

MultiSector Dynamics Community

Welcome to the newsletter of the
MultiSector Dynamics Community

INSIDE THIS ISSUE

- [MSD Vision Report](#)
- [Reflections on AGU 2021](#)
- [Research Highlight: Nicole D. Jackson](#)
- [MSD Careers](#)
- [MSD Publications](#)

Hello MultiSector Dynamics (MSD) Community!

In this issue, we are showcasing the release of the MSD 2030 Vision Report and highlighting the associated community building webinar. We are also reflecting on this past year's AGU Meeting and featuring the work of Nicole D. Jackson, a researcher in Energy-Water-Systems Integration at Sandia National Laboratories. Below you will also find some general information about recent publications and job postings.

www.multisectordynamics.org

Introducing the MSD 2030 Vision Report

[Download Here](#)

The MSD community is pleased to announce the release of the *MultiSector Dynamics: Scientific Challenges and a Research Vision for 2030, A Community of Practice Supported by the United States Department of Energy's Office of Science*. This report outlines a vision for MultiSector Dynamics (MSD) as an emerging transdisciplinary field that seeks to advance our understanding of how human-Earth systems interactions shape the resources, goods, and services on which society depends. The core objective of this MSD Vision Report is to clarify core definitions, share research questions, highlight scientific opportunities, and provide steps for improving the MSD community's capacity to support needed scientific progress. As a transdisciplinary endeavor, the vision presented here should have elements that directly interest sectoral analysts engaged in energy, water, agriculture, transportation, health, etc. We hope these audiences will find the report a helpful reference and a source of opportunities for shaping the future of MSD science.

The report incorporates ideas and insights from the members of the recently established MSD Community of Practice (CoP). MSD finds its roots in a number of research fields and communities, including integrated assessment; impacts, adaptation, and vulnerability; Earth system science; and complex adaptive systems. However, the MSD CoP draws its conceptual basis from a 2016 workshop sponsored and led by the DOE, "Understanding Dynamics and Resilience in Complex Interdependent Systems: Prospects for a Multi-Model Framework and Community of Practice," organized with other federal agencies and hosted by the US Global Change Research Program. The rationale for the CoP is that research on understanding risks and opportunities arising from tightly connected human and natural systems is fragmented across several fields, requiring improved collaboration and synthesis to accelerate needed scientific advances.

The link to download the report is available on our website: <https://multisectordynamics.org/vision/>. In the supplemental materials, you will also find all figures and images used in the report along with a sample Powerpoint presentation of main concepts from the report. There is also a copy of the report with tracked changes, resulting from an internal review and comment process with the major projects in the DOE MSD research program.



MSD Vision Report Cover and example graphics

Vision Report and Community Building Webinar

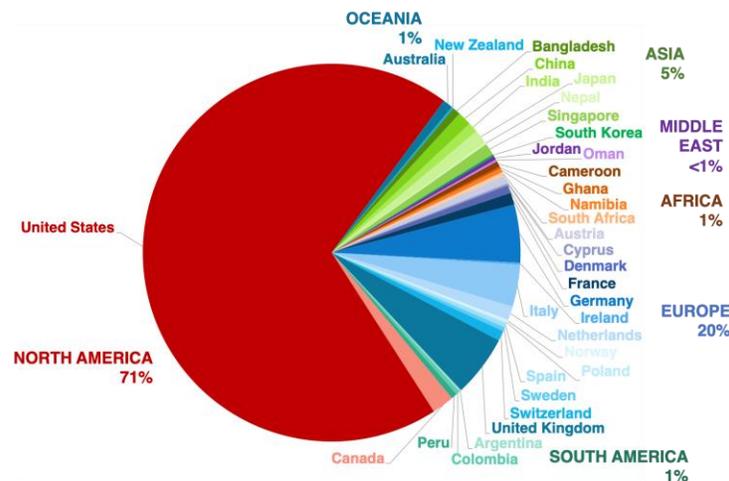
To learn more about the report and our community, please join us on Tuesday, February 22nd from 1-3 PM ET in a community building webinar where we will be presenting the main themes of the report and seeking community inputs for future events and engagement. Please register in advance for this meeting. After registering, you will receive a confirmation email containing information about joining the meeting.

