MONTANA NSF EPSCoR

FALL 2016

MSU LEADS EPSCOR TRACK 2 PROJECT TO RESEARCH BIOFUEL, CARBON CAPTURE TECHNOLOGIES FOR UPPER MISSOURI RIVER BASIN

A regional interdisciplinary team led by **Montana State University** has received a $6 million EPSCoR Track II award to develop new innovations at the intersection of food, energy and water systems while training the next generation of scientists.

The 4-year grant from the National Science Foundation will allow MSU, the **University of Wyoming** (UW) and the **University of South Dakota** (USD) to coordinate a massive effort to address questions about whether biofuels and carbon capture technologies can be sustainably introduced into the Upper Missouri River Basin, said **Paul Stoy**, principal investigator and associate professor in Land Resources and Environmental Sciences. The project is hosted by the **Montana Institute on Ecosystems** in collaboration with the **Energy Research Institute**.

The main goal is to develop a framework for evaluating proposals to reduce atmospheric carbon dioxide concentrations -- the leading contributor to climate change -- while maintaining food security, water quality, biodiversity and other benefits.

The researchers could find unexpected social and environmental conflicts when biofuels are used to generate energy and carbon dioxide is removed from the atmosphere and stored in geological formations or in ecosystems, Stoy explained.

The Upper Missouri River Basin refers to the Missouri River and all its tributaries upstream of Sioux City, Iowa. The basin contains parts or most of five states -- Montana, Wyoming, South Dakota, North Dakota and Nebraska -- and more than 20 Indian reservations. It represents 30 percent of the wheat produced in the United States, 13 percent of the soybeans, 11 percent of the cattle and 9 percent of the corn, according to the Upper Missouri River Basin Association. The area also contains the Colstrip power plant in eastern Montana – the second largest coal-fired generating facility west of the Mississippi – and the Bakken shale formation.

Thirty-one private, state and federal institutions and more than 50 people, including 18 MSU faculty and 13 MSU graduate students, will be involved in the project that will run into 2020. MSU will lead the research on agriculture and biofertilizers, food security, clean energy, and water supply and quality. Researchers at USD will focus on land use, biodiversity and ecosystem services assessment. UW will oversee agricultural economics, economic modeling and land use. Importantly for the integrated award, all institutions will have the opportunity to collaborate on all aspects of the project.

"These awards represent a tremendous value for the scientific community, as they foster research into some of the most pressing issues facing U.S. society, while simultaneously supporting collaborative research programs and workforce development. ...These projects hold the promise of transforming our daily lives."

~Denise Barnes, head of NSF EPSCoR

Montana partners in the project will include **Little Big Horn College** on the Crow Indian Reservation and **Salish Kootenai College** on the Flathead Indian Reservation. Federal participants include **National Park Service, the U.S. Geological Survey** and the **U.S. Department of Agriculture**. Outreach partners include **MSU Extension** and **MSU Extended University**.

Benjamin Poulter, an EPSCoR hire and MSU ecologist now at **NASA Goddard Space Flight Center** collaboratively initiated the project with researchers from MSU, USD and UWY. The interdisciplinary project draws on the strengths of MSU across a range of environmental science, energy-related, and food and agricultural disciplines.

For example, project investigator and EPSCoR-supported hire **Julia Haggerty** is an assistant professor of geography in MSU's Department of Earth Sciences.

"This work is closely aligned with my ongoing interests in the nexus of energy policy, resource management and rural economies," Haggerty said. "It is very exciting to think we can conduct cutting-edge, integrated modeling science using the model available in our own backyard."

The project will provide much-needed insight toward developing greenhouse gas mitigation scenarios and designing management strategies without compromising food security and clean energy. At the regional level, results and broader impacts of this work are essential for raising awareness among stakeholders to minimize impacts on food production systems, livelihoods and benefits provided by the ecosystem.

