Driving Tomorrow Research Initiatives—Grand Challenges Research Grants Phase 2  Fall 2017

Provost Karen Hanson in October 2017 announced a second round of UMN Grand Challenges Research grants to advance the research goals of Driving Tomorrow, the Strategic Plan for the Twin Cities Campus. The internal research investment provides two-year interdisciplinary team awards totaling $2.96 million to six interdisciplinary projects engaging more than 120 faculty and external partners, as well as support for two six-member Grand Challenges Research Scholar Collaboratives for 2018–19.

This is the second phase of the Provost’s GC Research initiative to seed ambitious collaborations aligned with the multiple goals of Driving Tomorrow (strategic-planning.umn.edu). The grants and collaborative groups for this phase address complex issues in two of the University’s five Grand Challenges focus areas: Assuring Clean Water and Sustainable Ecosystems and Fostering Just and Equitable Communities, or an integration. An initial phase of Driving Tomorrow research investments, in fall 2016, spanned all five areas and awarded a total of $3.9 million to 29 teams of faculty. All areas will have opportunities as the initiative continues.

Interdisciplinary Team Awards for 2017–19

Six interdisciplinary teams of faculty received awards. The funded interdisciplinary projects include co-PIs, extended teams with additional faculty members, representatives of external partner organizations, and students. The interdisciplinary team awards total $2.96 million over two years. Funding partners include the Institute on the Environment (funding for water/ecosystem-related investigations), and the University Metropolitan Consortium (support for two projects related to just and equitable communities).

Fostering Just and Equitable Communities

Identifying and Addressing Disparities in the Criminal Justice and Health Care Systems. Co-PIs: Rebecca Shlafer, Pediatrics; Michelle Phelps, Sociology; Kevin Reitz, Law School; and Tyler Winkelman, Medicine. $570K interdisciplinary team award, with support from the U Metropolitan Consortium.

Extended Team—Members and Partners: Stephanie Abel, Hennepin County Human Services and Public Health Department; Peter Bodurtha, Hennepin County Center of Innovation and Excellence; Danette Buskovick, Hennepin County Department of Community Corrections and Rehabilitation; Kathy Doty, Hennepin-University Partnership; Erik Erickson, Hennepin County Human Services and Public Health Department; Erin Harbinson, Robina Institute of Criminal Law and Criminal Justice; Latasha Jennings, Minneapolis Medical Research Foundation; Deanna Mello, Robina Institute of Criminal Law and Criminal Justice; Kelly Mitchell, Robina Institute of Criminal Law and Criminal Justice; Ebony Ruhland, University of Cincinnati; Shira Shavit, Transitions Clinic Network, San Francisco; Ron Solheid, Minnesota Department of Corrections; Christopher Uggen, Sociology; Monica Wittstock, Robina Institute of Criminal Law and Criminal Justice.

While considerable attention has focused on the causes and consequences of mass incarceration, the majority of the criminal justice population is supervised through community supervision, particularly probation. Minnesota is a leading exemplar of this pattern; while Minnesota has the sixth lowest incarceration rate in the nation, our community supervision rate is the seventh highest. Probation and supervised release violations represent a large share of prison admissions, are a key driver of Minnesota’s rising incarceration rate in recent years, and disproportionately impact people from racial and ethnic minority groups.

Individuals involved in the justice system are known to have high rates of chronic disease, mental illness, and substance use disorders. Despite the considerable health risks of those with criminal justice contact, how community-based criminal justice contact intersects with broader health disparities in our communities has been largely ignored. This project aims to use Hennepin County as a strategic case study to better understand the relationships among community supervision, health, and well-being. The team will use a mixed-methods approach to understand the health and health care patterns of community supervisees, the impact of individuals’ well-being on completing community supervision requirements, and the impact of health and individuals’ well-being on completing community supervision requirements, and the impact of health and criminal justice disparities on communities of color in Minnesota.

The work will result in evidence-based policy and programmatic recommendations to help communities achieve lasting changes in health and supervision practices that are more just and equitable.
Homework Starts with Home Research Partnership. Co-PIs: Ann Masten, Institute of Child Development; Maria Hanratty, Humphrey School of Public Affairs; and Eric Grumdahl, Minnesota Department of Education. $540,000 interdisciplinary team award, with support from the U Metropolitan Consortium.

