SUS-RURI: Proceedings of a Workshop on Developing a Convergence Sustainable Urban Systems Agenda for Redesigning the Urban-Rural Interface along the Mississippi River Watershed held in Ames, Iowa, August 12-13, 2019

Workshop Panels: Organization Across Scales

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Published on: Dec 24, 2019

DOI: 10.31274/3d9ea6a4.d9d099dd

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New transdisciplinary approaches relevant to *functional landscape scales* are necessary to enable transformative research and provide results useful to improve community resilience and community members' lives (Buxton et al. 2016; Carvalho et al. 2017). Our approach to the topic of the rural-urban interface along the Mississippi River Watershed (MRW) assembled diverse expertise from local sustainability professionals, working with social and biophysical scientists, architects, urban planners and infrastructure engineers, as well as artists, community stakeholders, and industry. These disciplines and professions share interests in the social, ecological, economic, and technological dimensions of multi-scale research and application questions within the MRW and other similar large-scale urban systems.

The SUS RURI workshop showed the necessity for SUS science to integrate perspectives proposed in the [ACERE SUS Agenda](#) (ACERE 2018). As an event focused on a group of cities within the MRW, the workshop specifically addressed the second perspective described in the report: "the study of multiple cities and communities, exploring inter-relationships among networks of cities and communities, and identifying city typologies for the study of cohort groups and comparison groups" (ACERE 2018). To engage participants across disciplines, the workshop was organized around three major climatic/ecological scales: *macro*, *meso*, and *micro* (e.g. Fig. 1), and included panel presentations, interactive sessions, and a final roundtable to define the boundaries and overlaps among these scales. Each panel participant was asked to situate their presentation within this multi-scale and regional perspective.

The organizing committee brought experts from multiple disciplines into dialogue on each panel, rather than arranging panels around discipline-specific themes. This integration encouraged discussion from many perspectives about challenges and opportunities faced by large and small communities in the MRW. Workshop participants identified areas for further study that could enhance the resilience of communities with respect to their quality of life, (Peters et al. 2018), needs for food and sustainable energy (citation here), climate-adaptive green infrastructure and building construction practices (Kalvelage et al. 2014; Rabideau et al. 2012), and the social-ecological-infrastructure linkages between them.

At the *micro* scale, workshop participants addressed research questions such as those related to urban microclimates and local human-built environment interactions. Geographer Craig Colten introduced “Citizen Geosophy” to recognize lay knowledge and the use of repeat photography/cartography and video transects which expose landscape and the processes of human intervention in natural systems not detected with satellite imagery. Engineer Baskar Ganapathysubramanian advocated for a three-stage process in the quest to model and design resilient food-energy-water systems. Architect and urban designer Andy Kitsinger talked about his work on the Wolf River urban watershed restoration project in Memphis TN, while artist Lee Running introduced paper art as a reflection of land-water patterns and boundaries. To close, engineer Charles Stanier proposed successful efforts to improve air quality as a cross-cutting theme that might offer a model for addressing flooding and water contamination within a convergence research agenda.

At the *meso* scale, participants addressed multi-system challenges related to ecology from neighborhood to community scales, and the integration of infrastructure, hydrology, and food systems. In this panel, architect Anirban Adhya introduced the architecture and urbanisms of first suburbs into the discussion, followed by artist Aaron Dysart, who described art as a means of communication and a transformative medium for community engagement. Planner Asli Göçmen described mid-scale innovations focusing on the development and consumer response to Conservation Subdivision Design. In addition, at this scale rural sociologist David Peters discussed social resiliency in MRW communities in the context of climate change and urban informatics researcher Xinyue Ye presented opportunities to develop data-driven crowd-sourced disaster response capabilities.

At the *macro* scale, participants considered the entire MRW and relationships between urban communities, across urban-rural gradients, and collective regional responses to

climate change. This panel included architect and urban designer Tom Fisher who argued that new roadway designs will be needed for autonomous vehicles which could also be used to transform road hydrology. Agronomist Matt Liebman reported on long-term experimental results for enhanced agricultural sustainability along the urban-rural interface. Artist Shanai Matteson provided insights from [Water Bar](#), the artist collaborative and studio space that she co-founded that highlights the importance of water quality and healthy ecologies through storytelling, community building, and by serving water to patrons. Applied GIS researcher Doug Shoemaker and engineer Joshua Sperling provided macro-scale data science perspectives by characterizing dynamic feedback loops for human interventions in hydrological regimes, effects associated with uncertainty in environmental and social systems, as well as discussions of coupling and leapfrogging.

A fourth panel addressed boundaries and concepts across all three scales. On this panel, and throughout the workshop, participants were asked to consider connections between urban and rural communities and adjacent lands along the entire MRW. Educator Claire Anderson presented [Ripple Effect](#), the educational outreach non-profit organization she co-founded that works with K-12 students and teachers in the Louisiana Gulf Region on science-based water literacy curricula and activities. Economist Mark Imerman provided a sobering account of the economic impact of flooding and nutrient pollution, offering potential solutions that directly address the financial and political complexities of the problem. Engineer Christopher Jones and natural resource economist and geographer Silvia Secchi further addressed these important issues from the perspective of how climate change makes it even more challenging to find strategies to reduce the negative effects of flooding and nitrate pollution in the MRW. Finally, engineer Qi Li presented her research on multiscale weather and climate modeling and how these tools could be utilized in guiding long-term planning for more sustainable and resilient communities.

The following section presents position papers contributed by the workshop participants.

This event is supported by the National Science Foundation, Award #1929601. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.