Generous funding from the PepsiCo Foundation, whose $6 million gift supports water projects, and from Columbia Trustee Gerry Lenfest, whose $5 million endowment supports the LCSE, will help us tackle two of the most profound challenges of the next century: the growing scarcity of fresh water and the need for new energy technologies that reduce the production of climate-altering carbon dioxide.

As the world's premier academic center dedicated to the field of sustainable development, we continue to attract students from around the world, including developing countries. The next phase of our campaign seeks to make permanent our role as an educator of the next generation of leaders. One of our continuing goals is to establish permanent endowment funds to provide scholarships and fellowships to these students as well as funding for internships so they can travel to the field for practical application of their studies. We hope to repeat this success in the coming year and continue to support some of the Earth Institute's signature endeavors such as the Earth Clinic, the Cross-Cutting Initiative and the Center for Environmental Research and Conservation's certificate program. We also plan to build endowments for new research positions, professorships and programs.

In addition, we will begin planning for a permanent home for the Earth Institute, a building or dedicated space where meetings and symposia can be hosted, where students and scholars can meet and where visitors from around the globe can come together for shared learning.

Our success requires the efforts of the entire Earth Institute community and the support of individuals and institutions who believe in the transformative nature of our mission. Thanks to you, our donors, we have been able to pursue many wide-reaching and innovative projects—from work in the Millennium Villages in Africa to the construction of a new geochemistry building at the Lamont-Doherty Earth Observatory—that will bear fruit for many decades to come.

Our success requires the support of individuals and institutions who believe in the transformative nature of our mission.

Photo: Bruce Gilbert

Photo: Bruce Gilbert

Above: Office of Funding Initiatives team (left to right): Barbara Charbonnet, Urania Mylonas, Terry Karamanos, Jennifer Swift-Morgan and Jasmina Metjaic. (Laurie Schnidman not shown). *Left:* Lamont-Doherty Earth Observatory fundraising team (left to right): Doug Brusa, Stacey Vassallo, Sarah Huard and Ronnie Anderson. International Research Institute for Climate and Society (IRI) fundraising officer Haresh Bhojwani not shown.

Opposite page: President Bollinger launching the Columbia Campaign. The new Gary C. Comer Geochemistry Building at the Lamont-Doherty campus (bottom left). The future Columbia University Manhattanville campus (bottom right).

WHAT LIES AHEAD—THE COLUMBIA CAMPAIGN AND THE ROLE OF THE EARTH INSTITUTE

The Columbia Campaign was publicly launched on September 29, 2006, at a simulcast event with Columbia alumni and friends in New York, London and Hong Kong—a fitting medium for a campaign dedicated to expanding the University's role as a global thought leader in the 21st century.

Columbia University has taken on this ambitious effort to deepen its strengths, including its influential core curriculum and distinguished faculty, and build its capacity to bring the very best thinking and research possible to bear on unprecedented global issues. Within the context of the Columbia Campaign, the Earth Institute is charged with raising $200 million by 2011 to strengthen our unique position and globally relevant work.

Our campaign priorities include:

- **Endowed professorships** to support the continued pursuit of cutting-edge research and thought at the Earth Institute.
- **Scholarships** to support diverse and talented degree candidates from around the world.
- **Funding for ground-breaking initiatives and research programs** that are addressing critical world issues.

Few institutions can match the breadth and scope of our work. It is our privilege to work with you to shape this bold initiative, so essential to the future of the earth and its inhabitants. We hope you will continue to join us in this important endeavor.

"Our foundation is delighted to join in a partnership with the Earth Institute that will have a tangible impact and bring distinction to Columbia as a global university."
— Gerry Lenfest

Enduring Support

H.F. "Gerry" Lenfest, University trustee, alumnus and benefactor, stepped onto the Columbia campus for the first time in 1955 as a student at the School of Law. He would go on to gain distinction as a pioneer in the cable television industry. But he never forgot Columbia. His enduring 53-year friendship with the University has resulted in more than $100 million of funding throughout Columbia, including vital support for the Earth Institute.

The commitment shown by Gerry Lenfest and his wife Marguerite to climate change, sustainable development and poverty reduction has translated into more than $28 million in support for the Earth Institute. In 2004, the Lenfest Foundation helped establish the first Millennium Village in Sauri, Kenya. That same year, the Foundation endowed the first professorship at the Earth Institute, currently held by Alissa Park. Additionally, a lead gift helped launch the Lenfest Center for Sustainable Energy, headed by Professor Klaus Lackner.

