Lu Liu, Ph.D.

CONTACT INFORMATION

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EDUCATION

University of Maryland — College Park, Maryland

Doctor of Philosophy in Water Resources Engineering — 2017

- Cumulative GPA 3.82/4.0
- Dissertation: "*Water-Energy-Climate Nexus: interdependencies and tradeoffs, and implications for strategic resource planning"*

University of Oklahoma — Norman, Oklahoma

Master of Science in Environmental Science — 2012

- Cumulative GPA 3.50/4.0
- Thesis: "*Assessments and projections of regional hydro-climatic variability over the Southern U.S.: potential teleconnections with El Niño/Southern Oscillation"*

University of Oklahoma — Norman, Oklahoma

Bachelor of Science (with distinction) in Environmental Science — 2010

- Cumulative GPA 3.55/4.0
- Capstone: "*Chemical constituents in water and sediment from Grand Lake O' the Cherokees, Oklahoma, downstream from the tri-state lead-zinc mining district"*

Beijing Normal University — Beijing, China

Transferred to University of Oklahoma — 2008

PROFESSIONAL EXPERIENCE

Rice University — Houston, Texas

Postdoctoral Research Associate — 2018-Present

University of Maryland/Joint Global Change Research Institute — College Park, Maryland

Graduate Research and Teaching Assistant — 2014-2017

International Institute for Applied Systems Analysis — Laxenburg, Austria

Young Scientists Summer Program Fellow — Summer 2016

	Joint Global Change Research Institute	College Park, Maryland
	Post-Master Research Associate	2012-2014
	University of Oklahoma	Norman, OK
	Graduate Research Assistant	2010-2012

GRANTS AND FELLOWSHIPS

- InterDisciplinary Excellence Awards (IDEA), 2019 (assisted proposal writing) – **awarded**
- Google AI Impact Challenge, 2019 (Rice University PI) – **pending**
- Grant Opportunities for Academic Liaison with Industry (GOALI) Proposal, 2019 (Rice University co-PI) – **pending**
- National Science Foundation Cyber-Physical Systems (CPS) Proposal, 2019 (Rice University PI) – **pending**

REFEREED PUBLICATIONS

17. **Liu L.**, E. Lopez, L. Dueñas-Osorio, L. Stadler, Y. Xie, P. Alvarez, and Q. Li (2019), *Decentralized direct potable water reuse: the importance of system configuration*, Nature Sustainability (under review).

16. Li X., Y. Zhou, Y. Liu, X Zhang, P. Kyle, **L. Liu**, G. Jia, W. Gutowski (2019) Booming challenges of thermoelectric cooling water withdrawals in the Western United States, Nature Climate Change (under review).

15. **Liu L.**, M. Hejazi, G. Iyer, and B. Forman (2019), *Implications of water constraints on electricity capacity expansion in the United States*, Nature Sustainability. DOI: 10.1038/s41893-019-0235-0.

14. **Liu L.**, S. Parkinson, M. Gidden, E. Byers, Y. Satoh, K. Riahi, and B. Forman (2018), *Quantifying the potential for reservoirs to secure future surface water yields in the world's largest river basins*, Environmental Research Letters. DOI: 10.1088/1748-9326/aab2b5.

13. **Liu L.**, M. Hejazi, H. Li, B. Forman, and X. Zhang (2017), *Vulnerability of US thermoelectric power generation to climate change when incorporating state-level environmental regulations*, 2, 17109, Nature Energy. DOI: 10.1038/nenergy.2017.109.

12. Voisin N., M. I. Hejazi, L. R. Leung, **L. Liu**, M. Huang, H. Li, and T. Tesfa (2017), *Effects of sectoral water withdrawals, allocation and consumptive use on the redistribution of water resources in an integrated water model*, Water Resources Research. DOI: 10.1002/2016WR019767.

11. Talati S., H. Zhai, P. Kyle, M.G. Morgan, P. Patel, **L. Liu** (2016), *Consumptive water use from electricity generation in the Southwest under alternative climate, technology and policy futures*, Environmental Science and Technology. DOI: 10.1021/acs.est.6b01389.

