Promoting Public Service in Sustainability through Research, Education, Outreach, and Practice

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Introduction

This paper presents the portfolio of activities that Columbia University’s Earth Institute undertakes to serve the public good by employing research, education, public outreach, and practice to move toward a more sustainable global economy. The mission of public service is embodied in activities across Columbia University’s Earth Institute. While primarily a research institution, the Earth Institute blends natural, physical and social scientific research, and cutting edge technical knowledge with education, outreach, and practical application of knowledge to address the critical issues of global sustainability. The Earth Institute promotes the ideal of public service by connecting our students and the public to issues of environmental sustainability and showcasing the problem-solving capacities of the public and non-profit sectors.

The overarching goal behind the research of the Earth Institute is to achieve environmental sustainability in the context of a world of environmental challenges—from rapid population growth and climate change to extreme poverty and infectious disease. With Columbia University as its foundation, the Earth Institute draws on the scientific rigor and academic leadership for which the University is known to create an interdisciplinary community dedicated to cutting-edge research. The Earth Institute has built research units to examine every facet of global sustainability.

The Earth Institute has established a comprehensive set of education programs at the Undergraduate, Masters and Doctoral levels, including three Master of Public Administration (MPA) programs: the MPA in Environmental Science and Policy, the MPA in Development Practice, and the Executive MPA Concentration in Environmental Policy and Sustainability Management. The challenges of global sustainability are among the most difficult public policy problems that we face today, and training the next generation of sustainability leaders is critical to working towards solutions to these complex issues.

Serving the public through the practical application of knowledge is also an important feature of the Earth Institute’s work. Unlike many research institutions, the Institute is dedicated to application of our knowledge to help people around the world live better and more sustainable lives. Our work does not end in the lab. Our faculty and researchers regularly advise policymakers, work directly with government agencies and NGOs to implement and assess sustainability programs, and provide opportunities for students to directly serve the public good. Many of our education programs culminate in Capstone projects where student teams analyze real problems for clients in government and nonprofit agencies. This allows students to contribute a public service for clients whose missions Columbia University and the Earth Institute support.
The Earth Institute also convenes hundreds of public lectures, conferences, and media events each year, connecting critical science to policymakers, students, and the general public. The Earth Institute’s website was developed to be the go-to resource for information on sustainable development. Our public outreach extends to other outlets, including a regular blog on the Huffington Post to support the need for sustainability education, environmental policy and public engagement in sustainability problem solving.

This paper describes the complex challenges of global sustainability that threaten our continued existence on this planet. We present the case for sustainability and what we, as a society, need to do to put the planet on a path toward a renewable green economy. Next, we introduce the Earth Institute, a unique academic institution, and describe its history and mission. We describe how, through research, education, outreach and practical application of knowledge, the Institute promotes the ideal of public service by connecting our staff, students and the public to challenges of and solutions for sustainability.

The Challenges of Global Sustainability

In the past several decades, we have developed what we sometimes call a “brain-based economy.” The high value added elements of modern economic life involve analytic concepts, technological development, mathematical models, communications, and creativity. We have developed a highly mechanized, energy intensive, high throughput economy that is using up the planet's resources at a ferocious pace. This has resulted in rising prices of raw materials and in massive destruction of environmental resources that provide us with free "ecological services" such as clean water and air. Shutting down this economy to prevent further damage is not an option. Instead, given the needs of the developing world, the world's economic production and consumption will grow dramatically throughout the 21st century. The only way this growth can be both achieved and maintained is if we pay far more attention to the natural resource base of our economies and the impact of economic development on self-renewing, interconnected ecological systems.

Through a combination of population growth, economic growth, the pattern of material consumption, and ignorance, human impact on environmental systems threaten to damage those systems and their ability to sustain human life. Climate change is one of the obvious impacts of human activity, but it is by no means the only impact and it may not be the most difficult to address. Our production of chemicals that have toxic impacts on ecosystems and harm a variety of living species (including the human variety) may prove to be more difficult to mitigate than climate change. The fact is we do not know enough about human impacts on this planet.

