



SUSTAINABILITY AND SOCIAL SCIENCE RESEARCH SYMPOSIUM

17-19 May 2017 | University of Michigan, United States
#SocSciSustain

Program

Wednesday May 17th, 2017

(all activities on Wednesday will be held in the Pendleton Room of the University of Michigan Union, 530 South State St, Ann Arbor, MI 48109)

- **12:00-2:00pm - Registration and set-up of posters**
- **2:00-2:30pm – Welcome**
 - **Trivellore Raghunathan**, Professor of Biostatistics, Department of Biostatistics, School of Public Health; Director and Research Professor, Survey Research Center, Institute for Social Research, University of Michigan
 - **Stephanie Rowley**, Associate Vice President for Research, Social Sciences and Humanities; Professor, School of Education; Professor, Department of Psychology, College of Literature, Science, and the Arts; Chair, Combined Program in Education and Psychology. University of Michigan
 - **Walter Leal**, Symposium Co-Chair; Head of the Research and Transfer Center "Sustainable Development and Climate Change Management," Faculty of Life Sciences, Hamburg University of Applied Sciences; Professor of Environment and Technology School of Science and the Environment Manchester Metropolitan University

- **2:30-3:15pm - Plenary Session 1**

Life, Liberty, and the Pursuit of Happiness: Planning a Sustainable, Just, and Flourishing Society American Style

Richard K. Norton (Urban and Regional Planning Program, University of Michigan)

This paper presents a critique of contemporary theorizing on sustainability, especially when conceived as the need to advance a singular, generalizable vision of sustainability science through a conventional array of institutional arrangements. Gaining and deploying robust knowledge of how environmental and social systems respond to perturbations, especially anthropogenic perturbations, is necessary but not sufficient. Similarly, insight on how and why humans act individually and collectively, both within their environments and in response to environmental change, requires something more than a simplified individualistic and mechanistic explanation. Rather, efforts to promote sustainability need to be engaged in cultural and place-specific context, through the deployment and integration of both knowledge and values within evolving institutions. Moreover, sustainability itself—lest it be taken to mean everything and thus nothing—needs to be conceptualized in the context of other societal goals and values. The American context can be used to explain and justify these assertions. Doing so can help to explain and justify, in turn, the assertion that sustainability—properly conceived—is and ought to be a fundamental American priority.

- 3:15-3:45pm - Coffee Break

- 3:45-4:30pm - Plenary Session 2

Using Behavioral and Social Sciences to Support the Work of Environmental Organizations: Learnings from the Environmental Defense Fund

Rainer Romero-Canyas (Senior Social and Behavioral Scientist, Environmental Defense Fund)

Environmental Defense Fund (EDF) is an international non-profit organization celebrating its 50th anniversary in 2017. Since its foundation, rigorous science has been the basis of EDF's work and advocacy. Five years ago, EDF committed to utilize psychology, behavioral economics and other social and cognitive sciences to understand the human dimensions of environmental challenges and to identify solutions for those obstacles. This talk will provide an overview of EDF's integration of these disciplines to the work and offer suggestions for maximizing the synergies between environmental groups and academic social scientists.

- 4:30-5:15pm - Plenary Session 3

U-M Sustainability Initiatives and Cultural Change

Robert W. Marans (University of Michigan)

Universities throughout the world are actively trying to become more sustainable, in part to reduce their operating costs but also to instill in their students, staff and faculty an understanding of the meaning of sustainability, its importance in a local and global context, and the need for individuals to adapt a more pro-environmental environmental way of life. As part of this effort, universities are initiating programs aimed at conserving energy and reducing their carbon emissions, reducing the amount of material and food wastes, educating faculty and staff as well as students, and both implicitly and explicitly, changing the culture of sustainability on their campuses. This session will provide an overview of efforts at the University of Michigan to create and measure sustainability culture.

- Evening: Free for Informal Meetings

See [Ann Arbor Area Convention & Visitors Bureau](#) for restaurant and entertainment guide

<https://www.visitannarbor.org/>

Thursday, May 18th, 2017

(Breakfast, plenary sessions, lunch, and coffee breaks on Thursday will be held in the Pendleton Room of the University of Michigan Union, 530 South State St, Ann Arbor, MI 48109)

- 8:00-9:00am - Breakfast

- 9:00-9:15am – Opening Remarks
- 9:15-10:00am - Plenary Session 4

Using Meta-Analysis in the Social Sciences to Improve Environmental Policy

Alexander Maki (Vanderbilt Institute of Energy and Environment, Vanderbilt University), Mark A. Cohen (Law School, Vanderbilt University) and Michael P. Vandenbergh (Law School, Vanderbilt University)

Policymakers have recently looked to the social sciences for effective strategies to address environmental issues, including how to change people’s environmental behaviors. During that time, social scientists have been challenged to improve how they assess, summarize, and convey the state of environmental social science. Meta-analysis, the quantitative review of existing research using data from multiple studies, is one method researchers use to assess the state of knowledge and share best practices. Development of new data reporting standards and systems would improve not only environmental social science, but also the interface between environmental social sciences and policymakers. In particular, dynamic meta-analyses, or frequently updated meta-analyses, would ensure that policymakers have access to up-to-date findings and would allow policymakers to examine subsets of studies that best approximate relevant contexts for new policies. These new standards for conducting and reporting meta-analyses would allow environmental social scientists to more effectively inform policy, and would help policymakers understand and assess the latest developments in the field.

- 10:00-10:30am - Coffee Break
- 10:30am – 12:00pm – **Parallel Sessions 1, 2 and 3** (*held in conference rooms at the Institute for Social Research [ISR] 426 Thompson St., Ann Arbor, MI 48106*)

Session 1: Examining Behavior (ISR Conference Room 1430 AC)

Chair: Meaghan Guckian

Organizational Characteristics in Residential Rental Buildings: Exploring the Role of Centralization in Energy Outcomes

Elizabeth Hewitt (Department of Technology & Society, Stony Brook University)

Organizational literature often points to decentralization as a driving force behind the success of organizations, but centralization can have benefits as well, particularly for energy efficiency initiatives in particular contexts. This paper conceptualizes the multifamily residential building as an organization, and posits that in large, multifamily rental properties a measure of centralization is helpful and even necessary for the effective management of energy conservation. This research relies on qualitative interviews, site visits, and publicly available energy data from a sample of New York City residential properties to examine the organizational characteristics that contribute to the

building's energy consumption. Findings indicate that certain organizational characteristics lend themselves to more centralized building management. These types of residential rental buildings, in turn, performed better than expected in annual energy consumption compared to other properties. This research carries important implications for social science and behavioral researchers, as well as building owner organizations and management firms, who can better craft programs and policies in buildings to capitalize on these organizational characteristics.

Impact of Normative Feedback on Household Energy Consumption

Kyle Anderson and SangHyun Lee (Dept. of Civil and Environmental Engineering, University of Michigan)

Behavior interventions that aim to reduce household energy consumption by inducing occupants to behave in a more environmentally consciously manner are becoming more widespread. In recent years, the application of individual feedback and the use of social norms have been receiving increased attention as they frequently are found to reduce household energy consumption in the short term. Unfortunately, the long-term effects of these treatment methodologies have received considerably less attention and are not well understood. The authors' work attempts to begin to bridge this gap in the literature through conducting and analyzing two yearlong field experiments, investigating the effect of normative feedback messages on occupants' energy consumption. Contrary to previous findings, the authors found that adding normative elements to feedback had no effect on energy consumption in the short-term. However, it was found that certain subsets of the sample were affected. Individuals with high concern for social norms reduced their use with an estimated treatment effect of 14%. Conversely, individuals with low concern for social norms surprisingly increased their use, an estimated treatment effect of -5%. Additionally, normative messaging duration positively affected the long-term behavior change durability. The long-term effect of behavior change was twice as strong in high social norms individuals.

