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Atkinson's Academic Venture Fund awards $1.8M to 15 projects

By Sheri Englund

The Atkinson Center for a Sustainable Future's Academic Venture Fund awarded $1.8 million in 2017, with a record 15 grants to seed novel approaches to some of the world's greatest sustainability challenges.

Several Atkinson teams are exploring new ways to promote planetary health for the well-being of humans, animals and ecosystems. Cornell's new Master of Public Health (MPH) – an interdisciplinary degree program begun in fall 2017 – is co-sponsoring three projects, thanks to a gift from David Atkinson.

Atkinson research teams will work for New York state, finding ways to remediate lakes with legacy pollutants, helping dairy and cattle farmers reduce antibiotic use while protecting their livelihoods, and improving rural resilience as solar development comes to farming communities. Two teams will refine Cornell's Earth Source Heat technology, which aims to bring clean geothermal heat to the Ithaca campus by 2035.

In support of Engaged Cornell, Atkinson is promoting undergraduate contributions to AVF research. Project teams involved with community-engaged research can apply for $10,000 of student research funding through the Office of Engagement Initiatives.

Greening the Grid: Some U.S. fossil fuel power stations primarily run during periods of high cooling demand. The output from these "peaker" plants is relatively inefficient, producing higher emissions. Ground source heat pumps, which harness the Earth's heating and cooling energy, could help an integrated energy grid meet periods of peak demand with renewable energy. Currently in the testing phase, a geothermal system with ground source heat pumps will be coming to Cornell, using the Ithaca campus as a living laboratory to test the technology.

Investigators: C. Lindsay Anderson, biological and environmental engineering; Jefferson Tester, chemical and biomolecular engineering; Michal Moore, chemical and biomolecular engineering; Mark Milstein, Cornell SC Johnson College of Business, Johnson; Tim Mount, Energy Institute at Cornell.

Making the Most of Marginal Lands: Marginal land, including degraded farmland and contaminated sites, could be the next frontier for expanding biofuel production. Less-fertile soils are often poorly drained, with pronounced wet and dry cycles, and these fluctuations can also affect how plants respond to climate stress. The team will identify responses in the rhizosphere – the soil layer where plant roots and microorganisms interact – that help biomass crops thrive during drought and rewetting cycles, for better productivity in marginal soils and a changing climate.

Investigators: Taryn Bauerle, School of Integrative Plant Science, Horticulture Section; Abraham Stroock, chemical and biomolecular engineering; Ludmilla Aristilde, biological and environmental engineering; Larry Smart, School of Integrative Plant Science, Plant Breeding and Genetics Section.

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Taking the Quicksilver out of Gold Mining: Artisanal gold mining is the largest source of mercury emissions globally. Indonesia's small-scale mining operations lead the world in mercury use and environmental contamination. This project aims to reduce mercury use in the mines and mitigate exposure in local food and water systems, while helping communities build alternative livelihoods. The team will also develop strategies for rehabilitating forest land degraded by mining. Co-sponsored by MPH.

Investigators: Jenny Goldstein, development sociology; Matthew Reid, civil and environmental engineering; Thomas Pepinsky, government.

Analyzing Antibiotic Use in Animal Agriculture: Antibiotic resistance is a global public health threat – but regulations intended to reduce antimicrobial use in food animals could undercut the economic viability of animal agriculture and many related industries. This project aims to inform policymakers by analyzing the impacts of strategies for controlling bacterial resistance by looking at the entire food system, from production to processing, transport and consumption. The researchers will develop a sustainable model for antimicrobial use that protects human and animal health and also livelihoods. Co-sponsored by MPH.

Investigators: Yrjo Grohn, population medicine and diagnostic sciences; Donald Kenkel, policy analysis and management; Lori Leonard, development sociology.

A Lethal Legacy: Environmental managers have decades of experience protecting lakes from watershed pollutants that are feeding harmful algal and cyanobacterial blooms (HABs). What happens when old phosphorus deposits in lake sediments are still feeding toxic algae today? This project will quantify how these legacy effects influence HABs in shallow lakes, where waves stir bottom nutrients into the water. Working with managers and community stakeholders at a New York lake, the team will collect data toward a remediation method for HABs caused by legacy nutrient loading.

Provided

Hairston lab members Ludivine Sanchez Arias, left, and Lindsay Schaffner test water for algal blooms in Honeoye Lake in May.

Investigators: Nelson Hairston, ecology and evolutionary biology; Alexandra King, ecology and evolutionary biology; Richard Stedman, natural resources.

Seeding Solar in New York: Solar development is coming to rural New York. Meeting the state's renewable energy goals will require large, land-hungry solar projects, and cleared farmland is a top prospect for solar leases. This team will investigate how expanding solar capacity will affect New York agriculture. Working with landowners, solar energy developers, and local and state policymakers, the researchers will identify economic, social and spatial areas of conflict and develop policy recommendations to strengthen the farm sector and increase rural resilience.

Investigators: Jennifer Ifft, Cornell SC Johnson College of Business, Dyson; Richard Stedman, natural resources; K. Max Zhang, mechanical and aerospace engineering.

The Future of Pharma Is Sustainable: Many medicines are unsustainable to mass-produce, demanding complex, energy-intensive manufacturing processes and leaving toxic wastes. This team is finding new ways to make drug manufacturing more efficient and sustainable. Partnering with Snapdragon Chemistry, the researchers are testing a new chemical synthesis

process, recently discovered in Song Lin's lab, that converts cheap, abundant natural resources like carbon dioxide into pharmaceuticals in a single operation. Combining this discovery with continuous-flow processes suitable for commercialization promises cleaner, greener pharmaceuticals.