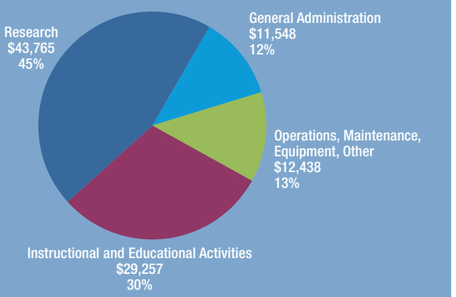
"These are urgent issues, and the world's leading scientists and experts will be drawn together by the Earth Institute to find practical solutions," Mr. Lenfest has said. "Our foundation is delighted to join in a partnership with the Earth Institute that will have a tangible impact and bring distinction to Columbia as a global university."

Financial Statement

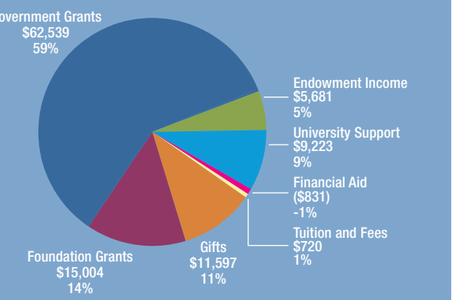
July 1, 2007-June 31, 2008

Dollar amounts in thousands.

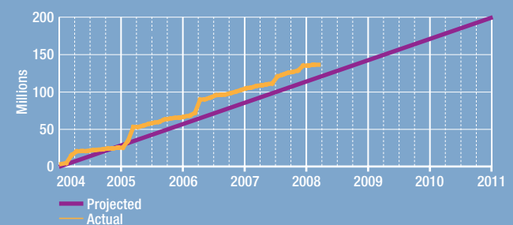
Expenses



Revenue



Thanks to the generous support of our donors, we have raised 65 percent of our campaign goal to fund research, professorships, scholarships and educational facilities.



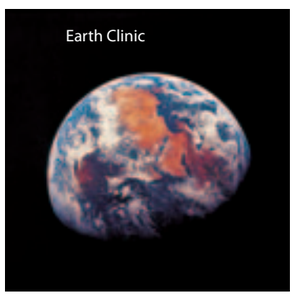


Photo: Eileen Barroso

Cross-Cutting Initative

- WATER
- ENERGY
- URBANIZATION
- HAZARDS
- HEALTH
- POVERTY
- FOOD, ECOLOGY & NUTRITION
- ECOSYSTEMS
- CLIMATE & SOCIETY

Our Donors

The vast body of work represented in the preceding pages only skims the surface of the diverse educational programs, initiatives and research projects conducted by Columbia University's extraordinary faculty, scientists and students whose collective knowledge drives the Earth Institute's agenda and impact on policy and decision making at local, regional, national and global levels.

At the core of all these efforts is our reliance on and appreciation of supporters who make this extraordinary work possible. We are heartened and grateful for the calls we receive every day from concerned citizens asking "What can I do to help?" Thank you for recognizing the unique contribution we are making to solving the most pressing global issues of the day. The Earth Institute is proud to acknowledge our generous supporters over the past year.

"The immense generosity, leadership and vision of our donors allow us to remain the world's leading academic center confronting the practical challenges of sustainable development."

— Jeffrey D. Sachs

Photo: Jennifer Swift-Morgan

DONORS IN ACTION: SUPPORTING THE MILLENNIUM VILLAGES

In June, six intrepid Earth Institute supporters—Joy Tartar of the Lenfest Foundation, George Hall, Nancy Best, Diane Troderman, Harold Grinspoon and Bonnie Potter—joined Earth Institute funding initiatives staff and 200 project staff in Bamako, Mali, for the third annual Millennium Villages retreat as part of a larger trip to Millennium Villages in West Africa. The trip was a unique opportunity for these donors to see on-the-ground results of the Earth Institute research they and many others have been supporting since 2004.