From Sustainable Cities to Sustainable People – Changing Behavior towards Sustainability with the Five A Planning Approach

Petra Stieninger Hurtado (Urban Breezes)

The discussion about sustainable cities mainly focuses on technical solutions such as public transportation systems, resource-efficient buildings, and renewable energy generation. However, most cities don't take into consideration that the main factors that make a city sustainable are the people who live in the city. Sustainability is not just about using new technologies that make cities and their systems more sustainable by addressing the technical cause of inefficiencies. Sustainability is about changing behavior. The installation of public transportation systems alone doesn't guarantee that people will actually use them and drive less. Therefore, to create a sustainable city, the factors that make people choose the sustainable option over the unsustainable one need to be addressed in a planning process. Extensive research in European and American cities resulted in five factors that can make a change towards sustainable behavior possible: the accessibility, the affordability, the attractiveness, and the availability of sustainable urban amenities and people's awareness of their existence (the five A's). This paper explains how these five factors must be incorporated in urban sustainability strategies and how they can create truly sustainable cities by enabling long-term behavior change.

Session 2: Engaging Participants (ISR Conference Room 1430 BD)

Chair: Denielle Emans

Links Between Campus Sustainability Engagement and Behavior Change Among Undergraduate Students: The Mediating Role of Awareness

Noah J. Webster and Robert W. Marans (Institute for Social Research, University of Michigan), and John Callewaert (Graham Sustainability Institute, University of Michigan)

Encouraging university students to participate in sustainability-related courses, programs and activities is a key component of university efforts to create a more environmentally sustainable campus. However, little is known about how and when engagement can impact behavior change during the undergraduate students' time on campus. To address this need, we examine longitudinal associations between types and level of campus sustainability-related engagement and changes in waste prevention behavior. We then explore if and at which point during a students' four years waste prevention awareness mediates the link between engagement and behavior change. Survey data from the University of Michigan's Sustainability Cultural Indicators Program are used in the analysis. Specifically, data cover four years of responses collected annually from a panel of undergraduate students who entered the university in 2012. Preliminary results indicate considerable variability in the types and levels of undergraduate sustainability-related engagement. Also, engagement was found not to be directly associated with changes in waste prevention behavior, but rather only indirectly through higher levels of waste prevention awareness. Findings can inform university stakeholders, enabling them to more effectively design and implement sustainability-related programming that encourages not only increases in sustainability awareness but also changes in behavior.

The Impact of Status and Brainstorming in Participation in Small Group Deliberations

Sandra Rodegher (Global Institute of Sustainability, Arizona State University)

Scenario planning first gained traction within corporations as an energy transition management tool, but recently gained popularity within sustainability. It is a process for exploring potential futures and thinking critically about complex decisions that involve high degrees of uncertainty. It is also effective in shifting mental models and engaging diverse stakeholders, making it ideal for complex sustainability problems. Scenario-planning insights are typically used in strategic planning, further aligning with sustainability's commitments to action-oriented solutions. However, as a participative process, success hinges on equitable participant engagement that is threatened by power imbalance. The current pilot study uses an experimental design to explore the impact of explicit acknowledgement of status differential and pre-event brainstorming on participation in a small group task. The task was selected based on its parallels to scenario-planning interactions. Twenty-four triads engaged in group deliberation while wearing devices that gather data to measure interactions. Afterward, participants completed a participation perception survey. Despite the popularity of brainstorming, results of the pilot study point to the utility of status concealment over individual-level brainstorming to bolster participation. Ultimately, this work contributes to a more nuanced understanding of participation in service of more robust, pluralistic sustainability decision-making.

Achieving a Climate-Neutral Campus: A Psychological Analysis of the Participation Process with the Stage Model of Participation

Stefan Zimmermann, Thomas Bäumer and Patrick Müller (Business Psychology, University of Applied Sciences)

The complexity of social transformations requires participative approaches to research. One such approach to meeting this need is the so-called "Living Lab", in which the participation of all stakeholders lies at the heart of the research process. This article presents a stage model as a way of describing the psychological aspects involved in participatory processes in an environmental context. The purpose of the model is to show the psychological parameters underlying a successful

participatory process as a basis for finding suitable participatory measures for different project settings. It is the aim of this article to introduce the elaborated model with its different levels of environmental participation as well as to demonstrate its application. Three case studies demonstrating the application of the model are presented from the "climate-neutral city campus" Living Lab at the University of Applied Sciences Stuttgart. The case studies show participation opportunities using (1) interviews with employees about sustainability measures, (2) the integration of sustainability-related topics into teaching, and (3) the support of mobile apps for achieving climate-neutrality. So far, three important findings have emerged: (1) Depending on the degree of involvement, different forms of participation are appropriate. (2) Participation at higher levels of involvement is difficult to achieve when people's motivations at the lower levels are not adequately addressed. (3) The participatory process in the environmental context can be described using the proposed model and it provides useful insights how to better implement appropriate measures in order to achieve social transformations.

The Teaching Green Building: Five Theoretical Perspectives

Laura B. Cole (Architectural Studies University of Missouri)

Teaching Green Buildings are designed to educate building users about green building design and often broader themes about the connection between buildings and their surrounding ecosystems. The outcomes of a well-designed Teaching Green Building range from increasing knowledge to promoting environmental behavior change to fostering a sense of place. To date, however, Teaching Green Buildings have been weakly theorized in scholarship and haphazardly designed in practice. This chapter draws on an interdisciplinary research base to discuss five potential roles for TGBs as: symbol, science museum, 3D textbook, call to action, and place.

Session 3: Competing and Converging Agendas (ISR Conference Room 6050)

Chair: Laura Bell

Social Justice and Sustainability Efforts in the U.S.-Mexico Transborder Region

Sylvia Gonzalez-Gorman (Department of Political Science, University of Texas Rio Grande Valley)

The 1983 La Paz Agreement originally defined the U.S.-Mexico transborder region as 62.15 miles (100 kilometers) on each side of the international border. The La Paz Agreement between the U.S. and Mexico created the first bilateral cooperation program on issues of environmental quality along the U.S.-Mexico border. Prior to La Paz, cities throughout the U.S. adopted and have continued to adopt various sustainability policies to address environmental concerns. However, in the U.S.-Mexico transborder region where cities are fundamentally unique from communities in the interior United States, local sustainability policies and issues of environmental social justice are still in their infancy and deficient environmental conditions continue to exist in some border areas. While sustainability and social justice are two important goals for city governments, harmonizing both values is challenging due to their conflicting policy natures. This study examines if transborder cities pursue social justice and sustainability simultaneously despite the challenge of balancing nebulous goals. This study focuses on factors that influence different levels of environmental sustainability measured by greenhouse gas (GHG) amounts among transborder communities. The results indicate that U.S. transborder cities with densely populated areas and the geographical size of the community contribute to higher levels of GHG emissions and less equitable sustainability.