Investigators: Song Lin, chemistry and chemical biology; Héctor Abruña, chemistry and chemical biology; Abraham Stroock, chemical and biomolecular engineering.

Sustainable Yield for Colombian Cows: In the developing world, family income and food security rise with dairy production. Facing climate change, disease and low-quality forage, South American dairy farmers often expand their businesses by raising more animals on more land. This team will help dairy farmers in Colombia sustainably by increasing the yield of each cow. The project will identify risk factors for metabolic diseases that limit milk production during early lactation, develop farm management strategies and introduce new technologies for disease control.

Investigators: Jessica McArt, population medicine and diagnostic sciences; Miguel Gómez, Cornell SC Johnson College of Business, Dyson; Thomas Overton, animal science.

Small Device, Big Results: A pocket-sized device promises health workers around the world an easy, inexpensive way to detect antibiotic resistance and manage infections. Partnering with Weill Cornell Medicine, the researchers will develop Rapid Identification of Antibiotic Resistance (RIDAR), a handheld diagnostic tool that delivers near-instant information about a patient's infection type to reduce unnecessary antibiotic use. If the infection is bacterial, RIDAR will check its antibiotic susceptibility and suggest the most effective drug for treatment. Co-sponsored by MPH.

Investigators: Saurabh Mehta, nutritional sciences; David Erickson, mechanical and aerospace engineering; Marshall Glesby, Weill Cornell Medicine; Lars Westblade, Weill Cornell Medicine.

Wildlife-Friendly Beef: Vast fences in southern Africa separate cattle from wildlife that can carry foot-and-mouth disease, impeding key species migration routes. A new approach to keeping beef virus-free for international sale that does not completely depend on fences could open global markets for farmers, enhancing livelihood opportunities from agriculture and sustainable ecotourism. Working with partners in Botswana, this team will pilot test new guidelines for biosafety in beef production that rely on practical risk-mitigation steps, instead of habitat-disrupting fences.

Investigators: Steven Osofsky, population medicine and diagnostic sciences; Shirley Atkinson, population medicine and diagnostic sciences; Randy Worobo, food science.

Preparing for Earth Source Heat: An enhanced geothermal system could bring clean, renewable heat and a smaller carbon footprint to Cornell by 2035. Cornell's Earth Source Heat (ESH) project will use hot water circulated deep within the Earth to heat Ithaca campus buildings. The researchers aim to refine this emerging technology by testing techniques for mapping how fluids move underground, optimal well placement and long-term safety monitoring. The team will also engage community stakeholders in assessing perceived risks and benefits and planning ESH implementation.

Investigators: Matthew Pritchard, earth and atmospheric sciences; Katherine McComas, communication; Katie Keranen, earth and atmospheric sciences; Greg McLaskey, civil and environmental engineering.

Green Is the Norm: U.S. racial and ethnic minorities are underrepresented in environmental activism, although they rank among the most environmentally concerned demographic groups. This study will counter the widespread misperception that people of color are indifferent to the environment by engaging with Latino communities in major cities. To boost Latino environmental action, the team will test public messages that "green" attitudes and behaviors are in fact the norm in minority communities – especially those facing acute environmental hazards.

Investigators: Jonathon Schuldt, communication; H. Oliver Gao, civil and environmental engineering; Neil Lewis, communication.

Photosynthesis for Farmers: African farmers face severe agricultural risks from drought, floods and disease outbreaks. Accurate early predictions can save lives. Relief initiatives like famine early warning systems and index-based agricultural insurance rely on satellite images that show farmland or pasture greenness but do not directly measure actual plant functioning. The researchers will develop a new framework to improve yield predictions and emergency response systems, using satellite chlorophyll fluorescence that can probe the molecular process of photosynthesis, including stress-induced degradation in crops.

Investigators: Ying Sun, soil and crop sciences; Yanyan Liu, Cornell SC Johnson College of Business, Dyson; David Matteson, statistical science/social statistics; Toby Ault, earth and atmospheric sciences.

Learning for Conservation: Understanding how organizations learn and what constrains learning is essential for advancing sustainability transitions. Partnering with the Environmental Defense Fund, an interdisciplinary team will study learning dynamics in habitat exchanges. These conservation platforms allow farmers and ranchers who maintain habitat for at-risk species to sell habitat credits to businesses to offset environmental degradation. The researchers will work with stakeholders to assess and build capacity for critical reflection and learning to help the exchanges thrive, along with the habitat and vulnerable species they aim to protect.

Investigators: Steven Wolf, natural resources; Glen Dowell, Cornell SC Johnson College of Business, Johnson; Angela Fuller, natural resources.

No Fish Tale: Feed of the Future: World demand for seafood is rising as wild fish stocks decline, creating an urgent need for new sources of protein to grow fish. The researchers are developing a process for converting the aquaculture industry's wastes into protein-rich feed. The technique acid-preserves offal from seafood processing facilities and solidifies it, creating a sustainable feed directly out of fishery byproducts. The new feed system could eventually replace fishmeal, reducing the aquaculture industry's feed costs and carbon footprint.

Investigators: Eugene Won, animal science; Joe Regenstein, food science; Helene Marquis, microbiology and immunology.

Sheri Englund is science writer and editor for the Atkinson Center for a Sustainable Future.