EPSCoR was established in 1979 to expand and enhance the research capability of scientists in states that traditionally have lacked strong university-based research efforts. Montana was one of the original five states to be involved in the EPSCoR program.

~by Evelyn Boswell for MSU News Service

UM BIOLOGIST FUNDED BY NATL PARK SERVICE

Diana Six, an IoE fellow, **University of Montana** professor of forest entomology/pathology, and chair of the UM Department of Ecosystems and Conservation Sciences, was funded to do work by the National Park Service in **Devil's Tower National Monument, Mount Rushmore National Memorial** and **Wind Cave National Park**. Her work with the NPS will focus on ponderosa pine adaptation to climate change. She has also been funded by the **Climate Science Center** (part of the USGS) to do similar work on whitebark pine.

Six's research involving pine beetles and climate science was featured in the *Missoulian* this spring. See **http://bit.ly/2e8cK3m**

CARY INSTITUTE DIRECTOR VISITS MONTANA

Dr. William Schlesinger of the Cary Institute for Ecosystems Studies at Duke University visited the campuses of the University of Montana and Montana State University in September as part of the Montana Institute on Ecosystems' Distinguished Visiting Lecturer series. Schlesinger presented "Four Horseman of the Apocalypse," a talk on unbridled population growth, the fallacy of the benefits of economic growth, unmitigated greed, and species and habitat decimation.

TEAM FUNDED TO STUDY GALLATIN RIVER WATERSHED

A research team based at **Montana State University** has received funding from the U.S. Geological Survey's State Water Resources Research Institute (WRRI) Program to use geochemistry to study water flow in the Gallatin River watershed of the Upper Missouri River Basin. The grant is funded through the Montana Water Center, led by **Wyatt Cross** of MSU Ecology.

Ewing

The research team is led by **Stephanie Ewing** of MSU Land Resources & Environmental Sciences in collaboration with EPSCoR hire **Rob Payn,** MSU LRES; Jim Paces and Rob Striegl, USGS; and MSU graduate students **Florence Miller, Erika Sturn** and **Ethan Wologo** and undergrads **Joe Capella**, **Sam Leuthold** and **Joe Rizzi**.

The team will focus on a common landscape pattern in the intermountain West: relatively steep, actively eroding mountainous headwater streams that drain onto more depositional sedimentary environments in intermountain basins. Such areas are typically impacted by human settlement.

The team will search for geochemical signals that impart information about base flow storage along the mountain-basin continuum. Their goal is to better understand fundamental controls on water quality and quantity with climate and land use change in the Upper Missouri

MSU PROFESSOR AWARDED GRANT TO TEACH ECOLOGICAL PERFORMANCE OF URBAN LANDSCAPES

Rebekah VanWieren, an Institute on Ecosystems affiliate and assistant professor in Plant Sciences & Plant Pathology at **Montana State University,** received a Landscape Performance Education Grant from the Landscape Architecture Foundation. VanWieren's Advanced Landscape Design studio is integrating landscape performance principles and metrics on a design project with the City of Bozeman Water Conservation Division looking at landscape design scenarios for water conservation in the Middle Rockies. Students analyzed the ecology and lifecycle of designing landscapes through field explorations around four themes: water, vegetation and soil, energy, and human health and well-being. These findings are being applied to design performance alternatives for water resource resiliency in the semi-arid West. Read more at: **http://bit.ly/2eJ6Vek**

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Montana EPSCoR's Track I focus is on understanding the effects of climate change on sustaining healthy ecosystems and economic growth. The Institute on Ecosystems (IoE) is a statewide Institute based at the flagship research universities through which current Montana EPSCoR activities are implemented.

TEAM WILL STUDY HOW CITIZENS RECEIVE, RESPOND TO MESSAGES ABOUT HAZARDS LIKE FLOODS

A team of Institute on Ecosystems researchers led by **Liz Shanahan**, a political science professor at MSU and an EPSCoR project lead, has received funding from the National Science Foundation to study whether the style in which risk is communicated can influence the degree to which citizens prepare for disasters such as floods. Other researchers include EPSCoR project lead **Geoffrey C Poole** (Land Resources and Environmental Sciences), **Clem Izurieta** (Computer Science), EPSCoR hire **Jamie McEvoy** (Earth Sciences) and **Eric Raile** (Political Science).