Inclusive Sustainability: Environmental Justice in Higher Education

F. Lu (Department of Environmental Studies, University of California, Santa Cruz), R. Rosser (American Indian Resource Center, University of California, Santa Cruz), A. Renteria (Ethnic Resource Centers, University of California, Santa Cruz), N. Kim (Asian American/Pacific Islander Resource Center, University of California, Santa Cruz), E. Erickson (Sustainability Office, University of California, Santa Cruz), A. Sher and L. O'Connor (Institutional Research, Assessment & Policy Studies, University of California, Santa Cruz)

The aim of this paper is to demonstrate why and how efforts at UC Santa Cruz have begun to shift from sustainability as a technical, expert-oriented activity focused on aspects such as built environment, climate, energy, food and water, to more of a concern with *inclusive sustainability*, which centers on issues of power dynamics, difference, and ethical considerations. As the campus undergoes significant demographic change (e.g., UCSC's undergraduate population is 66% non-white and 43% are first generation college students), framings of sustainability must resonate with these increasingly diverse populations. The People of Color Sustainability Collective (PoCSC), is a groundbreaking partnership between UCSC's Ethnic Resource Centers, Colleges Nine and Ten, and Sustainability Office. PoCSC's efforts to recognize, celebrate, and validate diverse understandings and expressions of sustainability is a response to evidence of exclusion among certain sectors of our student population. Based on a recent campus-wide survey, this paper compares and contrasts responses between white, non-Hispanic students and students of color in terms of their participation in and perceptions about the environmental sustainability movement, finding that the former participate at a higher rate and rate mainstream environmental concerns such as conservation of biodiversity as more important, while environmental justice issues such as food access were rated more important to students of color. However, many areas of convergence between the two groups was found, notably a broad agreement about the importance of environmental issues.

Blockchain for Good? Digital Ledger Technology and Sustainable Development Goals.

Richard Adams (Surrey Centre for the Digital Economy, University of Surrey), Beth Kewell (Surrey Centre for the Digital Economy, University of Surrey) and Glenn Parry (Business & Law, University of the West of England)

Blockchain technology (aka Distributed Ledger Technology or DLT) is a novel configuration of Peer-to-Peer, cryptographic and distributed computing technologies that have the potential to shift the internet from an internet of information to an internet of value network, with significant disruptive potential. To date, the cryptocurrency 'bitcoin' is the application of DLT that has attracted most attention, not all of it favourable. However, DLTs are about much more than cryptocurrencies and, as Kranzberg's (1986) first law of technology, that 'Technology is neither good nor bad; nor is it neutral' reminds us, we can ethically frame applications of new technologies. To date, research has tended to focus on the technical characteristics of DLTs, and there has been little reflection on potential socially and environmentally beneficial use cases: Blockchain for Good (B4G). The aim of this this exploratory and descriptive paper is to reflect on innovative B4G applications that could help deliver socially and environmentally beneficial outcomes, framed in terms of the UN's Sustainable Development Goals, through challenging existing business models and providing new opportunities for value creation.

A Sustainable Touristic Place in Times of Crisis? The Case of Empuriabrava – a Superdiverse Mediterranean Resort

Dawid Wladyka (Department of Sociology and Anthropology, University of Texas Rio Grande Valley) and Ricard Morén-Alegret (Department of Geography, Autonomous University of Barcelona)

Empuriabrava is a cosmopolitan neighborhood located in Costa Brava and one of the world's largest residential marinas. About sixty-five percent of Empuriabrava's population are foreign residents from dozens of nationalities. Their profile constitutes an intersection of religions, languages, socio-economic statuses, and migratory histories. Previous research rooted in conflict and contact theories as well as studies based on the superdiversity paradigm underscored the contradictory effect that diversity may have on the sustainable development of local communities. This paper analyzes Empuriabrava's population daily life and community sustainability. The analysis is based on interviews with local key informants, both natives and immigrants, as well as analysis of statistical and documental sources. The results suggest that while superdiversity provides vast possibilities to empower sustainable development, a perceived lack of local authorities' involvement diminishes this positive effect. The economic downturn has been observed as enhancing conflict and limiting collaborative initiatives. However, the efficient management of superdiversity in tourism-oriented neighborhoods has been found to be a key asset, which may help to experience rejuvenation instead of decline in the resort life cycle model. In this sense, this paper shows practical sustainability lessons to be learnt from Empuriabrava recent history and present situation.

- **12:00-1:30 – Lunch, Networking, and Posters** (Pendleton Room, Michigan Union)

Note: Posters will be displayed throughout the symposium but authors will be present during this time (12:30-1:30).

#1 Assessing the Accuracy and Usability of Arsenic Test Kits in Bangladesh

Grace Rodriguez (University of Michigan)

Every year millions of Bangladeshi citizens are exposed to dangerous levels of arsenic through their drinking water. Monitoring groundwater sources for arsenic contamination is an essential step in ensuring safe drinking water access; however, the accuracy, reliability and affordability of currently available mobile testing kits has not been well documented. In this study, eight test kits were assessed under field conditions for a wide range of arsenic concentrations [10 to 200ppb As]. The Hach EZ High Range Arsenic Test Kit, a test commonly used in Bangladesh, inaccurately indicated water containing high concentrations of arsenic were safe to drink (<50ppb As) in 54% of tests. Three kits, the Sensafe Arsenic Quick II, the LaMotte Arsenic Test Kit, and the Merck Arsenic Test, performed well, correctly identifying the safe and unsafe water samples in 93%, 92%, and 80% of tests, respectively; however, these kits cost more per test than the commonly used kits.

#2 Sustainable Water Supply in Bangladesh: Household Perceptions, Awareness, and Behavior

Grace van Velden (University of Michigan)

This baseline household survey, conducted June-September 2016 in Phulsara and Goga unions in Bangladesh, sought to evaluate: sustainability of arsenic-safe water supply, user awareness of water quality, user behavior related to drinking water sources, and specific user perceptions regarding arsenic as a drinking water contaminant. Surveying 903 households, the study found greater than 75-percent of households collect drinking water from shallow tube wells, many of which have been found to be in exceedance of the Bengali arsenic standard (50 ppb), and only 21-percent access drinking water from community (arsenic-)safe water devices. While greater than 40-percent of households believe the government should be responsible for providing safe water, only 10-percent believed the government was actually carrying out those responsibilities, indicating a possibly significant gap in arsenic policy and governance. Further, study findings indicate user perceptions of water quality are closely tied with aesthetic indicators such as smell, taste, and color, none of which bely the presence

of arsenic; this suggests user behavior is influenced by factors that are not currently targeted in many arsenic mitigation or other water quality strategies in Bangladesh.

#3 Rethinking Post-Occupancy Evaluation for Sustainable Learning Environments

Andrea Wheeler (Iowa State University)

Green or sustainable schools are an important building type from which to explore questions of community, changing social behaviors, inclusivity and difference, as well as the more usual objective of reductions in energy efficiency and innovation in material production. Building performance studies, including post-occupancy evaluations (POE), are increasingly taking into account behavioral and social dimensions of sustainability; and adopting ethnographic and art-based research methodologies to examine building users' relationship to their environments. The need to create new ways to inhabit is not in question, nor is the role of the built environment in this task; but confronting methods of scientific norms and accounting perspectives that promise to build future ecological worlds: these are, and moreover, are profoundly challenging to the biases of the profession when presenting the importance of new methods.

#4 Michigan Sustainability Cases

Helen Gutierrez (University of Michigan)

Michigan Sustainability Cases strives to unpack the complexities of sustainability through more case-based, dynamic, and engaged teaching and learning. A collaborative platform expands the conversations, encouraging students, instructors, and practitioners to get involved at every step.

