For the last four years, Earth and Environmental Studies Professor Mark Chopping has been mapping changes in Arctic tundra on the Alaska North Slope with the help of a Terrestrial Ecology Program grant from NASA.

The first NASA Earth Observing System satellite became operational in 2000. “We hope to be able to map and quantify the changes in tall shrub cover in Arctic tundra over the period 2000 through 2012,” Chopping says. “Remote sensing of vegetation in the Arctic is challenging because of cloud cover, low sun elevation, currently low shrub cover and intrinsically dark surfaces.”

“Shrubs affect climate because they absorb more sunlight than other tundra vegetation in summer and they help snow insulate the land surface in winter from cold Arctic air, promoting permafrost thaw and soil microbial respiration,” Chopping explains. “This potentially releases large volumes of the greenhouse gases methane and carbon dioxide. By mid-century, we are likely to see very rapid and very large releases of these gases from Arctic soils.”

Chopping sees climate change as a bio-directional process. “It affects Arctic ecosystems and the changes in Arctic landscapes are affecting climate.”

Yet the impact of these changes is not confined to the Arctic. Changes in Arctic amplification—or surface warming at high latitudes—have the potential to cause extreme weather like cold spells, heat waves and drought even in New Jersey.
Understanding dialect variation

Psychology Professor Jennifer Pardo hopes to gain greater understanding of the differences in dialects and accents with the help of a grant from the National Science Foundation (NSF).

“My research focuses on acoustic-phonetic variation in conversational settings,” says Pardo. “The aim is to understand how personal and situational factors influence the production and perception of spoken language.” Her three-year grant allows her to continue her work on the differences in the ways people pronounce consonants and vowels—particularly in accents or dialects—a study that was also funded by the NSF. “We are hoping to understand the mechanisms behind patterns of dialect variation and people’s ability to modify their accent—or not,” she explains. Six graduate and undergraduate students are currently assisting Pardo in this work.

By recruiting equal numbers of male and female participants and including minority groups in all activities, Pardo’s project also broadens the participation of underrepresented groups in psychology studies. “Speech production is highly variable,” she says. “My research bridges gaps between psycho- and social-linguistic approaches by treating speech-variability as an integral part of a talker’s cognitive and social repertoire.”

“It makes a difference in how they perceive themselves. And that affects the choices they make.” — Robert Reid

Through research with the youth, Montclair State’s specialists are finding that their work is also improving attitudes among the teens regarding the importance of school, getting tested for HIV and not engaging in risky behaviors. The services provided through Project COPE (Communities Organizing for Prevention and Empowerment) are endorsed by the Centers for Disease Control and Prevention and specifically target at-risk African American and Latino teens, ages 12 to 17.

“In order to continue getting federal funding, we have to show the outcomes of what we’re doing, so we are always evaluating the program’s effectiveness,” says Associate Professor and Principal Investigator Robert Reid.

The program, a collaborative effort between Montclair State and numerous community-based organizations, helps social services agencies by providing health education and intensive case management services.

Prevention specialists connect individuals and families with community resources and work with them to avoid risks in their communities. The program provides workshops not only on substance abuse and HIV/AIDS but also on other sexually transmitted diseases, tobacco use prevention, healthy relationships, career development and gang awareness.

Current funding for the program runs through September 2013, and Reid has applied for a Drug-Free Communities grant from the White House Office of National Drug Control Policy and the Substance Abuse and Mental Health Services Administration to continue the work well into the future.

“We give the youth the information they need,” says Reid, who works with co-investigator Dr. Pauline Garcia-Reid and several interns each semester.

“Some of the young people have told us that it is the first time someone took an interest in them and really cared,” Reid says. “It makes a difference in how they perceive themselves. And that affects the choices they make.”
Training science teachers

To improve science education in New Jersey schools, a team of five Montclair State faculty members will implement a five-year project that will train science teachers and support scientific research in the classroom.

The project, the Wipro Science Education Fellowship Program, is supported by a $1.3 million grant from Wipro, an India-based IT corporation.

The team includes Mika Munakata, Jackie Willis and Colette Killian of the College of Science and Mathematics and Emily Klein and Monica Taylor of the College of Education and Human Services.

Teachers will engage in a two-year professional development program that will “nurture classroom research and the implementation of new methods of teaching,” Munakata says. “We want teachers to focus not only on the content, but how you work with the content.”

Another aim is to improve teacher retention by preparing veteran teachers to train new teachers.