A partnership between the Earth Institute, the United Nations and Millennium Promise, the Millennium Villages project offers a bold, innovative approach to development. It is tackling hunger and disease and improving infrastructure and education to achieve the Millennium Development Goals, eight globally endorsed targets aimed at reducing extreme poverty by the year 2015. Our donors' generous support has enabled the Earth Institute and the Millennium Villages project to make a positive difference in the lives of countless individuals in 80 villages in Africa.

It is the bold approach of the project that inspires donors like Bill Gross and his wife Sue to support the Earth institute. "The Millennium Villages project reaches the poorest people throughout Africa and invests in their futures. We're happy to play a part in their growth and will continue to follow the development of these villages," says Mr. Gross.

While in Africa, our donors saw a few examples of the progress being made in the Millennium Villages. Tiby, Mali, has seen a boost in agricultural output and its health clinic now includes a maternity center, a waiting annex and a treatment facility. In Potou, Senegal, there is a new center for onion production and the local market has tripled in size over the last couple of years, thanks to agricultural inputs introduced by the project.

In other Villages, donor support has led to improvements in health care, schools, piping for fresh water and more. For example, some of Nancy Best's contributions have been used to support malaria programs in West Africa.

At the end of the retreat in Bamako, Jeffrey Sachs closed with words of encouragement to the many project staff and the donors in attendance. "You are effecting extraordinary change in people's lives and at regional, national and international policy levels. I cannot fully enough express my gratitude to all with whom we partner to make this transformative work possible."

Photos: Barbara Charbonnet, Jennifer Swift-Morgan and Earth Institute Archive

Left and right: Residents, donors and students in Millennium Villages.

Ceil and Michael Pulitzer

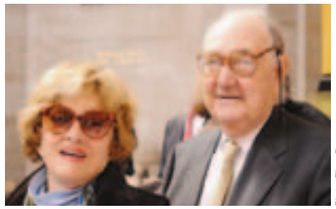


Photo: Eileen Barroso

Ceil and Michael Pulitzer have a long history with Columbia. Their family helped found the Journalism School in 1912, launching the careers of countless students. Today, the Pulitzers provide valuable scholarship support to Earth Institute students, such as sub-Saharan Africa candidates in the Master of Arts in Climate and Society Program.

The Pulitzers also support the work of Earth Institute researchers to develop solutions to climate-related problems, including finding better ways to access safe water for drinking and irrigation. Funding for the Koraro water project in northern Ethiopia has helped researchers develop methods of better capturing and storing drinking water in a drought-plagued region.

Ceil and Michael Pulitzer were immediately drawn to this particular research. "When we learned more about the work the Earth Institute was doing in Ethiopia," say Mr. and Mrs. Pulitzer, "it gave us an opportunity to support areas we are both interested in—Columbia University and sustainable development in Africa."

"It gave us an opportunity to support areas we are both interested in—Columbia University and sustainable development in Africa."

Joe and Barbara Ellis

Joe and Barbara Ellis' connection to the environment and to Columbia University took root when they were undergraduates at Columbia College and Barnard in the 1960s. At the time, there were few opportunities to take courses in environmental science.

"With the formation of CERC (the Center for Environmental Research and Conservation) at Columbia, this changed," say Mr. and Mrs. Ellis. "Columbia quickly became a leader in the environmental field, offering advanced degrees in conservation science and, most significantly, succeeded in establishing a special concentration in sustainable development at Columbia College," they add.

Mr. and Mrs. Ellis remain grateful for the way the Earth Institute "makes courses in sustainable development and environmental science available to students at Columbia" and "provides them with the more broadly rounded knowledge that is essential to dealing with global problems of environmental degradation, poverty and disease." They also appreciate the way "Columbia's exceptional faculty provides pragmatic solutions for the developing world."

The Ellis' continued support of projects like the Earth Clinic, the Earth Institute's main research-in-practice instrument, gives them the opportunity to show their support for both Columbia University and the pursuit of "economic and environmental solutions for people in need," they say.

"Columbia quickly became a leader in the environmental field, offering advanced degrees in conservation science and … succeeded in establishing a special concentration in sustainable development."

Sara Miller McCune

As a publisher who has worked in India for many years, Sara Miller McCune has seen and experienced the devastating effects of poverty first hand. When she first heard Jeffrey Sachs and read his book, *The End of Poverty*, she knew right away that she wanted to become engaged in the work the Earth Institute was pioneering to meet the Millennium Development Goals through the Millennium Villages project in Africa. "Less than two weeks after I first contacted Jeff, I delivered a check for $700,000 to Columbia to get started in the Ikaram-Ibaram village in the Ondo state of Nigeria," says Mrs. McCune.