The pressure on the planet from the combined impact of population and consumption is being replaced by pressure from increased consumption alone. Asia, Latin America, and eventually Africa will be increasing their level of material consumption for the foreseeable future. The idea of reducing
consumption is a popular idea with some in the environmental community, but on a world-wide basis has no real relevance. People with few possessions and little food are not interested in reducing consumption. In nations with a growing middle class there is also the problem of the connection of wealth and consumption to political power and political stability. Once achieved, people fear the loss of material security and well-being. One only needs to examine public opinion polls in America when the economy is in decline to understand the political impact of economic insecurity. When the economy is in decline, every elected leader in the country stops talking about everything except for job creation. Reducing consumption and reducing economic growth are politically infeasible prescriptions for environmental sustainability. We need to protect the planet, but we will not get very far if our method of protection is to slow down the economy.

We know what won't work, so what will work? In our view, the solution is something we have come to term sustainability. In simple terms, sustainability involves these critical and complex steps:

1. **Earth Observation:** We need to understand the earth's living and physical systems and be capable of measuring and modeling the impact of human activity on those systems. Humans are living creatures. We require non-toxic air, water, and food to live. Our understanding of the planet is growing but still very incomplete. Many of the earth's resources are fixed and finite, and environmental and earth system processes are complex and are not yet completely or widely understood. Scientific research is required to continue to advance our knowledge of these systems so that we can ensure our ability to sustainably utilize them in the long-run. It seems that no other type of science could possibly be more vital than the science of earth observation.

Earth system processes are complex and cannot be understood without detailed observations and sophisticated analyses. Basic research advances society's knowledge, so that it can be applied to improve our resiliency in the face of environmental change and stress. Earth system science provides the fundamental evidence base for humanity's decisions, but the fact is that we know far more about the functioning of our economy than about the planet. It is imperative that we expand our collective understanding of natural resources, earth and environmental processes, and biological systems. We must continue to learn about the resources we have at our disposal, the processes that create and sustain them, and, perhaps most importantly, the short-term and long-term impacts we are inflicting on these resources and systems. The discovery of fundamental knowledge over time has allowed us to improve our standard of living and holds the promise of a sustainable planet.

2. **Regulation:** We need to regulate human activities, production and material consumption to minimize damaging impacts on the planet's living systems. This means we need to understand the planet's ecosystems and the impact of the substances we are introducing to those systems.
We then need to reduce and control negative impacts. In developed nations, this occurs through environmental law. Those laws must be modified as new technologies are introduced. We also need to introduce the precautionary principle to the introduction of new technologies. We require prior testing of drugs before they come to the marketplace; we need to extend that principle to the introduction of new technologies.

3. **Sustainability Management:** Each organization and every organizational manager must understand and carefully manage the energy, water and other materials used by their organization. They must also understand and carefully manage the amount and impact of the waste generated by their organization's activities. Just as managers understand finance, human resources, strategy, marketing, law and information, they must also understand the physical dimensions of their organization's activities. The management of the physical dimensions of sustainability must become a routine management action, as commonplace as the application of generally accepted accounting practices. Of course to do this, we will first need to develop and adopt generally accepted sustainability metrics. The efforts to develop these metrics are still relatively primitive, and resources must be invested to develop these critical measures.

To build a more sustainable world economy we will need to change how we produce goods and services and gradually change the nature of what we consume. We need to end the practice of using finite resources once and then dumping what remains as waste in holes in the ground—or emissions into the atmosphere. We need to recycle more and use more organic, biodegradable substances in production. We need to move off of fossil fuels and replace them with renewable energy. Increases in consumption will need to be less oriented toward "hardware" and more oriented toward "software". The transition to a sustainable renewable global economy will only succeed if it is integrated into efforts to achieve other economic, social and political goals. If sustainability is seen a threat to a way of life that people value, or if it threatens the power of the entire economic elite, the transition to a renewable economy will be very difficult to achieve. A sustainable economy can be compatible with economic growth, but only if we do a much better job of understanding and managing the environmental impacts of economic production and consumption.