Extended Team—Members and Partners: Gerald August, Family Social Science; Heidi Barajas, Organizational Leadership, Policy, and Development; Andy Barnes, Pediatrics; Theodore Christ, Educational Psychology; Joe Curiel, Minnesota Department of Education; Kathy Doty, Hennepin-University Partnership; Danielle Dupuis, Minnesota Center for Applied Educational Improvement; Abigail Gewirtz, Family Social Science; Ed Goetz, Center for Urban and Regional Affairs; Michael Goh, Organizational Leadership, Policy, and Development; Jarrett Gupton, Organizational Leadership, Policy, and Development; Traci LaLiberte, Minnesota Center for Applied Educational Improvement; Nicole Mickelson, Center for Advanced Studies in Child Welfare; John Patterson, Minnesota Housing; Kristy Piescher, Minn-Link; Kirby Pitman, Minnesota Housing; Michael Rodriguez, Educational Equity Resource Center; Steven Ruggles, Minnesota Population Center; Leigh Schleicher, Minnesota Department of Education; Rebecca Shaifer, Pediatrics; Nancy Sherwood, Epidemiology and Community Health; Julie Swietzler, Educational Equity Resource Center; Judy Temple, Humphrey School of Public Affairs; Jane Tigan, Minnesota Management and Budget.

The Homework Starts with Home project aims to foster just and equitable communities by establishing a transformational research partnership focused on ending student homelessness in Minnesota. Homelessness among children and youth is a complex but tractable challenge requiring integrated system approaches. Student homelessness is linked to poor outcomes across many domains, including achievement and health and well-being, as well as future work success. It is a marker of poverty, marginalization, trauma, and many other adverse childhood experiences that threaten positive development of the citizens and work–force in Minnesota and other states. The most recent data from the U.S. Department of Education reported 1.2 million homeless students, with rising rates. Minnesota has reported an average annual increase of 15 percent in student homelessness across the state for the past decade. In 2016, over 9,500 students enrolled in 1,200 schools statewide met federal criteria of homelessness.

The team aims to build a model partnership focused on the grand challenge of student homelessness, engaging University, state, county, and community partners in a seminal effort to integrate, build, and disseminate high-quality evidence on solutions to this national problem. The team will design and implement a signature program of collaborative research to evaluate the State of Minnesota’s existing initiative, “Homework Starts with Home,” and to disseminate the best data available in Minnesota on this issue. The existing initiative is led by the state and the Heading Home Minnesota Funders Collaborative. A team of University scholars from multiple disciplines will partner with state, county, and community organizations engaged in the Homework Starts with Home initiative to evaluate progress to date and implement a high-quality research study on tailoring solutions to the needs of families in this program to achieve better outcomes.

The project will integrate strategies, expertise, and data in order to establish sustainable systems and partners to support future data-driven decision making in Minnesota on student homelessness. The Homework Starts with Home Research Partnership will elevate the capacity and prominence of the University, the state, and Minnesota’s philanthropic organizations as leaders in solutions to the challenge of student homelessness that threatens human capital here and across the nation.

Displacement, Dispossession, Belonging, and Embodiment: Co-creating Translocal Sciences and Arts of Storytelling for Justice. Co-PIs: Roozbeh Shirazi, Organizational Leadership, Policy, and Development; Cindy Garcia, Theatre Arts and Dance; and Kristine F. Miller, Landscape Architecture. $260,000 interdisciplinary team award.

Extended Team—Members and Partners: Mudar al-Haggi, artist, Berlin; Heidi Barajas, Organizational Leadership, Policy, and Development; Tia Gardner, Gender, Women, and Sexuality Studies; Melvin Giles, Urban Farm and Garden Alliance, St. Paul; Kristi Jensen, Libraries; Kristen Murray, Center for Urban and Regional Affairs; Lena Palacios, Gender, Women, and Sexuality Studies; Wael Qadour, artist, Paris; Catherine Squires, Communication Studies.