The researchers hypothesize that, while people are told about the importance of preparing for disasters, such communications are often ignored if they are presented in a style that is too scientific or technical. The team will test whether an alternative communication strategy—one that more closely mirrors the stories that people tell one another—will have a greater impact on people's preparation for hazards and extreme events.

The researchers wrote in their proposal that people's motivation to prepare for hazards is shaped by many factors, including cultural values, cognitive biases, knowledge and experiences. The researchers will collect stories about floods that have occurred in river communities, then use computational algorithms to identify traditional story-telling elements—such as the use of plot and characters, including which people are portrayed as heroes, villains and victims. They will identify the key narrative content, language and images that are most effective and then construct and test risk narratives that are scientifically accurate, locally relevant, and—ideally—more effective in convincing residents of flood-prone areas to prepare for extreme events.

Steve Stanley, KRTV

The interdisciplinary research draws upon expertise in social behavioral sciences, hydrology, and computer science, and is heavily influenced by community-based participatory research (CBPR). The outcomes are expected to be useful for local and federal agencies involved in communicating hazard preparedness to citizens.

MSU GRADUATE STUDENTS EARN IOE FELLOWSHIPS

Six MSU graduate students in environmental science and related fields have received EPSCoR-funded fellowships from the Montana Institute on Ecosystems to support their research in Montana and the Rocky Mountain West. The students are working with faculty affiliated with the IoE at MSU.

Nick Bergmann is a PhD student in Earth Sciences working with **Jamie McEvoy.** His research examines the water reservations that were granted to conservation districts along the Yellowstone River Basin in the 1970s, a landmark moment in the history of American water conservation. The project also traces the influence of the Yellowstone effort on water conservation in other parts of the western United States. Bergmann is originally from New Hartford, N.Y.

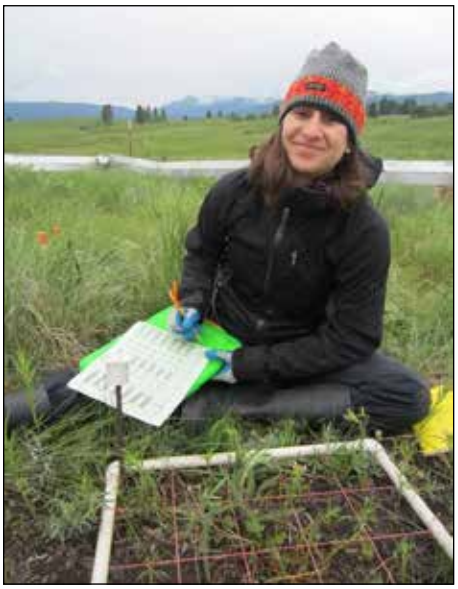
Katie Epstein is a PhD student in Earth Sciences, supervised by **Julia Haggerty.** Her research focuses on how population growth and land use changes in the Greater Yellowstone Ecosystem impact elk ecology, wildlife management, environmental conflict and private land conservation. Her goal is to study how the changing land tenure patterns in ranchland impacts hunting access, brucellosis mitigation and elk population dynamics. Epstein is originally from Boston.

Katie Carroll is earning a PhD in Ecology and works with **Andy Hansen**. She studies the impacts of climate and land use change on wolverine populations in Montana, Idaho, Washington and Wyoming. Carroll is using computer models to study potential changes in wolverine habitat suitability and connectivity in order to evaluate opportunities for conservation action. She is originally from Mesa, Ariz.

Claire Qubain is earning a PhD in Ecology and is supervised by **Jia Hu**. Her research explores the landscape and climatic factors that influence nitrogen availability for soils and trees. The information will become increasingly important as snowpack decreases and climate continues to change in the western United States. Qubain is originally from Gardner, Colo.