The project will involve more than 60 teachers from high-needs schools in Clifton, Montclair, Kearney, Paramus and Orange, who were chosen “on the strength of their applications, enthusiasm and past relationship with the University,” says Taylor. In addition to the research conducted by the external evaluation team, the Montclair State faculty will research the impact of the program on teachers’ attitudes, beliefs and practices. As a partnership with the University of Massachusetts-Boston, the project promotes collaboration throughout its duration, culminating in an end-of-the-year conference with participating teachers from both universities.

“We hope to form a professional community of science teachers, where they are encouraged to share their research and form ties in professional organizations,” adds Munakata. “By the end, we hope they will say ‘this program allowed me to implement an education method I never would have tried without the support.’”

Participants will be encouraged to lead professional workshops to train future teacher leaders.

“The ultimate goal is to strengthen the school districts through a grassroots approach that will allow teachers to become leaders within the classroom,” Munakata says.

Studying corporate governance

Activist investors—long criticized as corporate raiders who enrich themselves at the expense of employees, customers and communities—may actually benefit publicly held companies by forcing boards to pressure management for change, says Management Professor Ram Subramanian of the School of Business.

Subramanian studied venerable bookstore chain Barnes & Noble and Internet company Yahoo Inc.

At Barnes & Noble, the CEO settled a shareholder lawsuit that was filed after an activist investor raised concerns over the company’s purchase of a college bookstore chain from that CEO. At Yahoo Inc., an activist investor pushed Yahoo Inc. to fire its chief executive after the company confirmed that the executive had lied on his resume.

“Activist investors are people who buy millions of shares in a corporation, which gives them power to influence management,” says Subramanian, who used both companies as case studies.
Evaluating state abstinence education

Montclair State researchers are evaluating New Jersey’s abstinence education programs for middle school students that are funded by the Title V State Abstinence Education Grant Program to make sure that the programs are working for the 7,500 to 10,000 youth who participate in them.

Health Science Professor Joseph Donnelly and Exercise Science and Physical Education Professor Robert Horn have received a grant from the New Jersey Department of Child and Adolescent Health/Division of Family Health Services to conduct a comprehensive five-year evaluation of the efficacy of the state’s school-based abstinence education efforts for students ages 10 to 14. So far, the professors have secured about $350,000 during the initial three years of the project.

“New Jersey is the only state—among the 36 states that offer Title V abstinence programs—to conduct this kind of statewide evaluation,” Donnelly says. To help other states establish effective evaluation protocols, the team will present its initial results at the Second Annual Teen Pregnancy Prevention Conference in Baltimore, Md., at the end of May.

By developing a model evaluation program for New Jersey’s abstinence education programs, the team will be able to provide solid data that will contribute to the program’s future success. Identical surveys and consistent evaluative procedures are providing interesting results.

“These programs are providing a good opportunity for students at this age,” Donnelly notes. “Some 89 percent of program participants have not engaged in sex.” The hope is that abstinence education will encourage abstinence into the high school years, and researchers are trying to determine exactly what makes an abstinence education program successful.

“There’s a lot of skepticism about abstinence education, yet I’m finding that these programs really are making a positive difference to students,” Donnelly says.

“Mapping Arctic tundra” continued from page 1

Shrubs in the Arctic tundra

So far, mapping efforts have been confined to the Alaska North Slope. Chopping and Rocio Duchesne, an environmental management doctoral student, have conducted several field campaigns in Alaska. “We’ve constructed a large reference database,” Chopping says. “When we have tested our method, we will extend the mapping to the entire Arctic.”

Chopping’s project is part of the multi-agency North American Carbon Program. His goal is to construct a robust map series that will aid researchers from multiple disciplines who are studying changes in everything from Arctic wildlife habitats and carbon pools to permafrost thaw and snowmelt. “Although 12 years is a short period for most ecosystem change studies, the Arctic environment is changing so rapidly that we hope to detect a trend,” says Chopping.

“Studying corporate governance” continued from page 3

In his research. Through the case studies, Subramanian analyzes the motivations of activist investors.

“My research tries to understand whether their actions are beneficial or hurtful,” he said, adding that he uses the case studies in his MBA classes, where students debate ethical and governance issues. “I select cases for my research based on the presence of tension. There is no single perspective, so people can look at the same issue from multiple points of view.”
Restoring local waterways

Even if the beds of the lower Passaic River and Gowanus Canal were scraped clean and given the chance for new sediment to develop, these waterways would soon be back to their current levels of contamination, concludes Michael Kruege and his colleagues at the Passaic River Institute, after eight years of research.

Tests of the waterways show a messy blur of chemical fingerprints from various types of human activity. Coal tar, ash, oil and exhaust from cars and lawn fertilizer are among the many pollutants found in the Passaic and Gowanus.