This Grand Challenge intervention asks: Why does university research often estrange the very communities who step into advocacy and research partnerships with researchers, and what does it mean to engage equitably and collaboratively in responsible knowledge-making? These questions inform our work as an iterative transdisciplinary process to rethink relationship building and knowledge co-production within and across communities.

Drawing upon our longstanding cross-collegiate engagements with minoritized and refugee communities, we plan a series of dialogues on the themes of displacement, dispossession, belonging, and embodiment among researchers, community activists, scientists, dancers, writers, and artists located in Minnesota (including at the UMN), Cuba, France, and Germany.

Convenings will delve into: (1) partners’ conceptualizations of home, displacement, dispossession, and belonging in their work; (2) the methodologies and strategies they use to create more just and equitable worlds; and (3) the ways in which we as researchers, scholars, and writers can learn with them, while also co-creating innovative knowledges and strategies among and across differing sites of struggle. Together, we seek to
reimagine the roles and responsibilities of academic researcher and of land-grant institutions, with the aim of fashioning more equitable partnerships with communities to build responsible and just epistemic relationships across unequal locations.

By creating spaces for community-generated knowledges that are attuned to the distinct histories, struggles, and vocabularies for justice, the project seeks to: (a) generate newtranslocal knowledges around displacement, dispossession, belonging, and embodiment; (b) theorize the science and art of knowledge-making in dynamic ways so that the expertise, authority, and emerging knowledges can be co-owned by all; and (c) build and nurture an institutional culture of research and public engagement centered on ethical and equitable knowledge co-production at the University of Minnesota.

Assuring Clean Water and Sustainable Ecosystems

Assuring Clean Water and Sustainable Ecosystems via Improved Agroecological Management. Co-Pls: Lawrence P. Wackett, Biochemistry, Molecular Biology, and Biophysics; Carl J. Rosen, Soil, Water, and Climate; and William R. Harcombe, Ecology, Evolution, and Behavior. $150,000 interdisciplinary team award, with funding support from the Institute on the Environment.

Extended Team—Members and Partners: Mervyn DeSouza, Tate and Lyle; Sarah E. Hobbie, Ecology, Evolution and Behavior; Jennifer Kuzma, North Carolina State University; Heidi M. Peterson, Minnesota Department of Agriculture; Steve Polasky, Applied Economics; Jack E. Richman, BioTechnology Institute; Serina L. Robinson, Medical School; Tim J. Tripp, Office of Economic Development.

Nitrogen is vital to growing food crops and farm profitability, but environmental conditions can cause fertilizer to negatively impact water supplies and increase costs. The overall goal of the project is to protect billions of gallons of water from contamination while improving agricultural efficiency. The global nitrogen cycle is dominated by human activities, principally via generation of reduced nitrogen and amendments to soils as fertilizers, microbial inhibitors, and pesticides. In developing countries, where most of the world’s population resides, water contamination is even more acute.

In this project, the team examines the effect on water of many of the major nitrogen inputs used in agriculture and develop microbial management practices to decrease runoff. A key component of the project goal is to manage the rate at which microbial communities in the soil degrade the amendments that have been applied. Slowing the rate of microbial degradation will achieve a measured-release, meeting the nitrogen demand of crops to improve productivity while reducing runoff and leaching. Optimization will require understanding the biochemistry of nitrogen transformations, the dynamics of the microbial communities that degrade nitrogen containing compounds, and how these processes are influenced by practices in agricultural settings.

The team will develop an integrative program for systematically identifying optimal nitrogen amendment practices. This involves computer-based prediction systems, microbiology, DNA sequencing (genomics), plant studies, and ultimately, policy and business decision-making.

Intersection of Just and Equitable Communities and Clean Water

Water and Equity: Co-developing Research and Engaged Approaches to Transforming Environments (WE CREATE). Co-Pls: Kate Derickson, Geography; Susan Galatowitsch, Fisheries, Wildlife and Conservation Biology; Sarah Hobbie, Ecology, Evolution, and Behavior; Bonnie Keeler, Institute on the Environment; Stephen Polasky, Applied Economics; and Fred Rose, Institute on the Environment. $720,000 interdisciplinary team award, with funding support from the Institute on the Environment.