Emery Three Irons is earning a master's degree in Land Resources & Environmental Science and works with **Scott Powell** to study water quality in the Little Big Horn River Valley on the Crow Reservation in southeastern Montana. They will study the levels of coliform bacteria associated with wells, land use, proximity to the river, and other variables so they can share information about resource use and planning with tribal decision-makers in order to protect residents from sickness. Three Irons is from Crow Agency. Before coming to MSU, he studied at Little Big Horn College.

Matthew Weingart is pursuing a master's degree in Earth Sciences and works with **Dave McWethy** to investigate the relationship between fire, climate and people in forests on the Flathead Indian Reservation. Weingart is reconstructing the environmental history of the region by examining the pollen and charcoal preserved in lake-sediment cores. Weingart is from Pablo. He studied previously at Salish Kootenai College.



Claire Qubain is among six MSU graduate students funded by the Montana Institute on Ecosystems to support environmental science research projects. She works with Jia Hu to study how decreasing snowpack affects nitrogen availability.

SPECIAL REPORT: RESEARCH AND

As part of the research and economic infrastructure of the state of Montana, Montana NSF EPSCoR is proud to bring you this report on MREDI, the Montana Research and Economic Development Initiative.

The Montana University System received an appropriation of $15M in state funds from the 2015 Montana Legislature to serve as seed money to leverage university-based research into strategic advancements for Montana's economy. The fundamental purposes of this research initiative are to: (1) solve Montana problems with Montana solutions; (2) create good Montana private-sector jobs, and/or; (3) grow emerging and important research sectors that contribute to the diversity of Montana's economy.

The Commissioner of Higher Education administered competitive grants to researchers on the basis of each project's potential for private-sector job creation, commercialization, and economic return on investment for the State of Montana. Areas of emphasis include agriculture, natural resources and energy, materials and manufacturing, health and biomedical sciences, and technology and computer science. **Several of the projects are led by EPSCoR-supported researchers and Institute on Ecosystems Fellows and Associates.**

In September 2016, the Montana University System published a document outlining all the funded projects and their progress and economic impact to-date. Read the entire report at **https://mus.edu/research/MREDI_2016_ResearchBook_press-forWeb.pdf**

FUNDED PROJECTS INCLUDE:

AGRICULTURAL PROFITABILITY, MSU: $2.3M

Researchers on Montana campuses and the Montana Agricultural Experiment Stations are:

1) intensifying pulse and cover crop production on 4.6 million acres of Montana land left fallow between crops;

2) developing new/improved crops and practices such as peas with increased productivity under drought conditions and optical sensor-based nozzles for the precision spraying of weeds; and

3) increasing the adoption of precision ag technologies by helping farmers access data via an automated on-farm precision experimentation system.

OPTICS AND PHOTONICS, MSU: $2.5M

The research team is partnering with 10 private Montana companies to create

1) ultra-compact spectral imagers for precision agriculture, wildfire mapping, and natural resources;

2) hyperspectral imaging for monitoring cell growth and real-time image processing for disease studies, drug testing, and food sorting;

3) microcavity sensors for hyperspectral imaging for skin cancer detection, counterfeit drug detection, precision agriculture, and natural resources;

4) micro- mirror technology for microscopy, medical imaging, and astronomy;

5) active waveguides and integrated optical circuits that allow MSU and the Montana companies to enter the multi-billion-dollar telecommunications and defense markets of optical wave guides and integrated photonic circuits;

6) optical parametric oscillator for tunable lasers for chemical gas detection; and

7) nonlinear optical detection of surface contaminants to assess drinking water contamination and pesticide usage.

Joe Shaw, a fellow of the Montana Institute on Ecosystems, leads a statewide project that will bring private companies and university researchers together in optics and photonics.