#5 Michigan Journal of Sustainability

Elizabeth LaPorte (University of Michigan)

The Michigan Journal of Sustainability fosters transdisciplinary communication by publishing timely, innovative, stimulating, and informative articles that translate scholarly research on systemic sustainability problems into useful formats for practitioners and policy makers. The Journal is supported by the Graham Sustainability Institute and the Dow Sustainability Fellows Program, which believe that diversity, equity, and inclusion are key to individual empowerment, and the advancement of sustainability knowledge, learning, and leadership.

#6 Psychosocial Predictors of Climate Change Adaptation Behaviors

Jennifer Carman (University of Michigan)

This poster presents preliminary results from a review of literature on psychosocial and attitudinal variables that have been theoretically or empirically linked to individual-level behaviors to adapt to climate change impacts. Results so far show that many variables are linked to adaptation behavior, but there is no organizational framework that synthesizes the roles that these variables may play, and moreover, the literature is unclear on what kinds of behaviors are even desirable for adapting to climate change. Overall, results suggest that researchers from different disciplines may be unaware of relevant contributions in each other's work.

#7 University of Michigan Water Center: Supporting Collaborative Research That Improves Water Resource Decisions

Melissa Zaksek and Maeghan Brass (University of Michigan)

The University of Michigan Water Center addresses critical and emerging water resource challenges. We are driven by the desire to ensure management of our water resources is informed by the best possible science. Working with scientists and partners, the Water Center addresses water resource challenges in the Great Lakes region and nationally, by fostering collaborative research that informs policy and management decisions affecting our waters.

#8 Graham Sustainability Institute

Elizabeth LaPorte (University of Michigan)

The Graham Institute engages, empowers, and supports faculty, staff, and students from all U-M units, and integrates this talent with external stakeholders to foster collaborative sustainability solutions at all scales. Work spans three areas: translational science; transformative learning; and campus leadership.

#9 Modelling Student's Daily Transportation Behaviors and Responses to Institutional Interventions

Ying Xu (University of Michigan)

Despite the University of Michigan's continuous promotion on green transportation, preliminary results from the Sustainability Cultural Indicators Program suggest limited improvements on students' travel score. Among different types of sustainable behaviors, the mode of transportation is found to be the hardest one to be altered. Students' travel behaviors are largely constrained by situational factors, such as housing options, accessibility to the public transportation, and parking policies. To what extent the university's intervention can play a role on reducing travel footprint becomes a critical question. Promoting "greener"- if not "greenest" travel options – may be a feasible strategy to enable a long-term behavior change.

#10 A Living Learning Systems Model as a Methodology for Intra-Active Sustainability Learning Research

Joy O'Neil (University of Wisconsin - Stevens Point)

The field of sustainability education in higher education is not only about what we teach but, *how* we teach or *how* we learn. Rather, teaching and learning *as* sustainability is about fostering a transformative sustainability learning process that includes social, affective and cognitive learning in an intra-active, material-discursive learning environment. This poster presentation will detail a living learning system as an intra-active methodology that can be put into practice for research on transformative sustainability learning.

#11 *Incorporating Aesthetics into the Sustainability Dialogue: Lessons from an Exemplar of Art-Science Synthesis*

Edgar Cardenas (University of Michigan)

Sustainability researchers have primarily focused on interdisciplinarity in the sciences and engineering, paying little attention to the arts. However, natural aesthetics have contributed to shaping collective priorities and values, which influence both local and national land use policy. This poster addresses how the historic interpretations of natural beauty, the sublime, and the picturesque have manufactured a specific representation of nature and how that representation has proven detrimental to our ecological understanding. Additionally, it provides a way forward by providing a sustainability aesthetic model that is coupled to ecological understanding.

#12 *Connecting an Art-Science Practice to Collaborations*

Edgar Cardenas (University of Michigan)

Sustainability challenges have been deemed as wicked in nature, necessitating a cross-disciplinary approach. Additionally, the complexity of these problems requires high levels of expertise that are difficult for any one person to acquire, therefore mechanisms for developing high functioning creative teams become essential. This study investigated how working dynamics and methods of interaction fostered or hindered successful outcomes for 3-person interdisciplinary teams. The study used, ethnographic, survey, and wearable sensor data to triangulate — at multiple scales — which mechanisms were most important to the successful functioning of these teams.

- **1:30-3:00pm – Parallel Sessions 4, 5 and 6** (*held in conference rooms at the Institute for Social Research 426 Thompson St., Ann Arbor, MI 48106*)

Session 4: Teaching and Learning (ISR Conference Room 1430 AC)

Chair: Laura Cole

Connective Methodologies: Visual Communication Design and Sustainability in Higher Education

Denielle Emans (Graphic Design Department, Virginia Commonwealth University in Qatar) and Kelly Murdoch-Kitt (Graphic Design, College of Imaging Arts & Sciences, Rochester Institute of Technology)

By employing an expanded view of 21st-century communication design as a starting point for research, this paper aims to share with a multidisciplinary audience a brief overview of design research methodologies and its intersections with sustainability. The researchers trace this evolution from the 1960s to present, wherein higher education classrooms frequently integrate ecological and social dimensions into teaching and learning. The literature reveals how design research has developed distinct approaches to working *for* and *with* communities to fuel creative action. The researchers utilize grounded theory to review results from a series of initial interviews and survey data collected from a purposive sample of design professionals in the United States, along with an analysis of a range of texts in the intersecting realms of design, education, and sustainability. Professional respondents cite evolving trends in global business interactions, communications, and problem-solving as indicators that higher education should prepare design students to tackle complex

sustainability challenges. This paper concludes with a discussion of the importance of integrating intercultural collaboration into higher education curricula to help students realize the intricacies involved in environmental health and cultural vitality.

Interdisciplinary Teaching and Learning about the Social Sciences and Sustainability

Michaela Zint (School of Natural Resources and Environment, University of Michigan)

The social sciences, in addition to the natural sciences and humanities, are critical to addressing the complex sustainability challenges confronting us. In response to this growing appreciation of the social sciences, an increasing number of environmental social science courses are being offered across the globe. Unlike the majority of these courses, which focus on a single social science, the University of Michigan's "*Social Sciences and Environmental Problems*" introduces undergraduate students to seven social science disciplines (i.e., anthropology, communications, education, economics, psychology, sociology, political science) within the context of a variety of sustainability topics. The course's interdisciplinary approach enables students to learn about the similarities and differences between social science disciplines and how they, when considered in combination, provide a holistic understanding of the causes of sustainability challenges as well as comprehensive strategies for addressing them. As part of the presentation, the author will describe the course's content, pedagogies, and share "lessons learned" in over 10 years. The author will also speak to the course's main group assignment which engages students in applying social science research findings to addressing a campus sustainability challenge (see www.sustainability.umich.edu/enviro211 for examples). Students' recommendations have been implemented to enhance UM's sustainability efforts and preliminary research suggests that the "real world" nature of the assignment supports student learning.