[Register Here](#)

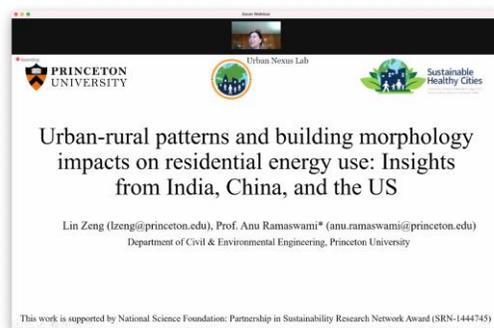


Reflections on AGU Fall Meeting 2021

Once again, MSD science had a major presence at the 2021 AGU Fall meeting. Despite the challenges posed by the ongoing pandemic and the hybrid format of last year's conference, the community hosted a DOE Town Hall, an MSD Union Session, seven oral sessions and five poster sessions in the Global Environmental Change section and one oral session and one poster session in the Education section. The MSD CoP sessions attracted 127 abstracts from a total of 585 authors, making it one of the largest coordinated topical areas overall. Over 30% of the authors of accepted oral and poster presentations came from countries other than the United States, with a total of 34 countries and all continents but Antarctica represented. Consistent with the MSD's commitment to advance early career researchers, 35% of presenters were students.



The 2021 AGU Fall Meeting MSD CoP program highlighted the value of research focused on exploring the complex sectoral interactions and potential co-evolutionary pathways within the integrated human-Earth system, including natural, engineered, and socio-economic systems. Across the sessions, several key themes and questions emerged that are relevant to advancing MSD research objectives including how extreme events affect the trajectory and interactions of sectors, how representing fine scale human systems influences natural resources usage and the microclimate, and new computational methods and tools to assess causal relationships between sectors and multisectoral impacts.



Following the success of the MSD CoP program at the 2020 and 2021 AGU Fall Meetings, we will again coordinate several MSD session proposals for the 2022 AGU Fall Meeting, aimed at bringing together researchers from around the world, present compelling MSD research and accelerate the development of the MSD community. If you wish to contribute to this effort, please follow the [instructions to submit a 2022 AGU Fall Meeting MSD session proposals](#).

MSD Research Spotlight: Nicole D. Jackson

Nicole's IM3-sponsored work contributes to the broader MSD community by demonstrating how potential climate impacts to critical infrastructure such as water resources can be affected by choice of modeling tool.