Extended Team—Members and Partners: Elizabeth Borer, Ecology, Evolution and Behavior; Kate Brauman, Institute on the Environment; Jonee Brigham, Institute on the Environment; Amber Cameron, Office for Public Engagement; Gabe Chan, Humphrey School of Public Affairs; Amy Cole, American Public Media Water Initiative and Minnesota Sustainable Growth Coalition; Diana Dablon, St. Anthony Falls Laboratory; Mae Davenport, Forest Resources; Marie Donahue, Institute on the Environment; Kathryn Draeger, Regional Sustainable Development Partnerships; Marta Echavarria, Eco Decision; Tannie Eshenaur, Minnesota Department of Health; Jacques Finlay, Ecology, Evolution and Behavior; Rebecca Flood, Minnesota Pollution Control Agency; MAKE Hammann, Institute on the Environment; Kris Johnson, The Nature Conservancy; Na’ Taki Osborne, Agnes Scott College; Nick Jordan, Agronomy and Plant Genetics; Kristi Kremers, Institute on the Environment; Eric Lonsdorf, Institute on the Environment; Rob McDonald, The Nature Conservancy; Kelly Meza Prado, Institute on the Environment; Lorena Munoz, Gender, Women and Sexuality Studies; John Nieber, Bioproducts and Biosystems Engineering; Katie Pratt, Minnesota Pollution Control Agency; Carissa Slotterback, Humphrey School for Public Affairs; Megan Voorhees, Institute on the Environment.

WE CREATE is a cross-college program designed to address grand challenges at the nexus of water and equity through investments in research, community engagement, and interdisciplinary graduate training. The program continued>
will launch research projects in the United States and internationally, employing a co-production model of scholarship in which communities and University researchers together design project objectives and pilot solutions. Closely linked to the research agenda, we will create a new interdisciplinary graduate fellowship program that trains the next generation of scholars to develop salient, credible, and legitimate partnerships with communities and practitioners. Research collaborations will address root causes of water and equity challenges, including incentives, policies, competing values, and mismatches in scale and scope that drive unequal distribution of clean water and associated benefits. In tandem, we will launch a new graduate fellowship program that responds to a need for training in collaborative, community-engaged research. The program will consist of a new practicum course, experiential learning in interdisciplinary research tools and methods, and funded externships and research fellowships. Through participation in the fellowship program, we will create cohorts of both graduate students and faculty from across the university committed to working with communities to develop action-oriented research.

**Wild Rice in Minnesota and the Great Lakes Region: A Flagship for Environmental Preservation and Indigenous Resource Sovereignty.** Co-PIs: G.-H. Crystal Ng, Earth Sciences; Mark Bellcourt, CFANS Office of Diversity and Inclusion; Mae Davenport, Forest Resources; Daniel Larkin, Fisheries, Wildlife, and Conservation Biology; Amy Myrbo, Earth Sciences; Cara Santelli, Earth Sciences; and Michael Dockry, U.S. Forest Service. **$720,000 interdisciplinary team award, with funding support from the Institute on the Environment.**

**Extended Team—Members and Partners:** Chanlan Chun, Natural Resources Research Institute/UMN-Duluth; John Coleman, Great Lakes Indian Fish and Wildlife Commission; Diana Dalbotten, St. Anthony Falls Laboratory; Peter David, Great Lakes Indian Fish and Wildlife Commission; Karen Diver, advisor; Tom Howes, Fond du Lac Band of lake Superior Chippewa; Erik Kojola, Sociology; Nicole Hansel-Welch, Minnesota Department of Natural Resources; Laura Matson, Geography, Environment and Society; Ray Norgaard, Minnesota Department of Natural Resources; Laura Phillips-Mao, Macalester College; Nancy Schuldt, Fond du Lac Band of lake Superior Chippewa; Edward Swain, Minnesota Pollution Control Agency; Darren Vogt, 1845 Treaty Authority; Great Lakes Inter-Tribal Council, Inc.; Minnesota Chippewa Tribe.