10. Scott M. J., D. S. Dalya, M. I. Hejazi, P. G. Kyle, **L. Liu**, H.C. McJeon, A. Mundra, P. L. Patel, J. S. Rice, N. Voisin (2016), *Sensitivity of future U.S. Water shortages to socioeconomic and climate drivers: a case study in Georgia using an integrated human-earth system modeling framework*, Climatic Change. DOI: 10.1007/s10584-016-1602-8.

9. Li, H.-Y., L. Ruby Leung, T. Tesfa, N. Voisin, M. Hejazi, **L. Liu**, Y. Liu, J. Rice, H. Wu, and X. Yang (2015), *Modeling stream temperature in the Anthropocene: An earth system modeling approach*, J. Adv. Model. Earth Syst., 7, 16611679, DOI:10.1002/2015MS000471.

8. Kim S., M. Hejazi, **L. Liu**, K. Calvin, L. Clarke, J. Edmonds, P. Kyle, P. Patel, M. Wise, E. Davies (2015), *Balancing global water availability and use at basin scale in an integrated assessment model*. Climatic Change. DOI: 10.1007/s10584-016-1604-6.

7. Hejazi M., N. Voisin, **L. Liu**, L. Bramer, D. Fortin, J. Hathaway, M. Huang, P. Kyle, L.R. Leung, H.Y. Li, Y. Liu, P. Patel, T. Pulsipher, J. Rice, T. Tesfa, C. Vernon, Y. Zhou (2015), *21st century United States emissions mitigation could increase water stress more than the climate change it is mitigating*. PNAS 112 (34), DOI: 10.1073/pnas.1421675112.

6. **Liu L.**, Hejazi M., Patel P., Kyle P., Davies E., Zhou Y., Clarke L., Edmonds J. (2015), *Water demands for electricity generation in the U.S.: Modeling different scenarios for the water energy nexus*. Technological Forecasting and Social Change, 94, 318-334, DOI:10.1016/j.techfore.2014.11.004.

5. Voisin, N., **L. Liu**, Hejazi, M., Tesfa, T., Li, H., Huang, M., Liu, Y., and Leung, L. R. (2013), *One-way coupling of an integrated assessment model and a water resources model: evaluation and implications of future changes over the US Midwest*, Hydrol. Earth Syst. Sci., 17, 4555-4575, DOI: 10.5194/hess-17-4555-2013.

4. Zhang N., Y. Hong, Q. Qin, **L. Liu** (2013), *VSDI: a visible and shortwave infrared drought index for monitoring soil and vegetation moisture based on optical remote sensing*. International Journal of Remote Sensing 34(13): 4585-4609. DOI:10.1080/01431161.2013.779046.

3. **Liu L.**, Y. Hong, J. Looper, R. Riley, B. Yong, Z. Zhang, J. Hocker, M. Shafer (2012), *Climatological Drought Analyses and Projection using SPI and PDSI:*

A Case Study for Arkansas Red River Basin. Journal of Hydrologic Engineering. DOI: 10.1061/(ASCE)HE.1943-5584.0000619.

2. **Liu L.**, Y. Hong, J. E. Hocker, M. A. Shafer, C. N. Bednarczyk (2012), *Hydro-climatological Drought Analyses and Projection using Meteorological and Hydrological Drought Indices: A Case Study in Blue River Basin, Oklahoma*, Water Resources Management. DOI: 10.1007/S11269-012-0044-y.

1. **Liu L.**, Y. Hong, E. J. Hocker, M. A. Shafer, L. M. Carter, J. J. Gourley, C. N. Bednarczyk, P. Adhikari (2012), *Analyzing Projected Changes and Trends of Temperature and Precipitation in the Southern U.S. from 16 Downscaled Global Climate Models under Different Emission Scenarios*, Theoretical and Applied Climatology. DOI:10.1007/s00704-011-0567-9.