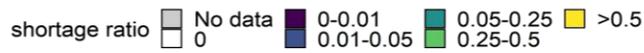


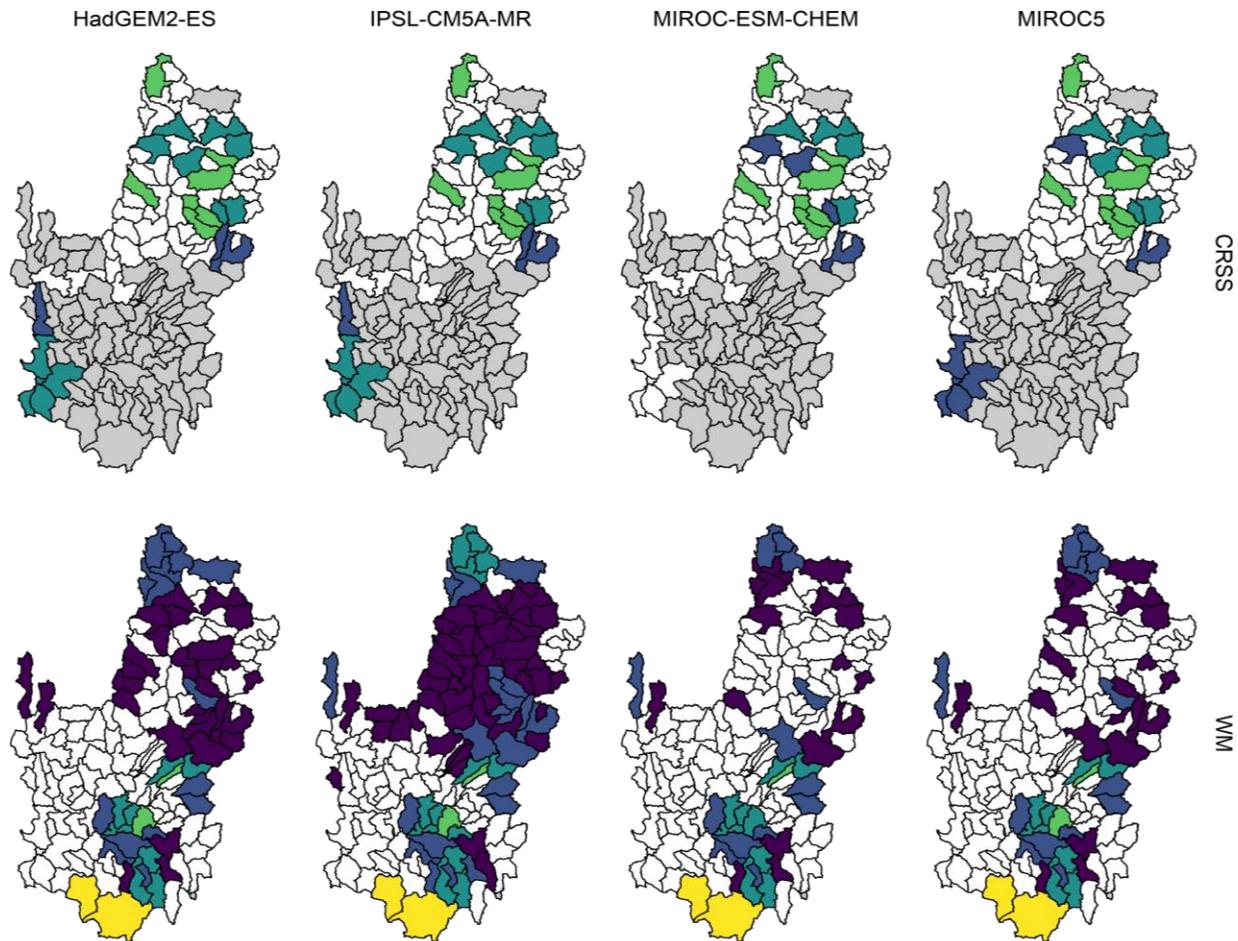
Nicole D. Jackson is a systems analysis researcher in the Energy Water Systems Integration department at Sandia National Laboratories (SNL), where she was also a postdoctoral appointee. Prior to joining SNL, Nicole completed her Ph.D. at the University of Illinois at Urbana-Champaign. There, her work focused on understanding the interaction and response of agricultural trade to extreme weather events such as temperature extrema, heavy rain, and drought. Nicole's current research focuses on the resiliency of critical infrastructure to extreme weather events and natural hazards, with an emphasis on renewable energy, water resources, and the electric grid.

Extreme weather events are expected to increase in frequency and intensity over the next several decades. These events pose serious threats to both communities and critical infrastructure (e.g., energy, food, dams, and water sectors). Today's decision makers need to account for climate change by considering acute and chronic stressors, the possible evolution of severe weather events, and uncertainty. Improved decision-making tools that explicitly account for climate change should result in increased resilience and reduced impacts to communities.

Through DOE Office of Science funded Integrated Multi-sector Multiscale Modeling (IM3), Nicole has been mentored by SNL's Vince Tidwell as well as had the opportunity to collaborate with Nathalie Voisin and Jim Yoon from the Pacific Northwest National Laboratory and Alan Butler from the US Bureau of Reclamation. Together, the group has been working on understanding how future water shortage projections compare from different water management models. These models are commonly used by water resource managers and decision makers to quantify water use, needs, and availability over time. In particular, the group has sought to answer two research questions: (1) How is water shortage impacted by changing climate conditions? (2) How sensitive are estimates of water shortage to the scale and purpose of model? To do so, the group is using the Colorado River Basin as a case study to compare basin and sub-basin water shortages from the Colorado River Simulation System (CRSS) and the MOfel for Scale Adaptive River Transport-Water Management (MOSART-WM) models under four future climate scenarios.