TRAUMATIC BRAIN INJURY, UM: $2.2M

Traumatic brain injury (TBI) affects 13% of Montana's adult population. Researchers are 1) expanding clinical

AGRICULTURAL PROFITABILITY: A team led by Barry Jacobsen of **Montana State University** focuses on intensifying cover crop production on land that is left fallow between crops and improve soil and water resources for this land; work with stakeholders to develop new, improved products and crops; and increase the usage and efficiency of precision agriculture. Other EPSCoR and IoE team members include **Clem Izurieta, Kelsey Jencso, Marco Maneta, Bruce Maxwell, Rob Payn, John Peters** and **Carl Yeoman.**

ECONOMIC DEVELOPMENT IN MONTANA

services for TBI survivors and veterans at the UM Neural Injury Center to improve graduation rates; 2) developing a comprehensive panel of tests to diagnose mild TBI; 3) using molecular techniques to develop new therapeutic inhibitors; 4) developing a computer-based cognitive training system for TBI subjects with cognitive impairment; and 5) developing and testing a novel post-traumatic epilepsy diagnostic analysis program.

ONE MEDICINE, MSU: $1.5M

Research aims to improve animal and human health by decreasing antibiotic resistance and developing new treatments for inflammatory and infectious disorders such as rheumatoid arthritis, calf scours, Herpes Simplex virus type 1, and West Nile virus.

DIAGNOSIS & TREATMENT OF MENTAL ILLNESS, MSU: $1.4M

Research addresses Montana's high suicide and Alzheimer's rates by 1) developing a brain function analysis tool that improves speed and accuracy of the clinical diagnostic process; 2) conducting studies on the use of deep TMS (transcranial magnetic stimulation) at the Western MT Mental Health Center in Butte to treat alcohol abuse and depression; 3) investigating the development of a non-opioid treatment for chronic pain; and 4) adapting a rural intervention program focusing on suicide prevention in rural high school students.

WATER QUALITY MONITORING, UM: $1.3M

Research team is developing environmental measurement and sampling systems for monitoring water, with a focus on 1) detection of arsenate contamination; 2) separation and detection of organic and ionic pollutants; 3) detection of aquatic invasive species, pathogens, and endangered native species; and 4) continuous water quality monitoring via an autonomous titration and pH sensor.

ENHANCING MONTANA'S ENERGY RESOURCES, MSU: $1.2M

Research focuses on overcoming regulatory and environmental hurdles to access Montana's vast oil and coal reserves by 1) developing new technologies to seal small leaks in wells at deeper depths than traditional methods; 2) addressing leakage regulations for coal storage ponds by cementing fly ash; 3) assessing air capture of CO2 for algae growth for value added byproducts; 4) evaluating co-firing potential of coal with biomass; and 5) investigating use of potential coal related byproducts to enhance oil and gas recovery.

DRONEFIRE: AUTONOMOUS AERIAL SYSTEMS FOR WILDFIRE MANAGEMENT IN MONTANA, UM: $900K

Researchers in fire science and forest management partner with unmanned aircraft systems (UAS) specialists and entrepreneurs to design and test instruments and techniques for providing measurements of forests and fuels before fires occur, to stimulate the adoption of UAS in fire management.

A research team at UM partnered with Montana's Unmanned Aircraft System (UAS) entrepreneurs to design and test instruments and techniques for providing measurements of fires, forests, and fuels—work that will ultimately lead to adoption of UAS in natural resource management at large. DroneFire is connecting land managers, researchers, and private companies to natural resource challenges, by streamlining FAA and business procedures, and by teaching and training a UAS workforce.

BIO-BASED FUELS, MSU-NORTHERN: $800K

Researchers aim to synthesize Montana-grown industrial oilseeds into high-value chemicals and fuels by 1) producing camelina-derived aromatics as a blend component to aviation gasoline; 2) developing a catalyst that has the potential to significantly lower the operating cost of avgas production from camelina; and 3) designing a process for fuel pellet production from camelina meal, agricultural byproducts, and lawn clippings.