Integrating Social Science Research to Advance Sustainability Education

Christine Jie Li (School of Natural Resources, University of Missouri). Martha C. Monroe and Tracey Ritchie (School of Forest Resources and Conservation, University of Florida)

The development and evaluation of the instructional module, *Southeastern Forests and Climate Change*, provided a platform to conduct social science research that has the capacity to improve sustainability education and our ability to achieve target outcomes. In addition to conveying information about climate change and forest management to secondary science students, the module was designed to empower learners to take action and build skills in systems thinking. We applied Hope Theory in the design of the 14 activities and measured hope among high school students who participated in the evaluation of the activities. Activities helped learners understand how others are working on climate issues, how forest owners adapt management protocols, and how individuals can contribute to solutions—all of which help nurture hopefulness and efficacy. We also focused on developing systems thinking skills by providing opportunities for students to learn and practice common systems tools, such as causal loop diagrams. High school students (n=924) from 24 schools in the southeastern United States completed pre-and post-activity surveys that assessed knowledge, hope, and systems thinking skills. Data suggest that there was a significant increase in hope concerning climate change, and a significant increase in systems thinking skills after some activities. Knowledge of forest management, carbon cycle, the role of forests in mitigating climate change, life cycle assessment, and product externalities also significantly increased. In this article, we describe the principles used to design the activities, the results, and the implications of this social science research.

Innovative Instructional Module Uses Evaluation to Enhance Quality

Martha C. Monroe (School of Forest Resources and Conservation, University of Florida), Annie Oxarart (University of Florida), Tracey Ritchie (School of Forest Resources and Conservation, University of Florida) and Christine Jie Li (School of Natural Resources, University of Missouri)

The instructional module, *Southeastern Forests and Climate Change*, is an example of innovation in sustainability education. The module was designed for high school science teachers and developed as part of a research project on southern pine productivity in a changing climate. As a result, it combines climate science with pine ecophysiology and economic productivity. It also encourages classroom debate and role playing activities to explore relevant ethical issues. It deftly brings together science education and education for sustainability. The process of developing the instructional module utilized a needs assessment, experimentation, and evaluation which improved program quality. The summative evaluation provided insights about the success of the program. This tight coupling of evaluation and program development created a high quality product that educators are requesting and using.

Session 5: Change Agents (ISR Conference Room 1430 BD)

Chair: Sandra Rodegher

Empowering Change Agents through the Environmental Defense Fund's Climate Corps Program

Sara Soderstrom (Organizational Studies and Program in the Environment, University of Michigan) and Todd Shifeling (Erb Institute, University of Michigan)

The overall question the proposed research addresses is how organizational dynamics shape the development of change agents working to move their organizations towards sustainability. Individual issue sellers drive change in organizations through forging coalitions, attracting powerful sponsors, and aligning issues with organizational values. Issue sellers accumulate social capital over time as they develop relationships with others in the organization and learn how to navigate the organizational decision-making channels more effectively. The EDF Climate Corps program is an incubator for sustainability issue sellers and provides a unique context for studying issue sellers' social and support networks that influence their success. EDF Climate Corps fellows are embedded both within organizations that are striving to improve their sustainability practices, while also engaging with the broader set of Climate Corps fellows with shared environmental identities. Through surveys and interviews with the 2016 Climate Corps cohort, this project explores how commitment and support varies over the course of the Fellows' internships, as well as how organizational structures influence these processes. This research can generate insights that help improve the effectiveness of both Climate Corps and sustainability advocates more generally.

Psychological Distance and Response to Human versus Non-Human Victims of Climate Change

Christie Manning (Department of Environmental Studies and Department of Psychology, Macalester College), Hannah Mangas (Macalester College), Elise Amel (Psychology Department, University of Saint Thomas), Hongyi Tang (Macalester College), Laura Humes (Macalester College), Rowena Foo (Macalester College), Vera Sidlova (Macalester College), and Kelly Cargos (Macalester College)

Despite the serious threat of climate change to sustainability, people in the United States feel little urgency to address the issue. The goal of this research project was to use psychological methods to better understand why Americans respond to climate change the way they do, and to assess strategies to spur a stronger action-oriented response. Using Construal Level Theory as a foundation, three psychological studies explored the perceived psychological distance of climate change, empathy toward victims of climate change, and people's willingness to take action. Past research suggests that perceptions of low psychological distance toward climate change are associated with higher concern and willingness to take action. In the current research, participants read short scenarios about climate change and how it impacts specific victims, such as geographically and socially similar people (low psychological distance) or a geographically and socially dissimilar social agent such as an animal (high psychological distance). Using both self-report surveys and implicit methods, our studies explore the relationship between psychological distance and response to climate change. Consistent with other research, we find that psychologically closer framings of climate change do not always effectively ameliorate psychological distance, nor result in greater intention to act. Our results further suggest that people may engage in psychological distancing when faced with climate change suffering. These findings provide important insights for effective communication about challenging sustainability issues.

Living Well and Living Green: Participant Conceptualizations of Green Citizenship

Erin Miller Hamilton (School of Natural Resources and Environment, University of Michigan), Meaghan L. Guckian (Department of Environmental Conservation, University of Massachusetts) and Raymond De Young (School of Natural Resources and Environment, University of Michigan)

For many people, sustainable behavior can be clearly articulated through an array of consumer choices made every day based on: where products come from, the environmental impact of the ingredients in household products, and how products are disposed of at the end of their life cycle. But outside of consumerism, are there other avenues an individual might explore in the pursuit of living a sustainable lifestyle? In an activity called Conceptual Content Cognitive Mapping (3CM) completed by environmentally-concerned academics and professionals, this study asked what it means to be a green citizen. Green citizenship, as understood and lived by our participants, transcends multiple levels of involvement that extend beyond consumer behavior. Green citizens embrace their individual agency to affect change, while recognizing the socially embedded nature of their actions. Beyond the support of community networks, green citizens also identify higher institutional structures as both conduits and barriers to change. Implications for constructing supportive pathways to sustainable participation focusing on the whole citizen, rather than just the consumer, will be discussed.

Cognitive Mapping as Participatory Engagement in Social Science Research on Sustainability

Meaghan L. Guckian (Department of Environmental Conservation, University of Massachusetts), Erin Miller Hamilton and Raymond De Young (School of Natural Resources and Environment University of Michigan)

What does it mean to be a green citizen? To date, discussion of green citizenship has been heavily rooted in theory, drawing largely from political and consumer studies. The scant empirical evidence exploring the behavioral components of this concept has overwhelmingly focused on individuals' identification as "green" via their role as consumers. However, little empirical research exists exploring *participant-driven* understandings of what it means to be a green citizen and how this role relates to and expands upon that of the green consumer. This study seeks to resolve these gaps by expanding the definition of green citizenship through a participatory process called the Conceptual Content

Cognitive Mapping exercise (3CM). Through this modified cardsorting task, participants are able to visually communicate their lived understandings of green citizenship by arranging and categorizing labeled cards into networks of meaning that reflect their personal understandings of this abstract concept. This presentation will focus on the 3CM exercise as a fruitful methodology to promote participant engagement in social science research on sustainability in general, and green citizenship in particular.

Session 6: Policy Perspectives (ISR Conference Room 6050)

Chair: Sylvia Gonzalez-Gorman

Bridging the Gap Between Policy and Action in Residential Graywater Recycling

Laura Bell (Department of Design and Environmental Analysis, Cornell University)

This study explores the social dimensions of local climate adaptive policies through an Arizona policy, the 2010 Residential Graywater Ordinance (RGWO). An ecological model of behavior is used as a framework for analyzing the complex relationship between sustainably focused policy initiatives and their success or failure on the individual level. Water cycle fluctuation will be significantly impacted by global climate change in upcoming decades and additional demand for potable water will increase due to growing urban populations. The reuse of residential graywater is an underutilized option for reducing potable water use, municipal energy use, and greenhouse gas emissions, with seemingly little negative impact on public health. The RGWO is a policy passed in Tucson, Arizona, requiring new single family and duplex housing be built with separate graywater plumbing to enable graywater recycling for irrigation. Local adaptations of such policies often depend on a variety of unforeseen factors and few studies have considered the role architects, activists, builders, and citizens play in the success of local climate adaptive initiatives. Data from guided in-depth guided interviews was used to develop insight into how different stakeholders can impact policy implementation. Eight participants were interviewed through a snowball sampling of local graywater installation professionals, educators, activists and researchers. Data from interviews was transcribed, coded, analyzed for themes presented within an ecological framework. The aim of this paper is to offer new perspectives on integrating sustainably focused policies by evaluating social and political barriers encountered at the multiple levels through an ecological model: individual, interpersonal, organizational, community and policy levels.