Through this work, the group has observed spatial heterogeneity of projected mean water scarcity across climate scenarios and water management models. This has led to the group identifying key differences between the two models: dissimilar computational representation of the basin; number and size of operated reservoirs used by each model; and the treatment of inter- and intra-basin water transfers. These fundamental differences result in significant variances in projected water scarcity across multiple spatial scales. This work allows us to improve our understanding of the differences in water management models and how these attributes affect our water resource decision making for a changing climate.

shortage ratio 



Sandia National Laboratories is a multimission laboratory operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration. This research was supported by the Office of Science of the US Department of Energy as part of 623 research in the Multi-Sector Dynamics, Earth and Environmental System Modeling Program. SAND2022-1415 A

Highlighted Articles:

Jackson, N. D., & Gunda, T. (2021). Evaluation of extreme weather impacts on utility-scale photovoltaic plant performance in the United States. *Applied Energy*, 302, 117508.
 Jackson, N. D., Konar, M., Debaere, P., & Sheffield, J. (2021). Crop-specific exposure to extreme temperature and moisture for the globe for the last half century. *Environmental Research Letters*, 16(6), 064006.
 Jackson, N., Konar, M., & Hoekstra, A. Y. (2015). The water footprint of food aid. *Sustainability*, 7(6), 6435-6456.

MSD Job Listings

Our website features a [careers page](#) that lists available MSD-focused positions at all levels. If you'd like to post a position to be featured in this page, please email us at: contact@multisectordynamics.org. Here are some of our latest postings:

Post Doctorate RA – Integrated River and Land Biogeochemistry: Pacific Northwest National Lab

The Pacific Northwest National Laboratory (PNNL) is seeking a postdoctoral scientist to conduct innovative research in modeling river biogeochemistry fluxes and land-river interactions in biogeochemistry using the U.S. Department of Energy (DOE)'s Energy Exascale Earth System Model (E3SM).

Postdoctoral Scholar Position in Integrated Urban Water Systems- Arizona State University

A Postdoctoral Scholar position is available in the School of Sustainability (SOS) or the School of Sustainable Engineering and the Built Environment (SSEBE) at Arizona State University (ASU) beginning in Fall 2021 to work with Prof. Garcia and Prof. Anderies.

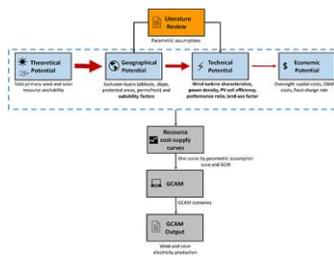
Scientific Programmer, Software Development and User Support for Climate Risk Management – Dartmouth College

A scientific programmer position is available in the Thayer School of Engineering at Dartmouth College. Successful candidates will join the Keller research group and become part of a transdisciplinary research network analyzing climate risk management strategies.

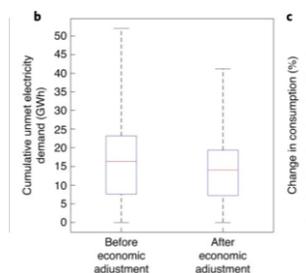
MSD Publications

We have been posting and will be regularly updating select MSD publications on the website, under the [Publications](#) page. If you have any publications you would like us to highlight, please email contact@multisectordynamics.org.

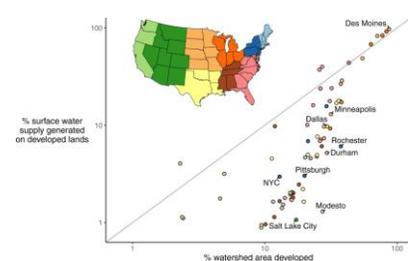
Below you can find some of the publications posted most recently:



[The implications of uncertain renewable resource potentials for global wind and solar electricity projections](#)



[Integrated hydrological, power system and economic modelling of climate impacts on electricity demand and cost](#)



[Comparison of potential drinking water source contamination across one hundred U.S. cities](#)

This newsletter has been edited by Rohini Gupta and the Community of Practice Facilitation Team. This and all previous newsletters can be accessed at the [Newsletters](#) page of our website. If you have any suggestions, concerns or other feedback about this newsletter or the MSD website, please email contact@multisectordynamics.org.