

Pennsylvania State University
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Education

Ph.D. Applied Economics, Pennsylvania State University	2025 (Expected)
M.S. & B.S. Civil Engineering, Zhejiang University	2012-2019

Research Interests

Energy and Environmental Economics, Urban Economics, Empirical Industrial Organization, Causal Inference, Machine Learning

Teaching Fields

Microeconomics, Econometrics, Energy and Environmental Economics, Urban Economics, Geographic Information Systems, Empirical Industrial Organization, Machine Learning

Job Market Paper

Drought responses in the Western United States: Household location choice and housing market feedback.

Abstract: Over the past three decades, cities and municipalities across the Western U.S. have experienced some of the nation's fastest population growth. Simultaneously, these regions have confronted increasingly frequent water shortages, primarily caused by droughts. This study employs a spatial equilibrium model to examine how water shortages have influenced household location decisions from 2000 to 2020 as well as the resulting welfare implications. The contributions of this research are twofold. First, the study leverages novel unmet water demand data that integrates the legal framework of water rights with actual water availability to better quantify water shortages. Second, the model reflects both the direct utility effect and indirect rent impact of water shortages on household decisions. The results indicate that households require substantial compensation to relocate to water-scarce regions, demanding a 0.06% wage premium for each additional cubic meter of unmet annual water demand annually. This compensation demand is notably higher among households over 40 as well as homeowners. Lastly, the analysis reveals that the welfare impact is driven primarily by the direct disutility of water shortages rather than by indirect rent shocks. These findings underscore the significant role of water scarcity in shaping population growth patterns across the Western U.S. [\[link\]](#)

Publications

Journal Article in Economics

[1] Shen, M., Fisher-Vanden, K. and Wrenn, D.H., 2024. Impacts of water-related building moratoria on California's housing crisis. (forthcoming at *Land Economics*) [\[link\]](#)

Journal Articles in Engineering (published prior to my transition to Economics)

- [1] Yi, N., Shen, M., Erdely, D. and Cheng, H., 2020. Stretchable gas sensors for detecting biomarkers from humans and exposed environments. *TrAC Trends in Analytical Chemistry*, 133, p.116085. [\[link\]](#)
- [2] Lü, C., Zhang, Y., Zhang, H., Zhang, Z., Shen, M. and Chen, Y., 2019. Generalized optimization method for energy conversion and storage efficiency of nanoscale flexible piezoelectric energy harvesters. *Energy Conversion and Management*, 182, pp.34-40. [\[link\]](#)
- [3] Zhang, H., Shen, M., Zhang, Y., Chen, Y. and Lü, C., 2018. Identification of static loading conditions using piezoelectric sensor arrays. *Journal of Applied Mechanics*, 85(1), p.011008. [\[link\]](#)

Book

- [1] FAO and CAAS. 2021. Carbon neutral tea production in China – Three pilot case studies. *Food and Agriculture Organization of the United Nations*. (Contributor). [\[link\]](#)

Working Papers and Work in Progress

- [1] Shen, M. “How does drought shape land-use regulations? Evidence from the Wharton regulation survey.”
- [2] Shen, M. “Evaluating the effect of California statewide lawn watering ban on water conservation using remotely sensed data.”
- [3] Ma, Z. and Shen, M. “The impact of non-GMO labeling on consumer demand for wine: Evidence from a choice experiment.”

Presentations

- 2024 Association of Environmental and Resource Economists Summer Conference, Western Economic Association International Annual Conference, Agricultural & Applied Economics Association Annual Meeting, CU Environmental and Resource Economics Workshop, Penn State Water Conference, Penn State Energy and Environmental Economics and Policy Initiative Seminar
- 2023 Association of Environmental and Resource Economists Summer Conference, Western Economic Association International Annual Conference, Cornell Northeast Workshop on Energy Policy and Environmental Economics
- 2022 Environmental Politics and Governance Conference

Research Experience

- Pennsylvania State University, Research Assistant for Karen Fisher-Vanden 2021-present
 - o As part of the Program on Coupled Human and Earth Systems at Penn State, I collaborated with an interdisciplinary team to study the impact of environmental risks on labor and housing markets. Working alongside economists, modelers, policy experts, and lawyers, I drew on diverse perspectives and expertise to address complex economic challenges.

Teaching Experience

- CED 201: Introductory Environmental and Resource Economics. Douglas H. Wrenn. Spring 2024
Teaching Assistant and Guest Lecturer

EMCH 210: Statics and Strength of Materials. Samia Suliman. <i>Teaching Assistant</i>	Spring 2021
EMCH 212: Dynamics. Christopher Kube. <i>Teaching Assistant</i>	Fall 2020
EMCH 212: Dynamics. Gary Gray. <i>Teaching Assistant</i>	Spring 2020

Professional Experience

Food and Agriculture Organization of the United Nations (FAO) <i>Specialist</i>	Feb. 2019-Nov. 2019 Rome, Italy
<ul style="list-style-type: none"> ○ Collaborated with a multidisciplinary team to develop a predictive model for estimating greenhouse gas emissions in tea production, laying the groundwork for FAO's carbon-neutral tea certification. ○ Partnered with the German Federal Ministry for Economic Cooperation and Development and the Chinese Academy of Agricultural Sciences to transfer tea planting technology to Kenya, fostering global knowledge-sharing. ○ Supported small-scale farmers in rural Honduras in adopting sustainable agronomic practices and green energy solutions to enhance their resilience to climate change. ○ Coordinated with national focal points to collect and synthesize Sustainable Development Goals statistics, contributing to global efforts to alleviate poverty and achieve zero hunger. 	

Scholarships and Awards

Graduate Student Travel Award, Pennsylvania State University	2024
Longenecker Award, Pennsylvania State University	2020
Outstanding Graduates, Zhejiang University	2016
Corporate Scholarships for Outstanding Students, Enterprises	2015/2017/2018

Service

Reviewer	
○ Journal of Business and Economic Development	2024-present
○ Association of Environmental and Resource Economists Summer Conference	2024
○ Western Economics Association International Annual Conference	2024
Member	
○ Penn State Energy, Environmental, and Food Economics Graduate Student Association	2022-present
○ Penn State Water Council	2023-present
○ Penn State Alumni Association-Blue & White Society	2020-2023

Skills

Software: Python, R, MATLAB, Stata, SQL, ArcGIS, GAMS, Java

Certifications: Supervised Machine Learning: Regression and Classification (Stanford), Advanced Learning Algorithms (Stanford), Unsupervised Learning, Recommenders, Reinforcement Learning (Stanford), SQL for Data Science (UC Davis)

Languages: English (fluent), Mandarin (native)

References

Dr. Karen Fisher-Vanden (advisor)

Distinguished Professor of Environmental and
Resource Economics and Public Policy
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Resource Economics
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