**The Earth Institute’s History and Mission**

An interconnected set of problems maybe seen as the heart and the circulatory system of the world's environmental crisis. These complex global problems cannot be solved by any single discipline, academic department, or school. The Earth Institute at Columbia University is a new form of academic organization designed to institutionalize interaction among many academic fields and professional
disciplines to address the problems of global sustainability. The Earth Institute has built a truly interdisciplinary community to understand and address these issues.

To truly understand and appreciate the uniqueness of the Earth Institute and what it aims to achieve, it is important to understand the history of American higher education and how it has evolved. When Columbia University began as King's College in lower Manhattan in 1754, it provided a classical education in philosophy, history, and science; and it provided its students, such as Alexander Hamilton, with the knowledge needed to lead the new nation. As our higher education institutions evolved in the 19th and 20th centuries, we saw a system firmly based in meeting the practical needs of a growing economy and an increasingly more complex society. The land grant colleges focused on the development of agricultural technology and outreach to farmers to teach new farming techniques while urban universities, like Columbia, began with traditional arts and sciences academic departments such as biology, history, and philosophy and came to include professional schools like law, engineering and medicine. For example, one of the missions’ of Columbia's School of Mines (now the School of Engineering and Applied Sciences) was to help figure out how to dig into Manhattan’s bedrock to build New York's subway system.

In the 21st century, the preeminent need of our economy and society is to solve the problem of global sustainability. How do we create the high throughput economy that provides a decent life for the planet's seven billion people, without destroying the ecological systems that we depend on? We are all biological creatures and we require food, water, and air to live. If we continue the style of economic growth now underway, we will destroy the planet's capacity to provide safe water, food, and air for all of us. To address the problem of global sustainability we need to bring together the knowledge of many academic and professional disciplines. We need ecology, engineering, environmental science, chemistry, physics, law, medicine, public health, economics, political science, public policy, ethics, and management. We need to bring these fields together to help address the problems of climate change, renewable energy, ecosystem maintenance, water quality, food production, air quality, waste management, and the manufacture of goods and services with the least possible environmental impact.

The problem with the modern university is that it is organized around disciplinary fields, like biology and economics, or professional skills, such as engineering and law. While public policy schools have brought together many fields to attempt to solve policy problems, and business schools have done the same in attempting to train business leaders, both lack the grounding in sciences and engineering needed to address the issues of global sustainability. What is needed is a new form of academic organization that is university-wide, designed to facilitate and systematize interaction and collaboration among all of these fields to address the challenges of global sustainability.
The Earth Institute, created in 1996, is precisely that: a new form of academic institution that integrates the knowledge base of the 21st century university to address the problems of global sustainability. We have close to 800 people on staff, including approximately 500 who work on our Lamont Campus, located on 150 scenic acres overlooking the Hudson River about 20 miles north of New York City. Our annual budget is about $135 million a year, most of it from competitive scientific grants awarded by the U.S. federal government. The mission of this new institution is set by our director, Jeffrey Sachs, along with a governing council of 50 Earth Institute faculty members. This faculty includes 35 senior research scientists and tenured professors who hold appointments in 16 departments and schools. Our activities are deeply embedded within Columbia University, spanning three campuses. The Institute does not sit within a school, but rather reports directly to the Provost and is considered part of the central administration of the university.

The Earth Institute’s mission is to develop programs of research, education, outreach and practical application of knowledge to address the critical issue of global sustainability. We leverage excellence across academic disciplines to develop and implement holistic, trans-disciplinary approaches to develop solutions to the world's most pressing challenges. The Institute works to expand our understanding of the Earth as one integrated system – studying the earth and its environment, human society, and the interaction between the two while training a new generation of interdisciplinary practitioners equipped with the tools to address this great challenge. We bring together the people and tools needed to address the world's most difficult problems.