RECOVERY OF METAL CONTAMINANTS FROM INDUSTRIAL WASTEWATERS, MONTANA TECH: $495K

Chemists and engineers are developing a process to remediate acid rock drainage sites by 1) creating novel magnetic nanoparticles and 2) using the particles in a pipeline reactor to continuously extract heavy metal contaminants from wastewater in a concentrated form.

REMEDIATION TECHNOLOGY, MSU-BILLINGS: $263K

Researchers are addressing a nationwide pollution issue by developing a bacteria-based molecule to clean up sites contaminated by carbon tetrachloride. The new technology allows pollution to be treated on-site rather than current methods of moving the hazard from one site to another.

For more information, visit **https://mus.edu/research_initiative.asp.**

MREDI Montana Research & Economic Development Initiative

MONTANA GIRLS STEM COLLABORATIVE SELECTED FOR NATIONAL STEM OUTREACH PROGRAM

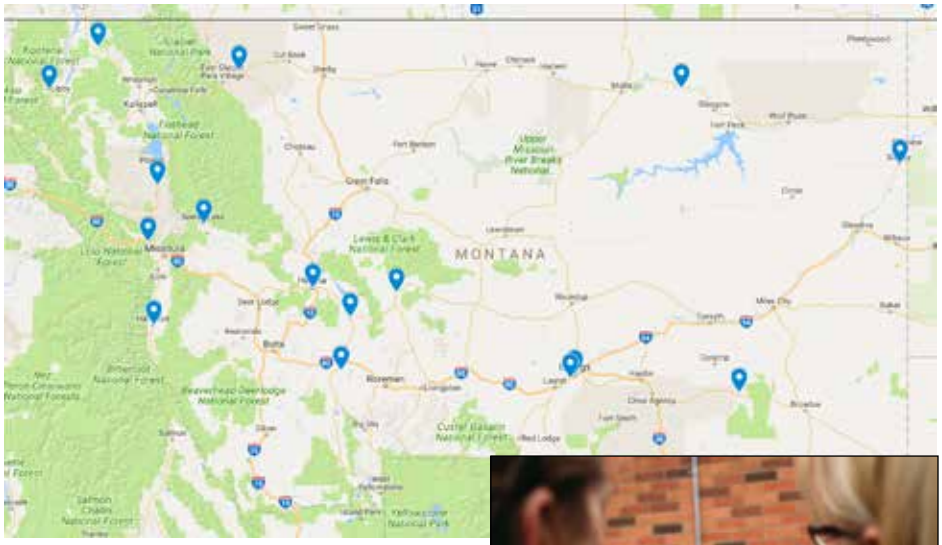
15 afterschool sites receive kits and training on citizen science and outdoor education

The **Montana Girls STEM Collaborative**, an education and public outreach initiative of Montana NSF EPSCoR, was selected for Science Action Club, a STEM outreach program created by the **California Academy of Sciences** and administered by the **National Girls Collaborative Project**.

Montana Girls STEM received hands-on STEM kits and selected 15 after-school programs from across Montana to receive kits and hands-on training. Educators from each site completed a training at MSU-Bozeman on Oct. 20 and will soon begin implementing their programs.

SCIENCE ACTION CLUB SITES ARE:

- 4-H Afterschool Hinsdale Elementary School
- Ashland Public School Afterschool Program
- Billings Public Library
- Boys & Girls Club of Richland County (Sidney)
- Browning Middle School
- Fortine School
- Frenchtown School
- Helena Family YMCA After School Program at Helena Middle School
- Keystone Afterschool Program (Hamilton)



- Libby Afterschool Program
- Ronan School District No. 30
- Seeley Lake Elementary School / SLE 21Century Community Learning Center
- Stevens Youth Center (White Sulphur Springs) / Townsend Afterschool Program
- United Way of Yellowstone County - Discover Zone (Billings)
- Willow Creek Bronc Busters

At the training, educators practiced collecting and observing insects, then uploading data via a citizen science app called iNaturalist.