So why is cleanup such a daunting task? There are two reasons: the legacy of contaminants and ongoing insults to the environment, mostly from combined sewer overflows.

“The only solution is to modernize the sewers, to separate sanitary from storm sewers.” – Michael Kruege

Legacy contaminants are the “chemical memories of former industries,” Kruege says. During the Industrial Revolution, factories proliferated along these waterways, which provided a cheap and easy place to dump waste made up mostly of the ash and tar by-products of coal used to produce energy for heat and light.

The other reason is that new contaminants, including storm-water runoff mixed with car oil and lawn fertilizers, are continually flowing into the Passaic and the Gowanus. Century-old single-pipe sewer systems that combine runoff with municipal sewage become overwhelmed in big storms, causing the systems to drain untreated into the waterways.

In both the Passaic and the Gowanus—each classified as a Superfund site by the EPA—Kruege’s team identified both sources of pollution. “Gradual buildup would come back, even if the rivers were scraped clean. The only solution is to modernize the sewers, to separate sanitary from storm sewers,” Kruege says.

Besides it being difficult and expensive to improve the infrastructure, there is the issue of disposing of the toxic matter. Shipping it to landfills doesn’t fix the problem, it only moves it.

Kruege is also exploring a solution for the toxic sludge: using it as an energy source. Such waste-to-energy plants are plentiful in Europe and there’s one in Newark, where municipal waste is used to generate electricity. The sludge contains methane, which can also be burned off to generate electricity. Once the chemicals are removed, what is left can be discarded or recycled into building materials.

“We have to take responsibility,” Kruege says. “Think of the future. What lessons can we learn? There are smarter ways to do things. Think about chemical memory,” he advises.
Spotlight: Student Research

The Student Research Symposium

The Seventh Annual Student Research Symposium showcased the academic research of more than 300 students from each of the University’s six colleges and schools. Students presented their research to their peers and the academic community. Below are a few of the projects.

A silent epidemic

Graduate student Rebecca Bagnato studied the issue of self-injury among adolescents 11 and older and discovered that school staff can spot the behavior but often lack the training needed to effectively deal with it. She developed a protocol for schools for handling these students. She created an informative training PowerPoint presentation for middle school and high school faculty, families and counselors, outlining warning signs and providing advice and resources for effective treatment and intervention.

According to Bagnato’s research titled “Breaking the Silence: Understanding Self-Injury,” the practice has become an epidemic among adolescents, especially girls, with an estimated 12 percent engaging in non-suicidal self-injury. Cutting and burning are the most common forms of self-injury, and causes can range from physical and psychological abuse to a history of depression or other mental illness to traumatic events such as losing a parent.

Bagnato’s aim was to create greater awareness of the epidemic and to help teachers and others who deal with children more effectively assist those who injure themselves. She has also presented her research to a graduate Child Advocacy & Policy class.

Consumer behavior

School of Business graduate students Urmila Kishore, Andrew LaBarbera and Douglas Bergquist, working with Avinandan Mukherjee, chair of the Marketing Department, analyzed buying patterns and trends in thousands of households with the goal of providing recommendations to online retailers. They used clickstream data from ComScore, a leading digital analytics company that collects online shopping data. Their analysis offers insight into consumer behavior as well as potential growth indicators for retailers.

Their research of consumer spending found that an average consumer spent around $40 more on single-branded apparel websites, such as Gap and Victoria’s Secret, as opposed to multibranded apparel websites, such as Amazon.com and Macy’s. Holiday season buying behavior indicated that 30 percent of all yearly transactions were made during November and December.

They also found that households with incomes exceeding $100,000 contributed to the rise in online movie ticket sales, as most affluent American households purchase online tickets on every premiere weekend.

Healing touch

In graduate student Shunda Wallace’s research of schizophrenia and depression, she found that symptoms such as hallucinations and physically aggressive behaviors can be treated with nonpharmacological approaches including massage, music therapy, meditation and other sensory interventions.

Wallace also found that patients with schizophrenia and depression are similar to Alzheimer’s patients in that they are not touched as often as the average individual. Expressive touch and auditory touch are necessary displays of empathy for these individuals because they produce improved physiological responses in the body and increased levels of serotonin in the brain. Studies show that these interventions reduce the inappropriate behaviors of Alzheimer’s patients and suggest that they could help treat patients of schizophrenia and depression as well.
An impassioned advocate for youth, Psychology Professor Robert McCormick helped establish the nation’s first Master of Arts program in Child Advocacy and Policy at Montclair State.