When she visited Ikaram-Ibaram in 2006, Mrs. McCune renewed her commitment to the project. The schools in which hundreds of eager children were taking classes were lacking windows, desks and blackboards. "A year later, I received photos of renewed and newly built school structures, including separate sanitation facilities for girls and boys. I saw children working at desks with slates and chalk for practicing their letters and numbers. Following my visit, I sent supplies of educational materials for the teachers and the school library, many of which were produced by my own company," says Mrs. McCune.

Bill & Melinda Gates Foundation

In the fall of 2006, the Special Initiatives team of the Bill & Melinda Gates Foundation's Global Development Program made a grant to the Earth Institute to conduct research in multiple scientific disciplines to identify new ways to alleviate poverty. "The grant supports the collaboration of scientists and researchers across sectors, rather than in isolated disciplines," says Melanie Walker, senior program officer for special initiatives in the Foundation's Global Development Program. The grant also aims to help translate academic learning from the laboratory into the field so the poor can benefit from this multi-disciplinary scientific approach.

The core value underlying the work of the Bill & Melinda Gates Foundation is that all lives have equal value. "We recognize the importance of the work being done by the Earth Institute to bring the benefit of scientific research, understanding and innovation to the world's poorest people," says Ms. Walker.

In the developing world, the Bill & Melinda Gates Foundation is focused on improving people's health and providing opportunities for them to lift themselves out of hunger and poverty. "The focused, multidisciplinary work of the Earth Institute plays an important role in addressing global poverty and making progress against the Millennium Development Goals," says Ms. Walker.

"We recognize the importance of the work being done by the Earth Institute to bring the benefit of scientific research, understanding and innovation to the world's poorest people."

Jerome Paros

Jerome Paros is a leader in the field of measurement sciences. Holding more than 20 patents, he has also authored countless articles in the instrumentation field and is the founder of Paroscientific, Inc., and other related companies that manufacture sensors based on the quartz crystal resonator technology he developed. His products have improved the measurements of geophysical phenomena such as tsunamis and enhance our ability to understand the complex earth and ocean processes that produce climate change.

In 2006, Mr. Paros established the Jerome M. Paros-Palisades Geophysical Institute Fund for Engineering Innovation in Geoscience Research at the Lamont-Doherty Earth Observatory. This gift supports the development of new technologies and the application of existing technologies to aid Lamont-Doherty researchers in their studies of Earth. "This fund will make us better able to address many of the critical environmental issues facing society," says Mr. Paros.

In 2007, Mr. Paros established the Jerome M. Paros Senior Research Scientist of Observational Geophysics, a position now held by marine geophysicist Spahr Webb. "The goal of the senior scientist will be to conduct research to develop and deploy new instrumentation and measurement systems that will advance cross-disciplinary knowledge in the oceanic, atmospheric and earth sciences," says Mr. Paros.

Eryl Court

When Eryl Court decided to make an unrestricted gift to the Earth Institute, she elected to tithe a portion of her income. While tithing was a new way of giving for the Earth Institute, it was routine for Mrs. Court, who is the former Canadian vice president of the Unitarian Universalist-United Nations Office (UU-UNO).

Through her work at the UU-UNO, Mrs. Court has championed the Millennium Development Goals, since they were adopted by the UN General Assembly, through advocacy and outreach. Inspired by the Earth Institute's work in the areas of poverty alleviation and sustainable development, she decided to make it first on her list of charitable giving. "I am very impressed with Jeff Sachs and his work. If people can support the work of the Earth Institute, their money will be used in the best way possible," says Mrs. Court.

Tithing, in other words taking the first 10 percent of your income and donating it to your church or charity of your choice, is a mainstay of the faithful, and Mrs. Court's faith runs deep: "I would say that I have a faith in humanity—and I do what I can to promote the needs and the goals of humanity."

"If people can support the work of the Earth Institute, their money will be used in the best way possible."

OUR THANKS

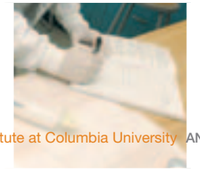
Our donors have made a difference this past fiscal year (July 1, 2007 - June 30, 2008).