Shrinking Cities

Margaret Dewar (Urban and Regional Planning Program, University of Michigan) and Alicia Alvarez (Law School, University of Michigan)

Many cities in the eastern half of the United States have lost large shares of their peak population and employment. They have experienced extensive property disinvestment and increased numbers of vacant lots. “Shrinking cities” plans in Detroit, Youngstown, Flint and Cleveland envision the transition of much previously residential land to green and blue infrastructure, green commercial uses, and more spacious residential areas. Literature on land use transition has shown that when redevelopment to the “highest and best” use generates enough return on investment to cover transition costs, land use change occurs. This research investigates what helps and hinders land use transition such as the changes envisioned in the plans when little or no return on investment exists, specifically the transition from vacant lot to green storm water infrastructure in Detroit and Cleveland. The research identifies key barriers to implementation of this land use change through study of laws, administrative actions, regulations, ordinances, and codes; interviews about governance practices; observation of meetings; and the experience of implementing four green infrastructure sites. Most

importantly, governance for implementation and maintenance of green infrastructure differs substantially from the institutionalized governance of gray infrastructure; traditional governance interferes with a shift to green infrastructure.

Sustainability and Civic Engagement: A Communications Engagement and Education Plan

Madhavi Venkatesan (Economics Department, Bridgewater State University), Jordan Remy and Andrew Sukeforth (Bridgewater State University)

Across the United States primarily on a town or city basis, the increasing public awareness and understanding of the detrimental impact of human activity on the environment is fostering the development and visibility of grassroots sustainability efforts. This is most readily noted in plastic bag, Styrofoam, and plastic bottle bans. These efforts have been typically facilitated by education campaigns focused on the symbiotic relationship between human life and the planet and the intrinsic or non-market derived value of the ecosystems we inhabit. However, often the communication strategy employed has been limited by an appeal to a like-minded stakeholder constituency, limiting the traction benefit from engaging other stakeholders and the subsequent en masse alignment with regulatory intent. This paper details a grassroots effort and the stakeholder engagement process related to a specific ban. It describes the development and implementation process as carried out through a university-town partnership, where the approach taken includes proactive stakeholder engagement inclusive of a consumer survey instrument. Though survey results reveal interest and even concern for the environment, interestingly they also highlight a self-evaluation bias among respondents. Results show that respondent perception of environmental concern is inconsistent with their actions, providing an entry point and justification for multi-channel education and communications strategies differentiated by stakeholder grouping.

Interplays of Sustainability, Resilience, Adaptation and Transformation

Jennifer L. Johnson, Laura Zanotti, Zhao Ma, David J. Yu, David R. Johnson, Alison Kirkham, Courtney Carothers (Purdue University)

This paper analyzes the complex interplays of *sustainability, resilience, adaptation* and *transformation*, key paradigms and analytical concepts that have emerged from the human-environmental interactions, socio-ecological systems, and global environmental change literatures. Specifically, this article provides a summary of how these key paradigms and analytical concepts have evolved over time and synthesizes current debates about the interplays of these paradigms and concepts. Our findings reveal certain theoretical synergies between and among *sustainability, resilience, adaptation* and *transformation*, as well as epistemological tensions and practical tradeoffs when actions are taken to promote ostensibly desirable attributes of social-ecological systems through on-the-ground actions. These findings highlight the need for scholars, practitioners and policy makers to be explicit about the normative assumptions associated with *sustainability, resilience, adaptation* and *transformation* as they complement or contradict each other in local contexts, and how they may affect or be affected by the characteristics of and processes within local communities. Such understanding will be crucial for moving a step further towards developing adaptation or transformation interventions that maximize the achievement of sustainability or resilience policy goals and minimize potential negative outcomes on both human well-being and environmental conditions.

- **3:00-3:30pm - Coffee Break** (Pendleton Room, Michigan Union)

- **3:30-5:00pm - Plenary Session 5** (Pendleton Room, Michigan Union)

Funders Panel

Evan Michelson (Sloan Foundation)

Maria Uhle (National Science Foundation)

Jane Bloch (Skoll Global Threats Fund)

Marilu Hastings (Mitchell Foundation)

A panel featuring sustainability funders who will discuss strategies for social science researchers interested in identifying support for their work. The panel discussion will be informed by a pre-symposium participant survey of current funding sources and research interests.

5:00:7:30pm –Reception and Dinner (Kuenzel Room, Michigan Union)

Friday, May 19th, 2017

(Breakfast, plenary sessions, lunch, and the coffee break on Friday will be held in the Pendleton Room of the University of Michigan Union, 530 South State St, Ann Arbor, MI 48109)

- **8:00-9:00am - Breakfast**
- **9:00-9:15am – Opening Remarks**
- **9:15-10:00am - Plenary Session 6**

The Influence of Learning about Carbon Dioxide Removal on Support for Mitigation Policies

Victoria Campbell-Arvai, P. Sol Hart, Kaitlin T. Raimi (University of Michigan) and Kimberley S. Wolske (University of Chicago)

A wide range of carbon dioxide removal (CDR) strategies has been proposed to address climate change. As most CDR strategies are unfamiliar to the public, it is unknown how increased media and policy attention on CDR might affect public sentiment about climate change. On one hand, CDR poses a potential moral hazard: if people perceive that CDR solves climate change, they may be less likely to support efforts to reduce carbon emissions. On the other hand, the need for CDR may increase the perceived severity of climate change and, thus, increase support for other types of mitigation. Our results suggest caution is warranted when promoting technological fixes to climate change, like CDR, as some forms may further dampen support for climate change action among the unengaged.

- **10:00-10:30am - Coffee Break**
- **10:30am – 12:00pm – Parallel Sessions 7, 8 and 9** (*held in conference rooms at the Institute for Social Research 426 Thompson St., Ann Arbor, MI 48106*)

Session 7: Methodology (ISR Conference Room 6050)

Chair: Stefan Zimmermann

Use of Email Paradata in a Survey of Sustainability Culture

Andrew L. Hupp, Heather M. Schroeder, and Andrew D. Piskorowski (Survey Research Center, University of Michigan)

To inform future survey design decisions, it's helpful to know how people invited to participate in web surveys engage with email invitation requests they are sent. This paper uses data from the Sustainability Cultural Indicators Program (SCIP) survey administered annually at the University of Michigan. The SCIP monitors the progress in moving toward a culture of sustainability. The SCIP utilizes email paradata to understand the engagement sample members have with email requests to complete a survey about the culture of sustainability. The email paradata combined with paradata from the survey about access and completion allows a view into how sample members engage with the emails and the survey they are being asked to complete on behalf of the program. This paper discusses practical applications for email paradata for the survey practitioner. First, it provides data to help understand specifically how the sample member is engaging with email communications containing survey requests. Low engagement may mean the sample member did not receive the email (e.g. spam). High engagement with low survey access (and completion) may mean there are other attributes (e.g. length of survey, survey topic, incentive, how the data will be used, etc.) affecting the decision to participate that researchers may need to address. Second, the data provide insight as to when the emails are being viewed. This potentially allows the survey practitioners to focus in on optimal times to contact them via email to try and gain their cooperation.

