



Dear colleagues,

I would like to introduce you to the Center for Applied Collaboration on Human Environments (CACHE) at the University of Illinois at Urbana-Champaign. Our mission is twofold: 1) to identify and mitigate the negative environmental consequences caused by and found within households, communities, and cities worldwide; and 2) to generate discussions and programs that invigorate traditional ways of doing research, outreach, and development.

We are supported in our goals by the University of Illinois' Institute for Sustainability, Energy and Environment, the College of Engineering, and the Department of Civil and Environmental Engineering.

#### Our Research:

At our core is a belief that all people are entitled to safe, healthy environments providing quality basic services to meet human needs. CACHE conducts research in three contrasting, yet complementary, initiatives to understand these factors:

- The SPHERE initiative examines the under-explored indoor environments of residences in the United States with the goal of developing a generalized understanding of where health stressors in these environments come from and what can be done to minimize risk.
- The focus of our GRAICES initiative is on basic services for households and communities around the world — especially in rural areas — by integrating the strengths of technical engineering, anthropology, sociology, and economics.
- Finally, SIMBAS seeks to improve our view into possible futures using emissions scenario modeling that draws from the new knowledge created by the SPHERE and GRAICES initiatives.

#### Other Programming:

Our Center stands at the very beginning of its mission, so we have the opportunity to build research portfolios and outreach efforts in new ways that challenge the status quo of the academic community and tap unexplored avenues of potential. For example, we are exploring ideas for an online forum to foster discussions about how to plan and complete impactful and sustainable development projects despite a funding and research system where motivations are not aligned.

In addition to research foci, CACHE will explore methods for forming partnerships, gathering data, training researchers, and implementing technology.

For more details about the Center and our work, visit our website at <http://publish.illinois.edu/humanenvironments>.

I'm excited to share with you a few updates on the activities happening at the Center, so please read on.

Sincerely,

**Tami Bond**

Director, Center for Applied Collaboration on Human Environments

## Director's Note: The birth of CACHE



In September 2014, I was still reeling from the phone calls, interview requests, and felicitations that flood a person who's been visited by a MacArthur Fellowship when Dean Andreas Cangellaris stopped by my office to add his congratulations. Something about his cheerful presence elicited the big question that had been simmering in my subconscious: "How do I do justice to this?" I'd been awarded the Fellowship for my work on black carbon particles—an important player in atmospheric chemistry, yet one that led to more questions than answers. After measuring, modeling, and thinking about the messy fires that beget black carbon for nearly 20 years, I had come to the inescapable conclusion that combustion effluents are just the wagging tail of an excitable dog. That dog is a dynamic mix of societal choices expressed as preferences, inertia, technology, and infrastructure. I recognized that I had an opportunity—almost a duty—to chase it.

It's taken a couple of years to clarify some meaningful subsets of the complex system where I think we can make progress. It's been a pleasure and a challenge to initiate conversations and collaborations that explore not just scientific questions, but the way we ask them. Keep talking.

Best, *Tami*

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## Development Effectiveness Workshop

The Development Effectiveness Workshop was held Sept. 29-Oct. 1, 2016, at the ACES Library and Alumni Center on the Urbana-Champaign campus. It brought together 30 minds from academia and non-government organizations to collectively explore the question: Why do development goals come up short, and why do we continue to let them come up short despite evidence our methods are ineffective?

We began our discussion rooted in the belief that there are several key mismatches in goals or expectations between researchers and those they seek to help, those who fund them, and the governments that either support or block them.

Four topics were explored over two days:

- Matching Technical Quality with Willingness to Pay

- Matching Program Effectiveness with Individual Motivations

- Matching Expertise with a Hierarchy of Capacity Needs

- Matching Donor and Investor Returns with Long-Term Success

Discussion on the final half-day centered on thoughts that would take participants forward into first steps for changing their approach to development as soon as they returned to their respective offices. Participants agreed that there are no absolute best *practices* for effective development — because every situation is different — but that there could be some best *processes*.

We are exploring ways to keep the dialogue happening online, including an online discussion forum.

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## Research Spotlight: Understanding Heating Emissions

Each year, indoor air pollution claims the lives of 4 million people worldwide — more than malaria and HIV combined. It's no wonder, considering that 3 billion people (nearly half the world's population) rely on smoky, sooty fires to provide energy for their homes. While many programs seek to improve the situation by offering replacement cooking stoves that boil water more efficiently, this only addresses one of several energy needs in the home: keeping warm, boiling water, and processing animal food in addition to cooking. Replacements that don't provide all these services may not be interesting to people in the household.

So, CACHE researchers are creating tools that will help programs more effectively intervene with low-emissions solutions.

"(To do that), it is really important to know what the end-users' needs are," said Nicholas Lam, a third-year postdoctoral researcher in environmental engineering at the University of Illinois at Urbana-Champaign. Alongside his teammates in the Bond Lab, he's creating a spatially distributed map of fuel consumption and the resulting emissions from space heating and other cold weather adaptation activities in Nepal, Alaska, Mongolia, and China.

To give the most realistic picture possible, the team is digging into regional differences in energy needs and fuel choices such as wood, grasses, animal dung, liquid propane, and kerosene.

"Our work in Nepal started with a very simple question: 'How much energy is needed for heating in the wintertime?' " Lam said. The team originally planned to add up the reported fuel used for space heating, calculate and characterize emissions from that amount, and reflect that relationship in the model, he said.

"But as we did interviews, one of the things we started to reconsider was, 'What does that question even mean?' Yes, we see big increases in the energy requirements at wintertime, but no one attributes that to 'heating.' "

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## Anthrogeoscience Session

Megan Konar and Tami Bond initiated a session on "Anthrogeoscience" at the American Geophysical Union (AGU) meeting in San Francisco in December, 2016.

"Responsible stewardship of the Earth system will require close-coupled projections of the connections between humans, infrastructure, political systems, and the Earth system," they wrote in their call for abstracts, seeking commonalities among researchers linking social science disciplines with atmospheric science, forestry, agriculture, hydrology, and oceanography. Expect to see this theme repeated at future AGU meetings!