Research

The Earth Institute is the largest research institute at Columbia University. The Institute mobilizes world-class scientific expertise and fosters interdisciplinary research and problem solving across nine cross-cutting themes. It includes over two dozen research centers and programs examining every aspect of sustainability. Much of our work is to support the community of senior and junior researchers working on this new interdisciplinary field of sustainability. The interdisciplinary aspect of the Earth Institute is centered on nine fundamental research themes:

Research in Climate and Society investigates humankind’s role as both driver of and responder to global climate. Our research in Water addresses the potentially global crisis of freshwater scarcity. Research projects that address Energy focus on major energy sustainability objectives—such as the development of energy resources without increased carbon emissions and the recovery of renewable energy from solid wastes. Our research in Urbanization looks at how growing urban populations threaten the sustainability of cities and natural resources, while also examining how cities can be important laboratories for innovative sustainability policy. Our Hazards and Risk research aims to deepen the
world’s understanding of a range of hazards and risks, from hurricanes to drought to earthquakes, which often become particularly threatening in highly populated areas.

**Global Health** research addresses both the environmental factors that affect human health, the ways in which a population’s poor health in turn inhibits environmental sustainability, and the methods of delivery of health systems. **Poverty**-related Earth Institute projects aim to reveal and work toward the mitigation of root causes of extreme poverty while research on **Food, Ecology and Nutrition** works to ensure the sustainability of regional factors of human health, such as agriculture, clean water access, and nutrition. Finally, the Earth Institute’s research theme of **Ecosystems Health and Monitoring** aims at stemming the loss of biological diversity in order to achieve environmental sustainability.

To help promote interaction along these themes and among our many research units, we established the Cross-Cutting Initiative to seed new interdisciplinary research that joins researchers from our different centers and across the University. Most of the scholars involved in Earth Institute research projects are also actively engaged in the more traditional discipline-oriented research activities of their respective research units and/or affiliated departments. Core research questions that researchers pursue through the Earth Institute tend to have two distinguishing characteristics: greater complexity and interdisciplinarity, and a more direct link to our mission of understanding and advancing global sustainability. Our research initiatives are designed to encourage greater synergies between disciplines and across units. The Cross-Cutting Initiative, an internal competition funded by the Institute, is one of the programs largely responsible for shaping these core multi-unit research activities. Through allocation Cross-Cutting Initiative seed funding, Earth Institute scholars apply their expertise to bridge disciplines via theme-driven research in response to complex global challenges. This funding program aims to establish new methods to bring together faculty and scientists from different fields to achieve new insights into intrinsically cross-disciplinary problems and work toward practicable solutions.

Similarly, we established the Earth Institute Postdoctoral Scholars program to encourage new scholars to engage in multidisciplinary work. This is a unique and premier program for young scholars embarking on their career to engage in research across multidisciplinary teams. Unlike many recent PhD graduates entering postdoctoral positions where they begin a discipline-focused career, these scholars have the opportunity to build a foundation in one of the core disciplines represented within the Earth Institute (i.e. social, earth, biological, engineering, and health sciences), while at the same time acquiring the breadth of cross-disciplinary expertise needed to address critical issues related to sustainable development.

In addition we provide staff support to convene research groups and to draft proposals and sections of proposals. Our goal is to encourage our faculty and researchers to invest their scarce time in
brainstorming and formulating research goals and methods and leaving the background work to staff in order to reduce the effort required to generate proposals.

These activities build the scientific base that we need to solve the challenges of global sustainability. The faculty, scientists and staff at the Earth Institute are mission-driven, seeking fundamental knowledge about our planet in order to protect it, serving the public good by enhancing our collective knowledge of critical natural, physical and social systems.

**Education**

The Earth Institute is dedicated to training a new generation of sustainability professionals equipped with the interdisciplinary problem-solving tools to address critical environmental problems. One of the Earth Institute’s long-standing strategic goals has been to create a comprehensive set of educational programs from the undergraduate to the doctoral level. This reflects a deliberate decision by the Director and the Earth Institute Faculty to enhance Columbia’s reputation as a leader in environmental education and to be seen as a peer to world-class institutions, such as Duke’s Nicolas School and Yale’s School of Forestry. Our goal was to put Columbia in this group, to be known for its portfolio of environmental and sustainability education programs.