INVITED TALKS

- Liu L. (2019), *Characterization of water-energy nexus with systems analysis approach*, February 15, 2019, Rice University, Houston, TX
- Liu L. (2019), *Water-Energy nexus and environmental sustainability*, January 18, 2019, University of Houston, Houston, TX
- Liu L. (2018), *Alternative water supply from wastewater reuse for the City of Houston*, June 18, 2018, Tsinghua University, Beijing, China
- Liu L. (2016), *Water-Energy-Climate Nexus: Climate change impacts on thermoelectricity generation in the United States*, January 6, 2016, Tsinghua University, Beijing, China

TEACHING EXPERIENCE

- Guest lectured for CEVE101 "*Fundamentals of Civil and Environmental Engineering*" and CEVE307 "*Energy and the Environment*"
- Mentored one M.S. student on Master's thesis at Tsinghua University, China
- Performed weekly homework grading and held open office hours for ENCE305 "*Fundamentals of Engineering Fluids*"
- Supervised two undergraduate students on capstone research
- Guest lectured for graduate level course CEES5020 "*Climate Change/Natural Hazards*"

RESEARCH EXPERIENCE

1. **Water and power infrastructure sustainability and resiliency assessment with data-driven modeling approach**
    a. Developed a novel modeling framework to assess the environmental and economic impacts of urban water system decentralization through direct potable water reuse
    b. Built a resilience assessment framework to evaluate urban water and wastewater infrastructure under extreme weathers
    c. Established a risk analytics platform for building resilient electric power systems in Electric Reliability Council of Texas (ERCOT)

2. **Large-scale Food-Energy-Water (FEW) Nexus study via systems analysis approach**
    a. Developed novel integrated modeling framework to quantify the impacts of environmental stressors (e.g., climate change, water scarcity) on the U.S. energy and water sector
    b. Developed reliability indicators tailored towards long-term planning of water storage infrastructure on global scale
3. **Integrated Assessment Model (IAM) development and human-natural model integration**
    a. Contributed to the development of global hydrologic models in Global Change Assessment Model (GCAM)
    b. Assisted the development of key modules in human-natural system model integration
4. **Assessment of climate change impacts on water resources**
    a. Analyzed hydrologic responses and drought development under different climate change scenarios for the Southern United States

COMMUNITY SERVICE

- Organized 2019 Chinese Environmental Scholars Forum with 150 attendees (2019)
- Contributed to STEM education in K-12 as LEAD E-Mentor for Elizabeth Seton High School, Maryland (2018)
- Member of American Geophysical Union (2013 – present)
- Peer reviewer for *Nature Sustainability*, *Nature Energy*, *Nature Communications*, *Environmental Research Letters*, *Journal of Applied Remote Sensing*, *International Journal of Remote Sensing*, *Civil Engineering and Environmental Systems*, *Environmental Science & Technology*, and *Climatic Change*. (2014 – present)
- Designed and hosted workshops for Creating Critical Connections in Math and Science (C3MS) program (2011)

AWARDS RECEIVED

CEE Student Spotlight

University of Maryland 2017

- Graduate advisor-nominated and faculty-approved recognition throughout the entire department for outstanding achievement in graduate research and charitable service during the program

Outstanding Graduate Assistant Award

University of Maryland 2016

- Department-nominated and faculty-approved recognition throughout the entire university for outstanding achievement in graduate research and community service during pursuit of a graduate degree

IIASA Young Scientist Summer Program Annual Fund Award

International Institute for Applied Systems Analysis 2016

- Selected from 200+ applicants worldwide to participate in the three-month summer program at IIASA in Austria

Engineering Deans Honor Roll

University of Oklahoma 2009 and 2010

- Faculty-nominated recognition throughout the entire School of Engineering for outstanding achievement in graduate research and curriculum work

Outstanding Senior in Environmental Science

University of Oklahoma 2010

- Faculty-nominated and department-approved recognition throughout the entire university for outstanding performance in undergraduate study. Honored at university-wide graduation commencement

John & Dolores Owensby Family Scholarship & Guy Bradford Treat Memorial Scholarship

University of Oklahoma 2009

- Honored for outstanding performance and individual achievement in undergraduate study

Undergraduate Research Opportunity Program Award

University of Oklahoma 2009

- Awarded $400 to conduct self-proposed research under the supervision of a faculty member in the department

Academic Scholarship

Beijing Normal University 2007

- Awarded ~$150 for outstanding academic performance and being ranked top 5% of the class