Re-shuffling the Deck on Environmental Sustainability: Using a card sort to uncover perceived behavioral categories, effort, and impact in a college environment

Casey G Franklin (Design & Environmental Analysis, Cornell University) and Alebiosu, Abram (Psychology Department, Cornell University)

Definitions of sustainability in social settings can vary widely across contexts and age groups. The aim of this experiment is to identify actions college students classify as sustainable within their everyday context, how such actions are grouped into behavioral categories, the perceived effort and impact of actions, and ways that public spaces can limit these actions. A card-sort, co-current interview, and ranking task was conducted with 10 students (ages 20-27). Student listed sustainable actions and behavioral categories were compared against a researcher-generated list of categorized actions possible within their college environment. Ranking data of perceived effort and impact was used to identify which behaviors would be easy and difficult to encourage in college buildings. Key findings are that students' perceptions of effort and impact varied widely, students categorized actions based on many types of commonalities, students consistently placed actions appropriately in predetermined categories, and that educational environments contain social and physical norms

limiting perceived ability to act. In the future, these methods could be replicated to identify perceptions influencing sustainable behaviors in multiple contexts.

Promoting Participation in a Culture of Sustainability Web Survey

Heather M. Schroeder, Andrew L. Hupp, and Andrew D. Piskorowski Survey Research Center, University of Michigan)

The Sustainability Cultural Indicators Program (SCIP) at the University of Michigan is designed to measure and track the university's progress (Callewaert and Marans, 2017) in moving the campus community towards a culture of sustainability. SCIP gathers this data using a web survey conducted annually. Web surveys generally attain lower response rates than other modes of data collection. Web surveys are also at risk of other forms of nonresponse, such as breakoffs, which happen less frequently in other modes. Breakoffs commonly occur very early in a web survey, often on informed consent screens required by Institutional Review Boards (IRBs), before respondents have a chance to get to the survey content. There are many methods used (prenotification, incentives, etc.) to try to increase participation and reduce breakoffs. This paper investigates the efficacy of two experiments designed to increase participation and reduce breakoffs in two SCIP surveys. The first experiment examines the effect of "celebrity endorsement". As part of the final email reminder, respondents were randomized to receive a reminder with a link to the survey or a reminder that also contained a link to a video of a head coach from the U-M Department of Athletics encouraging non-respondents to participate. The second experiment investigates informed consent screen design. One group was presented a screen appearing as a traditional informed consent form. The other group was presented a screen with the most important items visible and the rest of the information available via a series of accordion menus.

Session 8: Resource Management (ISR Conference Room 1430 AC)

Chair: Erin Hamilton

Wind Energy and Rural Community Sustainability

Sarah Mills (Ford School of Public Policy, University of Michigan)

Because it is a carbon-free source of electricity, wind energy is often unquestioned as an environmentally sustainable technology. But is this technology sustainable when considered within the context of the rural communities in which it is often sited? This paper uses survey data from paired rural communities with and without utility-scale wind energy projects to understand the economic and social impacts of wind energy development on these predominantly agricultural communities. It finds clear economic benefits to the communities that host wind turbines—namely, that wind developers' payments to landowners are largely re-invested in farming operations, leading to economic stability and increasing expectations that a younger generation will want to stay on the farm. The social impacts of wind development are more nuanced, and depend upon the windfarm's business model. Specifically, windfarms are least disruptive of the social structure in rural communities when wind developers employ a business model that gives more community members a direct financial stake in the project.

Sustaining Forest Ecosystems through Collective Management: Social Barriers and Facilitators to Cross-Boundary Coordination on Landscape Scales

Paige Fischer (School of Natural Resources and Environment, University of Michigan)

As recognition of the interconnectedness of ecological processes across large spatial scales grows, landscape management has become a policy priority in the US and elsewhere. Coordinating management across ownerships at the landscape scale is especially important for mitigating forest fire, invasive species and disease risks, which derive from conditions that span property boundaries, and for attaining economies of scale in forestry. Despite theoretical benefits of landscape management, coordination in practice is rare, especially among private landowners. One explanation for this is that social risks associated with coordination outweigh benefits given current policies and institutions. Social exchange theory posits that when parties in interpersonal relationships engage in transactions of an economic nature the risk of failing to meet expectations of reciprocity is high. We used a comparative case study approach to investigate factors in coordinated management among private landowners in the US Pacific Northwest and Great Lakes regions. We hypothesized that social exchange risks constrain coordinated management among landowners, and that new policy tools are needed to help owners make collective investments to attain ecological and economic benefits of managing on larger scales. Our findings shed light on social conditions needed to improve the sustainability of forest ecosystems.

Envisioning and Implementing Sustainable Bioenergy Systems in the U.S. South

J. Schelhas (Southern Research Station, USDA Forest Service), S. Hitchner (Center for Integrative Conservation Research, University of Georgia) and J.P. Brosius (Department of Anthropology, University of Georgia)

Recent promotion and development of wood-based bioenergy in the U.S. South have targeted cellulosic liquid fuels for the transportation sector and wood pellets for power generation. Bioenergy development has promised to meet multiple sustainability goals including renewable energy, energy independence, new markets for wood, and rural development. On the other hand, it has garnered opposition from environmental groups for threatening forests and air quality and from conservatives who object to government subsidies and doubt climate science. A team of anthropologists undertook research on narratives, interests, and behaviors of various bioenergy stakeholders. We conducted multi-sited and cross-scale ethnographic research around emerging bioenergy facilities and at extension events, workshops, and conferences attended by landowners, managers, bioenergy industry representatives, and scientists. We also analyzed written materials from websites, news articles, and policy statements. We use the concept of imaginaries to analyze of the promotion of wood-based bioenergy as a new sustainable energy system, while noting the ways the dominant bioenergy imaginary excluded some sustainability goals and voices. As a result, counter-narratives emerged, success was limited, and landowners and communities received few of the expected benefits. This case provides important lessons for envisioning and implementing new sustainability technologies.

Sustainability of Safe Water Supply in Rural Bangladesh

Raghav R. Reddy, Grace A. van Velden, Grace D. Rodriguez, Arun Agrawal, Kim F. Hayes, and Lutgarde Raskin (University of Michigan) Md. Rezaul Karim, Md. Joynul Abedin (Asia Arsenic Network), and Tara M. Webster (Cornell University)

The safety of drinking water is a concern for an estimated 70 million people in Bangladesh affected by geogenic arsenic contamination of underground water sources. To date, the most effective intervention has been switching to wells that tap deeper, uncontaminated groundwater aquifers.

However, arsenic removal drinking water treatment systems must be used where this is not possible. Such treatment systems are often community scale units serving between 20-50 households. Recent studies have shown that up to 70% of such systems do not function properly or are abandoned within three years of installation. This work aims to identify barriers to the sustainability of safe water supply initiatives in rural Bangladesh. Two study unions in south-west Bangladesh were selected and researched through (i) a survey of 800 households, providing insights about awareness, behaviors, and expectations of end users, (ii) discussions with water supply stakeholders, such as the Department of Public Health Engineering and local NGOs, and (iii) an assessment of 200 community owned treatment units focused on identifying common characteristics and strategies that have been successful/unsuccessful. This information was used to identify a combination of social, technical and economic factors that have hindered the long term success of past safe water initiatives.