Wild rice (*maa-noomin, psin, Zizania palustris*), Minnesota’s state grain, is central to both diet and cultural identity for many Native peoples around the Great Lakes. Wild rice is sensitive to environmental stressors, and thus serves as a flagship for protecting ecosystems and indigenous resource sovereignty. Wild rice also has been a flashpoint. Minnesota recently reexamined its sulfate standard for protecting wild rice waters, and despite efforts to include tribal interests, tribes call the state’s new proposed standard an “apparent rejection of the recommendations and experience shared by the tribes” (May 2017 letter from the Minnesota Chippewa Tribe and Minnesota Indian Affairs Council to the Minnesota Pollution Control Agency).

Among their concerns is that the standard does not account for the multiple environmental variables beyond sulfate that affect wild rice. The marginalization of tribal views in policy has been ubiquitous; protecting tribal resource sovereignty requires a culturally responsible, whole ecosystem approach to environmental stewardship and is a Grand Challenge faced in Minnesota, the Great Lakes Region, and throughout the world.

The project uses a collaborative approach to ensuring sustainable ecosystems—one that prioritizes tribal values, knowledge, and needs, starting from problem identification, throughout the research process, and to the formulation and implementation of new policies. Using an integrative and iterative method, the team will examine: (1) how cultural worldviews, social institutions, and ecosystem governance systems influence the generation, transmission, and use of ecological knowledge in healing and protecting wild rice ecosystems; (2) how research on wild rice ecosystems can be improved by integrating biophysical science disciplines—geochemistry, microbiology, hydrology, and ecology—with traditional knowledge and practices; and (3) how academic institutions and federal, state, and tribal agencies can jointly develop policies that account for multiple cultural worldviews and incentivize sovereignty-based approaches to wild rice research and management.

The study’s signature contribution will be to generate new understanding of the co-production of ecological knowledge and policy among tribes, academic researchers, and state agencies. A key outcome will be a culturally informed protocol for researching wild rice that can establish the University of Minnesota as a leader in fostering respectful and productive ties with Native communities. The proposed work is a local analysis of wild rice in Minnesota that will provide tangible policy recommendations for the state, but more broadly can serve as a flagship for the discourses of whole ecosystem sustainability and indigenous resource sovereignty.
**Grand Challenges Research Scholar Collaboratives**

Twelve faculty will have half-time appointments as Grand Challenges Research Scholars for 2018–19.* Each will be part of a six-member collaborative that will work to develop major initiatives in one or more of the spotlighted challenges. Each member will contribute to a comprehensive approach to each interdisciplinary area of focus. Some members also have Community-Engaged Scholar (CES) and Global Scholar (GC) designations, emphasizing work in partnership with external partners locally and globally.

The GC Research Scholar Collaboratives are supported by the Office of the Executive Vice President and Provost, with additional support from five campus partners: Global Programs and Strategy Alliance, Institute for Advanced Study, Institute on the Environment, Interdisciplinary Center for the Study of Global Change, and the Office for Public Engagement.

**Clean Water and Sustainable Ecosystems/Just and Equitable Communities Intersection Collaborative**

**Oscar Garza (CES),** Pharmacy Care and Health Systems  
**Kathryn Grace (GS),** Geography, Environment and Society  
**Mary Hermes (GS),** Curriculum and Instruction  
**Kimberly Hill-Malvick,** Civil, Environmental, and Geo-Engineering  
**Daniela Sandler (GS),** Architecture  
**Diane Willow (CES),** Art

**Just and Equitable Communities Collaborative**

**Bianet Castellanos (CES),** American Studies  
**Carl Flink,** Theatre Arts and Dance  
**Sumanth Gopinath,** Music  
**Susan Mason,** Epidemiology and Community Health  
**Richa Nagar (GS),** Gender, Women and Sexuality Studies  
**Ross VeLure Roholt (CES),** Social Work

*Support for the two Research Scholar Collaborative groups includes a 50-percent time appointment, physical space and logistics, and linkages to University and external information and resources.

More on the UMN Driving Tomorrow Research Initiatives >