Photo: Bruce Gilbert

Photo: Eileen Barroso

Photo: Ken Hunting

Photo: Eileen Barroso



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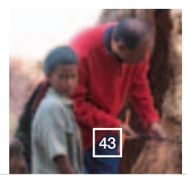

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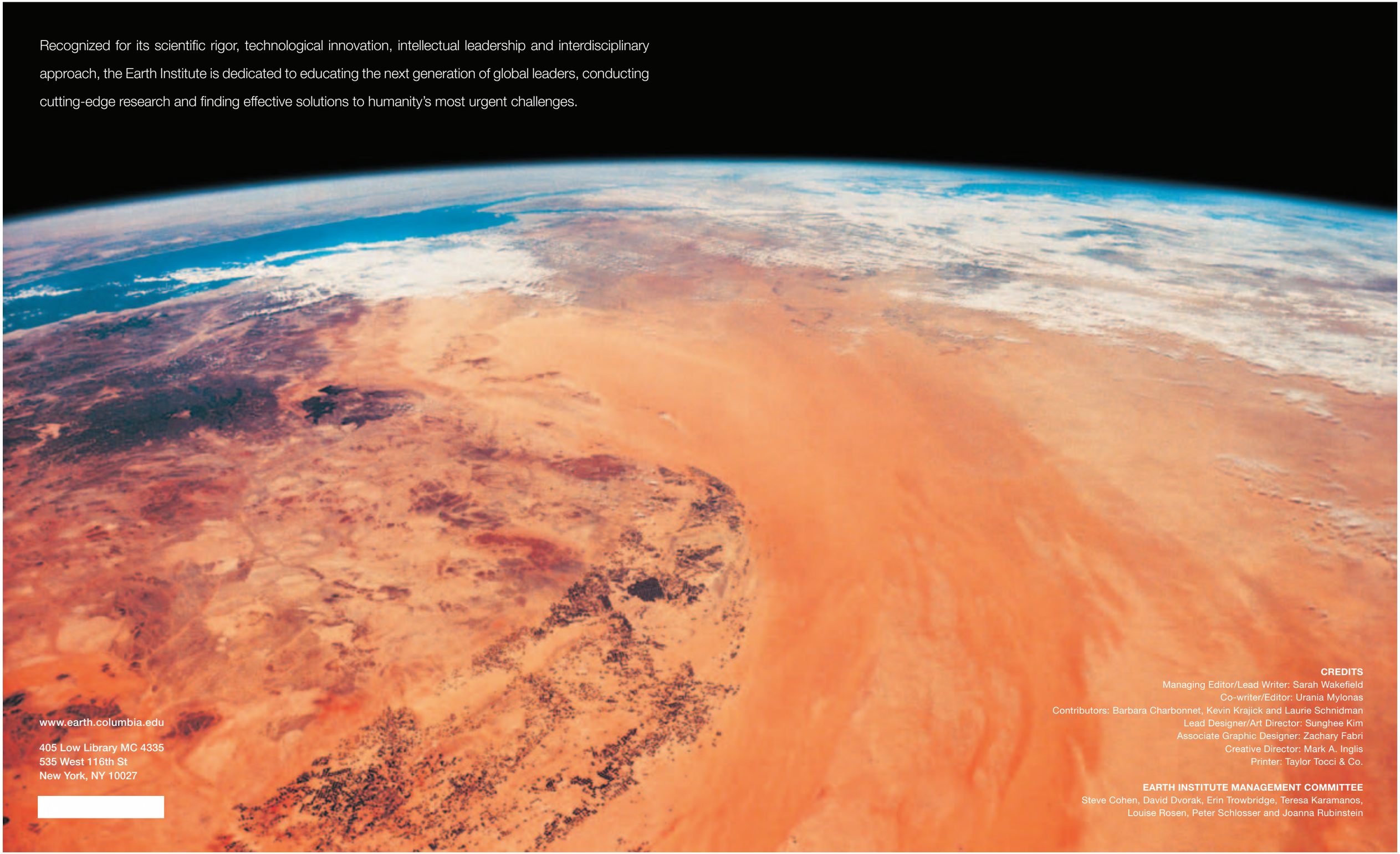

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