At a training on Oct. 20, educators learned to use the Science Action Club Bugs in Your Schoolyard kit and the iNaturalist citizen science app. Photos by of Adrian Sanchez-Gonzalez, MSU.

Each site will use a kit and curriculum called Bugs in Your Schoolyard. Middle school students explore their local environments and conduct active research as citizen scientists.

Eleven of the 15 sites are communities of under 2,500 and are supported by the Montana Girls STEM Collaborative's Small Town STEM program, which was funded by the **Women's Foundation of Montana** to support STEM education in our smallest communities. The training was hosted by Montana NSF EPSCoR's outreach partner **MSU Extended University,** with additional support from the **MSU Department of Chemistry and Biochemistry** and the **MSU Alumni Foundation**.

Montana Girls STEM is a statewide organization with leaders at the **University of Montana** and **Montana State University** and board members throughout the state. The program was launched under Montana NSF EPSCoR in 2012.

MONTANA TO HOST NATIONAL NSF EPSCOR CONFERENCE IN FALL 2017

The Montana NSF EPSCoR program was chosen to host the organization's national conference in Fall 2017. The meeting will be in Missoula on Nov. 5-8, 2017 and is expected to have 300 to 400 attendees.

The conference brings together representatives from all EPSCoR jurisdictions to discuss strategies to promote EPSCoR goals of building STEM research and education capacity to increase national competitiveness. This biennial event is a forum for EPSCoR project directors and participants to discuss opportunities and challenges at the local, state, national, and international levels and how EPSCoR efforts can collectively contribute to the advancement of science and engineering research and education.

The National Conference will showcase long-term, high-impact programs and explore the elements and strategies that make them successful over the long-term in their capacity for scientific and economic advancement. Sessions will highlight the novelty of the EPSCoR model for setting research priorities and survey the broad range of approaches and results within the scope of this model. Activities include plenary and break-out sessions, a student poster session, and a pre-conference workshop on approaches and opportunities for EPSCoR outreach and education programs targeting under-represented minority populations.

The 2015 biennial conference was hosted by New Hampshire NSF EPSCoR and Maine NSF EPSCoR. Montana will host in 2017.

EPSCOR-SUPPORTED FACULTY JOIN INSTITUTE ON ECOSYSTEMS AT UM AND MSU

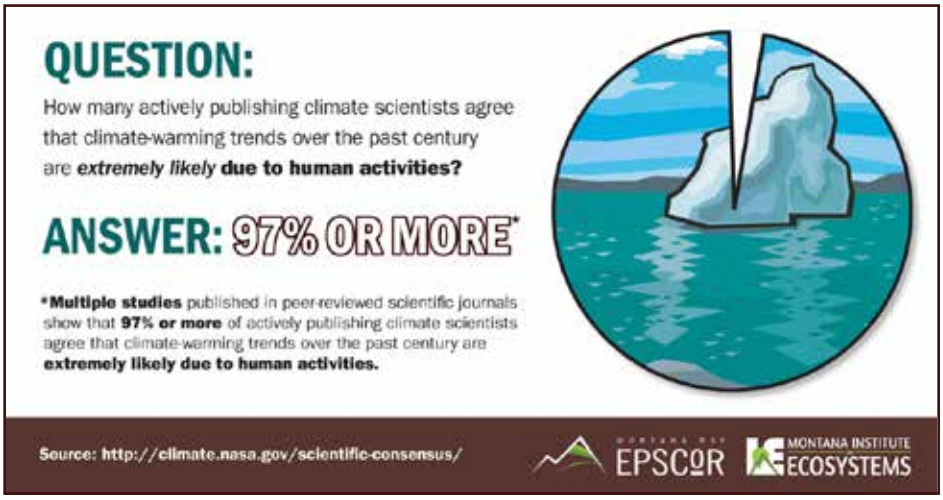
Angie Luis

Angie Luis has been hired as an assistant professor of population and disease ecology in the University of Montana's Department of Ecosystem & Conservation Sciences. Luis earned her B.S. in zoology from the University of Oklahoma. Her PhD is in ecology from Penn State University, and she did post-doctoral work at Princeton, Colorado State University, and Fogarty International Center, National Institutes of Health. Luis' lab explores how interactions between hosts and their environment (climate, seasonality, habitat type, etc) affect disease dynamics; how we can predict when outbreaks will occur; and species traits associated with reservoirs of zoonotic disease and cross-species transmission.