The Institute is not a school and does not grant degrees, but it has partnered with schools to create and, in many cases, manage eleven educational programs. We also help to promote 19 other programs in environmental education at Columbia. Earth Institute educational programs include non-credit programs of executive education and trainings, but they also include the following degree and certificate programs:

1. PhD in Sustainable Development,
2. MS in Sustainability Management,
3. MPA in Environmental Science and Policy,
4. Executive MPA Concentration in Environmental Policy and Sustainability Management,
5. MPA in Development Practice,
6. MA in Climate and Society,
7. Undergraduate Major in Sustainable Development,
8. Undergraduate Special Concentration in Sustainable Development,
9. Certification in Sustainability Analytics,
10. Certification Sustainable Water Management, and
11. Earth Institute Certificate program.

Columbia has now established itself as a global leader in sustainability education, providing a comprehensive set of offerings that meets the wide variety of professional-level needs in this growing field.

We created the PhD in Sustainable Development (the first of its kind) in 2004 to establish a new generation of young research scholars who are uniquely trained in multiple disciplines. The purpose of
this doctoral program is to create a generation of scholars and professionals equipped to deal with some of the most crucial problems in the world today. By starting their career engaging in multiple disciplines, these scholars have a unique advantage tackling research questions that are most important to global sustainability. The program includes a set of rigorous core requirements, but also provides students with the flexibility to pursue in-depth research in a broad variety of critical sustainability policy issue areas. By combining elements of a traditional graduate education in social sciences with a significant component of training in the natural or physical sciences, the program's graduates are uniquely situated to undertake serious research and policy assessments with the skills to create new insights in traditional fields.

In recognition of the importance of study for aspiring sustainability professionals, the Earth Institute developed varied program delivery and content options for environmental policy and management curricula, enabling this type of study to reach diverse audiences. The Institute works with schools and departments to provide a variety of professional, terminal master’s degrees in sustainability policy and management. While there is some overlap among the five professional masters programs, each is designed to meet specific and distinct needs. The Earth Institute works hard to differentiate these programs to prospective students. For example, we offer an in-person informational session that features all the masters programs where prospective applicants learn about each and the differences between them.

While each of these programs is unique, the programs share core common features including: 1) a set of environmental science requirements; 2) an interdisciplinary, systems-thinking approach; and 3) practical hands-on training and professional skill-building. All programs emphasize the complex and systemic nature of environmental issues and focus on the practical skills necessary to deal with such issues. Each program highlights the need for sustainability managers and policy makers to be well versed in the following subject matter: environmental science; quantitative analysis; public policy; finance; economics; and management. All programs offer students a cross-disciplinary learning experience, combining courses in the natural and physical sciences with traditional management, economics and policy courses. Further, environmental science is integrated into non-science course materials using carefully selected data, examples, cases, and assignments. Students learn technical skills (economics, policy analysis, management, etc.) but applied to environmental issues. Students are immersed in the study of environmental sustainability – it is not a part of a broad curriculum, but central to it.

The professional and practical skills required to address sustainability issues are taught in all of these programs. Though the curriculum structure and methods of instruction of each program differs in certain aspects, the following professional skills are developed in each program:

- Team management;
- Communication skills such as concise memo writing and effective oral briefing;
- Managing organizations to be adaptable and innovative;
• Analyzing anticipated costs and benefits;
• Quantitative analysis;
• Ability to work under financial, bureaucratic and political constraints; and
• Ethics.

The programs are also strengthened by each other. Sharing elective courses and co-curricular activities are ways that these programs build upon each program’s strengths and create a common pedagogy. By sharing courses, not only do students have a similar framework of decision-making skills and tools, but they also share the same discourse of the topics at large. This also allows the students across programs, backgrounds and goals to interact with each other, learn from each other, identify crosscutting themes, and build professional relationships.