Session 9: Sustainability Assessments (ISR Conference Room 1430 BD)

Chair: Christie Manning

Sustainability Knowledge and Attitudes – Assessing Latent Constructs

Adam Zwickle (College of Social Science, Michigan State University) and Keith Jones (Psychology Department, Central College)

The majority of sustainability related social science research conducted to date has primarily focused on individual level behaviors occurring within the environmental domain. In order to achieve the advancements needed to move towards a truly sustainable society, this interdisciplinary field must grow to not only include the social and economic domains, but also expand in scope to study groups and institutions. Sustainability research has paused at the brink of this needed growth and expansion because it has failed, thus far, to build new theories specifically tailored to the three domain model of sustainability. The purpose of this chapter is to encourage scientists to begin identifying and measuring sustainability latent constructs in order to do just that, and to submit two such measures to the academic community. This chapter introduces a revised Assessment of Sustainability Knowledge (ASK) and the Sustainability Attitudes Scale (SAS), and discusses when and how to use them for applied and theoretical purposes. Building theoretical models using these (and other) latent constructs will allow social scientists to test a new and diverse set of hypotheses and push the field to create cutting edge, sustainability-tailored theories.

Sustainability Literacy and Cultural Assessments

John Callewaert (Graham Sustainability Institute, University of Michigan)

As campus sustainability initiatives have expanded over the past decade, related efforts to assess the progress and impact of those initiatives have also developed. These assessments generally fall into two distinct categories, those focused on the assessment of student learning regarding sustainability and those focused on the assessment of campus culture – the sustainability values, behaviors, and awareness of students, faculty and staff. This paper provides an overview of leading examples of these two types of assessments - the Assessment of Student Knowledge (ASK) and the Sustainability Cultural Indicators Program (SCIP). Next, using self-reported assessment data from the Sustainability Tracking, Assessment & Rating System (STARS - a program of the Association for the Advancement of Sustainability in Higher Education) an analysis is provided on the number of institutions which are using such assessments. Results indicate that very few institutions are using these assessments and only a very small number are claiming the full STARS credit for this work.

Finally, recommendations are provided on strategies for developing assessments and disseminating results which can best drive progress towards advancing campus sustainability.

A Conceptual Framework for Designing, Embedding and Monitoring a University Sustainability Culture

Richard Adams (Business School, Surrey University), Stephen Martin (Honorary Professor, University of Worcester; Visiting Professor, University of the West of England) and Katy Boom (Sustainability Office, University of Worcester)

Universities across the globe are giving increasing priority to the challenges of sustainability, encouraged by a variety of drivers including international and national policy, student and societal pressures. Many extant initiatives focus on a narrow set of activities including curriculum design and operational efficiency, and overlook the importance of cultural change in embedding sustainability. Drawing and building upon previous studies in the cultural change and sustainability literature, the purpose of this article is to propose a conceptual framework for designing interventions and measuring and monitoring progress in building and embedding a university sustainability culture. Our efforts are contextualised in the case of a UK university.

- **12:00-1:30 - Lunch and Networking** (Pendleton Room, Michigan Union)

- **1:30-2:45pm – Closing Round-Table**

Future Directions for Sustainability and Social Science Research

Robert W. Marans, Institute for Social Research, Taubman College of Architecture and Urban Planning, University of Michigan

Arun Agrawal, School of Natural Resources and Environment, University of Michigan

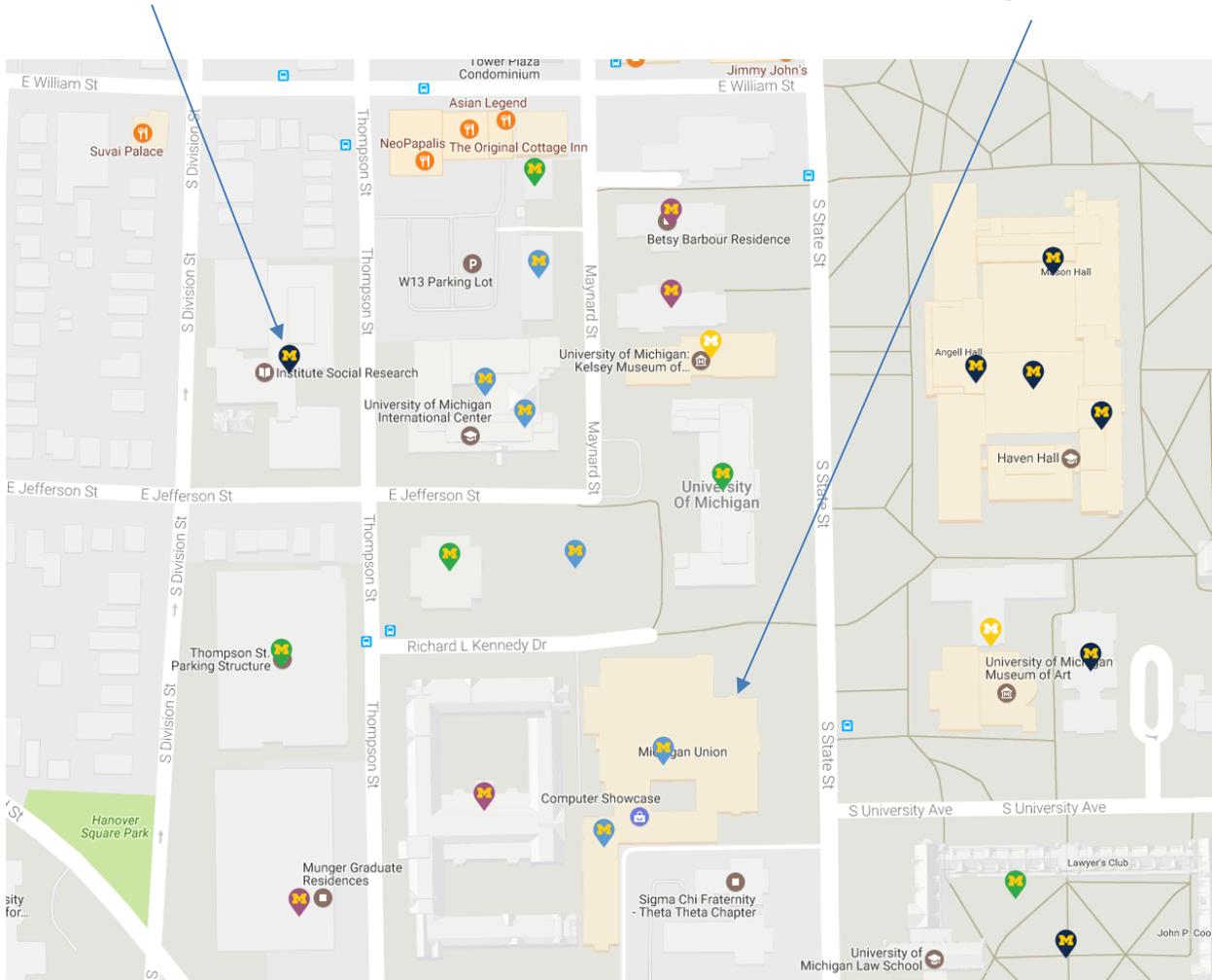
Kaitlin T. Raimi, Gerald R. Ford School of Public Policy, University of Michigan

Michaela Zint, School of Natural Resources and Environment, University of Michigan

Adam Zwickle, College of Social Science, Michigan State University

- **2:45-3:00pm – Close of Symposium**

Institute for Social Research



An interactive campus map for the University of Michigan can be found at:
<https://campusinfo.umich.edu/campusmap>