Under McCormick’s direction, the University’s Center for Child Advocacy administers several grants, including one for the New Jersey Child Welfare Training Partnership, which was formed by Montclair State and other universities to provide in-service training to child welfare staff throughout the state’s public child welfare system.

Now, with the help of a grant from the Division of Child Protection and Permanency (DCP&P), McCormick is leading another groundbreaking University initiative: a Post-BA Certificate in Adolescent Advocacy.

“This innovative graduate-level program is the first to address the needs of the adolescent population,” says McCormick. “Teenagers are often a forgotten group within the child protective system. This program will help correct that.”

The program helps child welfare professionals understand and meet the unique needs of adolescents. A final seminar gives students the opportunity to apply what they have learned in a child welfare setting. “Students complete research assignments as part of the requirements for courses in the program,” McCormick notes.

Collaborating with the DCP&P Office of Adolescent Services, the center is initially offering the Post-BA Certificate to 40 DCP&P staff members with plans to open it up to all students in the spring of 2014. “We’re taking a transdisciplinary approach to address issues from abuse and neglect to aging out of child welfare systems,” McCormick says.

Students also will meet youth having personal experience in the child protection system.

“This curriculum gives professionals the tools they need to be effective advocates for troubled teens and their families,” McCormick says.

Visualizing fluid flow patterns

The Mathematical Sciences department’s flow dynamics lab—one of the few such labs in a math department in the country—recently purchased a Particle Image Velocimeter (PIV) thanks to a National Science Foundation grant. Professors Ashwin Vaidya, Arup Mukherjee, Philip Yecko and David Trubatch will use it to study patterns of complex fluid dynamics.

“We are gaining insight in understanding the nature of swimming and flight that could be used to design better vehicles.”

– Ashwin Vaidya

The PIV’s camera records at thousands of frames per second, which slows down any flow process, says Project Principal Investigator Vaidya. “This allows us to visualize and understand complicated fluid flow patterns that could not otherwise be seen with the naked eye.”

This information helps develop mathematical models that can be used to estimate or predict behaviors in numerous engineering, biological and geophysical applications. “We are gaining insight in understanding the nature of swimming and flight that could be used to design better vehicles,” Vaidya explains. The flow patterns provide data about structural oscillations in air and water, which engineers can apply to prevent buildings from swaying, bridges from collapsing, airplanes from spiraling out of control or oil rigs from becoming unstable. The team is also interested in the flow of magnetic fluids, which have tremendous potential for biomedical use, notes Vaidya.

Using a magnet to guide a ferrofluid containing a chemotherapeutic drug directly to a tumor, for instance, can be more efficient and reduce unpleasant side effects.

“Understanding and advocating for adolescents”

An impassioned advocate for youth, Psychology Professor Robert McCormick helped establish the nation’s first Master of Arts program in Child Advocacy and Policy at Montclair State.
State to fund nearly $94M for capital projects

Montclair State University is poised to receive almost $94 million in State of New Jersey bond funding to expand its research and academic facilities and to upgrade its technology infrastructure when the Legislature approves the $1.3 billion higher education capital improvements package.

The University’s Center for Environmental and Life Sciences and the new School of Business building are two of the 176 shovel-ready projects proposed for legislative approval by Governor Chris Christie and New Jersey State Secretary of Higher Education Rochelle Hendricks. The Building Our Future Bond Act—which voters approved in November 2012—marks the first time in 25 years that the state has provided funding for capital improvements at New Jersey colleges and universities.

The two buildings at Montclair State will support growing academic and research needs in the areas of science and business. The $55-million 100,000-square-foot Center for Environmental and Life Sciences will expand the University’s science research infrastructure by 50 percent. The new facility will include teaching and research laboratories for the environmental and life sciences, a microscopy suite, and space to accommodate research partnerships with collaborating businesses.

“The project will support academic programs and cross-disciplinary research in the environmental and life sciences with a focus on sustainability science, pharmaceutical biochemistry and medicinal chemistry,” says College of Science and Mathematics Dean Robert Prezant.

The School of Business will replace its current, 40-year-old building with a new 143,000-square-foot, high-tech facility. The $66-million project will create an environment with sophisticated technology, along with computer, market research and business analysis labs. “This project will allow us truly to be a business school able to meet the 21st-century needs of New Jersey’s economy,” says School of Business Dean E. LaBrent Chrite.

Read extended versions of research articles at montclair.edu/forward-thinking.

Montclair State University offers the advantages of a large university—a comprehensive undergraduate curriculum with a global focus, a broad variety of graduate programs through the doctoral level, a wide array of significant research initiatives, and a diverse faculty and student body—combined with a small college’s attention to the student experience. For more information, visit montclair.edu.