These programs are an effort to address the needs of the growing sustainable economy and the important role of the educating professionals to engage in, manage and regulate sustainability practices. While these five programs undoubtedly compete with each other, they also complement each other and provide students with a wide range of options. We believe that providing this material in multiple formats provides two signals to prospective students: 1) Columbia University is serious about sustainability studies and has a comprehensive set of offerings available; and 2) whatever format or focus a student prefers, we probably have a program that can be tailored to meet their needs.

Why are we doing this? We are doing this because future policymakers, public administrators and leaders and CEOs of the 21st century need to understand basic environmental processes in order to be effective managers. An individual versed in environmental policy and sustainability management who hones these skills can succeed in careers in the public, non-profit and private sectors in a range of roles. What we have started to call the "physical dimensions of sustainability" create controllable costs in every organizational setting; in non-profit organizations, small businesses, multi-national corporations, and government agencies. Decision makers must have insight into the natural resources and inputs that sustain their organization or business. They need to know the costs and uses of energy, water and raw materials needed in their operations. They must also understand the impact of their production on the natural environment. Ask BP, after the Gulf of Mexico, or GE, after their experience with PCBs in the Hudson, if they think that is important knowledge for management to have. An education that includes basic science allows graduates of management and public policy programs to serve as managers and policymakers with the environmental and earth science information that is increasingly necessary to evaluate complex information and make informed decisions.

Students in these programs are challenging their faculty to develop creative solutions to the world's crisis in environmental sustainability. When faculty tell students that they believe the current forms of consumption may evolve, and become less destructive, but will still remain central to the planet's political economy -- students question our assumptions and force us to rethink basic premises. When we
tell them that it will take a generation or more to complete a transition from fossil fuels to renewable energy, they tell us why they think it will happen much faster. The generation of students in our graduate and undergraduate programs recognizes the intense challenge they will face as they come of age. They are looking for new approaches to economic life that will permit the material comfort they have grown up with, while keeping the planet intact. They are also dedicated and focused on learning and communicating the lessons they are learning about sustainability.

**Practice**

Applying research knowledge to help communities achieve sustainable development is a significant part of the Earth Institute’s work. We put science to work on real world problems. Our practice is informed by our research, thus bringing the most advanced knowledge base to applied work. But also our research benefits from exposure to the real world issues that practice requires that we confront. Our experts serve the immediate needs of society by responding to pressing economic and environmental problems locally and internationally. The Institute's practitioners apply the lessons from our basic research to real-world problems, and they offer science-based assistance on urgent issues of sustainable development, including: water, climate and society, energy, urbanization, hazards and risk reduction, global health, poverty, food, ecology, nutrition, and ecosystems health and monitoring. But practice is not simply about community service. It also enhances our research and when we involve students provides learn-by-doing experiential learning.

What distinguishes the Earth Institute from some university-based organizations is our willingness to engage directly with stakeholders and clients in long-term efforts to improve sustainable development, help introduce new technologies, policies, and institutional approaches to solve real-world problems, and evaluate what does or does not work. This requires building trust with the communities affected by these approaches, developing objective measures of progress and improving data and information systems, and taking into account societal values, perceptions, and behavior in crafting practical solutions that improve human welfare and ameliorate adverse effects. Our research centers build strong relationships with stakeholder communities and key public, non-profit and private sector partners. They lead the development, testing, and implementation of new technologies, data, and service; provide training and technical assistance to organizations around the world; and help scale up innovative solutions from the laboratory to regional, national, and global audiences.

One of our main practice instruments, the Earth Clinic, is designed to serve immediate needs in developing countries by creatively responding to pressing local economic and environmental problems. These needs are identified and analyzed; then suitable applications or interventions that help to ensure sustainable development are devised. The Earth Clinic offers science-based assistance to urgent issues of
economic development, public health, energy systems, water management, agriculture, and infrastructure. The clinic’s work differs from traditional consulting or non-profit work in that it brings a solid academic component to problem solving. An important element in this effort is close work with local partners on design and implementation to ensure long-term project effectiveness. Much of the Earth Clinic’s work stems from current Earth Institute research projects that have developed interventions ready for application on the ground. Current projects include: expanding healthcare in Ethiopia; reducing arsenic exposure in Bangladesh; and creating new tools to enable farmers to make real-time diagnoses of soil health.