Philip Higuera was hired as an associate professor of fire ecology in the UM's Dept of Ecosystems & Conservation Science. His B.A. is in biology from Middlebury College, and his M.S. and Ph.D. are in Forest Ecology, University of Washington. His post-doctoral work was at the University of Illinois, and he has taught at Montana State University and the University of Idaho. His research in the PaleoEcology and Fire Ecology Lab focuses on understanding the interactions among climate, vegetation, and fire regimes over a range of spatial and temporal scales, in the past, present, and future.

MSU has hired **Hongyi Li** as a joint appointment between Land Resources & Environmental Sciences and the Montana Institute on Ecosystems. Li earned his PhD. at the University of Illinois at Urbana-Champaign and his M.E. from Tsinghua University. His main areas of research are hydrological and biogeochemical modeling and analysis at the watershed and larger scales in view of land as hierarchical watersheds and river systems with intertwined natural and societal functions.

Dave McWethy has changed his position at MSU and become an assistant professor in the Department of Earth Sciences. As a new hire with an IoE/Earth Sciences joint appointment, McWethy will continue his research while also teaching. McWethy's research centers on understanding drivers of ecosystem diversity and change across multiple spatial and temporal scales. He is particularly interested in identifying the mechanisms responsible for dynamic, disturbance-mediated vegetation transitions that are increasing worldwide.



Download your own graphics at: montanaioe.org/outreach/climb-social-media

EDUCATION

UM STUDENT EARNS $20K TO STUDY MOUNTAIN LIONS

University of Montana wildlife biology master's degree candidate **Lara Brenner** recently was awarded $20,000 from the Summerlee Foundation to investigate the effects of hunting on mountain lions, which are also known as cougars. Brenner, from Houston, will use a social-ecological approach to understand the public's views of mountain lion hunting. She'll also measure how stressed the cougars are by analyzing hormones in hair samples.

She is advised by Professor **Elizabeth Covelli Metcalf** in UM's College of Forestry and Conservation and also will work with Professor **Creagh Breuner** on the stress-hormone analysis and with **Hugh Robinson**, who directs the landscape analysis lab for Panthera.

"This is one of the first studies that looks at wildlife from a social-ecological perspective," Metcalf said.

Brenner will conduct research in communities in several different states where cougar hunting restrictions vary. For example, in Montana hunting mountain lions with dogs is allowed while in Washington dogs are not allowed. Brenner will ask residents how hunting impacts the social tolerance for the species.

The Summerlee Foundation supports big cat research projects.

~University of Montana News

UPCOMING **EVENTS**

Feb. 2017: Montana's Changing Climate. This interactive online course is for natural resources managers, agricultural producers, decision-makers and citizens and features authors of the Montana Climate Assessment. Dates and registration information coming soon.

Feb. 28, 2017: NanoDays/MicroDays family science night. Small-scale science from IoE students & faculty. MSU-Bozeman.

April 6, 2017: EPSCoR All-Hands Meeting and IoE Science Summit, University of Montana-Missoula.

April 7-9, 2017: Montana Aquatic Ecology Research Symposium, Flathead Lake Biological Station.

April 11-13, 2017: Peter Vitousek of Stanford University visits UM & MSU. Dates TBA.

Nov. 5-8, 2017 NSF EPSCoR National Meeting, University of Montana-Missoula.

For a full schedule of IoE events, visit http://montanaioe.org/events

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