In addition, we regularly utilize our education programs to engage in practice work. The MPA in Environmental Science and Policy, the MS in Sustainability Management and the Undergraduate Major in Sustainable Development all culminate in Capstone Workshop projects where student teams analyze problems for clients in government and nonprofit agencies. Our students have now completed approximately 100 of these projects. The capstone provides practical training gained by working on real problems where student analyses and reports can have an impact on actual public sector operations. The goal is to teach students how to integrate their understanding of natural science, social science, policy studies, and management in a problem-solving exercise. In addition, it allows students to contribute a public service for mission driven clients. The capstone experience presents students with the opportunity to make real contributions to management problems in organizations. Public and non-profit organizations gain access to top-quality analysis at no cost plus the benefits of professional networking with top-quality graduate students about to enter or return to the community of environmental professionals. Students gain exposure to the industry, professional experience, and the ability to work on a project that contributes to the mission of the Earth Institute. Everyone benefits from the lessons learned since we post all workshop reports on our web site.

Two of our other masters programs, the MPA in Development Practice and the MA in Climate and Society, both incorporate field internships across the globe where students work firsthand on critical issues of sustainability. In the MPA in Development Practice, a three-month placement is designed to provide students with practical work experience in sustainable development practice and provides a holistic learning experience, deeply grounded in the local context. Students in the MA in Climate and Society program similarly spend the summer engaging directly on work to understand and cope with the impacts of climate variability and climate change on society and the environment.

**Outreach**

The Earth Institute strives to bring science and solutions developed within the Institute to the public. Through events, our website and blog, and media appearances by our faculty and researchers, we
deliver information to public audiences interested in sustainability. We aim to bring sustainability education to a global audience.

Earth Institute researchers are widely recognized as experts. For example, after Hurricane Sandy, we were in the news over 100 times in major media outlets. Between July 1, 2013 and March 31, 2014, over 1,500 Earth Institute experts were cited by media sources. The top stories during this period included policy recommendations and lessons learned at the one-year anniversary of Hurricane Sandy, and how the rise of the Mongol empire was aided by unusual weather and why many modern Mongolians may be driven off of their land due to climate change. Media outlets also extensively reported on research from the Lamont-Doherty Earth Observatory, the scientific heart of the Earth Institute, including a study to support the idea that oceans are absorbing excess heat from global warming and that the middle depths of Pacific Ocean temperatures have warmed 15 times faster in the last 60 years than they did during apparent natural warming cycles in the previous 10,000 years. We strive to connect to the media and to provide our scientists with the skills to communicate science to non-scientists. We provide training and expert staff assistance to support these efforts.

Managing our online presence—website, social media accounts and the blog—is one of the most important and relevant ways that we disseminate information and connect with our audience. The Earth Institute website is an essential tool in educating the public about critical issues of sustainability and remains a critical component of the Institute’s public outreach. The website, including the State of the Planet blog, is increasingly viewed as a go-to resource for information on sustainability. In fiscal year 2014, the website received over 475,000 visitors who accounted for more than 1.2 million page views. Web traffic was heaviest on pages related to our missions and to solutions for the challenges of sustainability. The State of the Planet blog itself gets roughly 40,000-50,000 visits a month; it received over 220,000 visitors in the first half of 2014 with over 300,000 page views. In addition, we developed a Massive Open Online Course (MOOC) to further reach the online audience interested in our mission of sustainable development. Jeffrey Sachs launched the free, global online course “The Age of Sustainable Development” in January 2014. This 14-week, university-level course was available through Coursera and open to anyone interested in the field of sustainable development, including students and development professionals working in government, corporations, and non-profit organizations.

In addition to enhancing the global citizenry’s understanding of sustainability through our online presence, we regularly convene hundreds of public lectures, seminars, conferences and events each year in New York City. Between July 2013 and May 2014, we held over 100 events across various units of the Earth Institute. These events bring together faculty, scientists, students, alumni, New York City professionals, and members of the local community to Columbia’s campus to learn, discuss and engage on all areas of sustainability.
Also new in 2014, we launched Sustainability Essentials Training, an in-person, noncredit training for anyone interested in the basic concepts of sustainability. This program was developed for people who wish to explore the concepts and principles of sustainability and who want to learn how to introduce sustainability practices into their organizations, new projects, and other aspects of their lives. The program offers well-designed lectures and participatory learning experiences designed to address key questions of sustainability; it is based on the same core elements that are taught in the M.S. in Sustainability Management. The training comprises four modules combining lectures, discussions, and in-class exercises that address key elements in understanding and practicing sustainability. The program is offered every fall and spring semester and can be completed in a single semester, or participants can choose to complete it over a longer period of time. It also enables participants to become part of the Earth Institute community, which makes it easier to learn about and access the Institute’s broad variety of public education offerings, including free lectures and events as well as our credit-bearing academic programs.

**Conclusions**

As the world gets more crowded and complex, universities are in the process of evolving to meet the needs of that changing world. Academic departments and professional schools will remain, but these "stove-piped" independent organizations must find a way to work together to address the pressing issues of our time. At Columbia, we are seeing the start of a second university-wide institute. The Mortimer B. Zuckerman Mind, Brain and Behavior Institute, will bring together scholars from medicine, psychology, biology, and other areas to understand the human mind. As the Earth Institute mobilizes all our knowledge to understand the world outside the human species, the Zuckerman Institute will work to understand the world within the mind of our species.

These 21st century academic initiatives are exciting and of course are greeted with great skepticism by traditional scholars, not to mention deans. As we learn to deal with the complex planet we live on, we will need all forms of knowledge: disciplinary, professional and interdisciplinary. Universities are being challenged to adapt to this new world, and although it is not yet clear they are up to the challenge, they need to be. However, while universities seem to have an image problem these days, the on-the-ground view that we can offer from one university is not likely to make the evening news. It is a world of hard work, struggle, and accomplishment. We see people who have come to school to develop the skills they need to get ahead. They tend to be focused and ambitious. However, they are not alone in their concern for this planet. All the scientists, faculty and practitioners that we interact with at Columbia and elsewhere talk about environmental issues. Environmental policy was a small, fringe issue just a few decades ago. Today it is at the center of a global discussion. The challenge of global sustainability is now part of the permanent agenda of concerns that young people have internalized. The people who have
come to Columbia to study sustainability are incredibly dedicated and give us reason to hope. Colleagues at many other universities share my sense of hope. Again, it is not just students studying sustainability who care about the planet. Students in public policy, health, law, business, engineering, journalism, and nearly every professional field, understand how the world has changed.

Today, learning is even more essential if we are to understand and come to grips with the crisis of global sustainability. We are going to need to learn and think our way out of the crisis we have created. This will require a detailed knowledge of our planet's systems that we do not yet possess. It will require ever more sophisticated models of the impacts of human production and consumption. This means that massive resources must be devoted to earth observation, research, and development of sustainability technology and a range of scientific, policy and management education programs. We need to mobilize, on a war-like footing to save the planet and learn to produce enough goods and services to ensure environmentally sustainable economic growth on a global scale.

Today, the Earth Institute has well over 700 students studying in sustainability programs throughout the university. We have nearly 1,500 alums. Times have changed, and the issue of environmental sustainability has moved from the fringes of the political dialogue to the center of it. World leaders, business leaders, and thought leaders are focused on sustainability and it is clear that the emphasis on preserving our planet is here to stay. The Earth Institute has begun a process to engage our local and global communities in issues of sustainability. This work extends from basic earth systems and applied research, to educating the next generation of sustainability policy and management professionals, to implementing solutions to environmental challenges informed by cutting edge science, and finally to informing all interested parties about the earth and our impact on it. We are executing on a bold vision for global sustainability, and showcasing the problem-solving capacities of an engaged, public-service driven community and the impact that community can have on the challenges we face as a global society.