Runzi Wang, PhD

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Education

2018-2020 | Ph.D. in Planning, Design and Construction, Michigan State University

Advisor: Ming-Han Li

Thesis reference: Wang, R. (2020). *Investigating Landscape-Stream Water Quality Relationships and Stream Water Quality Preservation Strategies in the Texas Gulf Region Using a Hybrid of Machine Learning and Hydrological Modeling Approach* (Doctoral dissertation, Michigan State University).

2014-2017 | Ph.D. candidate in Urban and Regional Sciences (attended), Texas A&M University

2011-2013 | Master of Science in Landscape Architecture (MSLA), Peking University

2006-2009, 2010-2011 | Bachelor of Engineering in Architecture, Shandong University

2009-2010 | Bachelor of Architecture (exchange student), Tongji University

Academic and Professional Work Experiences

Academic Work Experiences

2020-present | Assistant Professor, School for Environment and Sustainability, University of Michigan

2018-2020 | Research Assistant, Assistant of School Director, School of Planning, Design and Construction, Michigan State University

2015-2017 | Instructor of Record, Department of Landscape Architecture and Urban Planning, Texas A&M University

2014-2015 | Teaching Assistant, Department of Landscape Architecture and Urban Planning, Texas A&M University

2013-2014 | Research fellow, Graduate School of Landscape Architecture, Peking University, Beijing, China

Publications

Peer-reviewed Journal Articles (* indicates the corresponding author)

Guan, J., **Wang, R***., Van Berkel, D., & Liang, Z. (2023). How spatial patterns affect urban green space equity at different equity levels: A Bayesian quantile regression approach. *Landscape and Urban Planning*, *233*, 104709.

Wang, R., Ma, Y., Zhao, G.*, Zhou, Y., Shehab, I., & Burton, A. (2023). Investigating water quality sensitivity to climate variability and its influencing factors in four Lake Erie watersheds. *Journal of Environmental Management*, 325, 116449.

Goodspeed, R., **Wang, R.**, Lizundia, C., Du, L., & Jaipuria, S. (2022). Incorporating water quality into land use scenario analysis with random forest models. *Environment and Planning B: Urban Analytics and City Science*, 23998083221138842.

Guzman, C. B., **Wang, R.***, Muellerklein, O., Smith, M., & Eger, C. G. (2022). Comparing stormwater quality and watershed typologies across the United States: A machine learning approach. *Water Research*, *216*, 118283.

Wang, R.*, Kim, J. H., & Li, M. H. (2021). Predicting stream water quality under different urban development pattern scenarios with an interpretable machine learning approach. *Science of The Total Environment*, *761*, 144057.

Song, Y., **Wang, R.***, Fernandez, J., & Li, D. (2021) Investigating sense of place of the Las Vegas Strip using online reviews and machine learning approaches. *Landscape and Urban Planning*, 205, 103956.

Wang, R.*, Zhang, X., & Li, M.-H. (2019). Predicting bioretention pollutant removal efficiency with design features: A data-driven approach. *Journal of Environmental Management*, 242, 403–414.

Peer-reviewed Conference Abstracts

Wang, R., Zuo, C., Zhou, Y., Currie, W. & Chen, Y. (2022). Beyond imperviousness–Investigating the influence of urban form and socioeconomic characteristics on urban stream water quality in the Continental United States. *American Geophysical Union (AGU) fall meeting*, Chicago, IL

Zuo, C., **Wang, R.**, & Hong., Y. (2022). Investigating the impacts of urban road network topology on street flooding in New York City. *American Geophysical Union (AGU) fall meeting*, Chicago, IL

Zuo, Chen., **Wang, R.**, & Wu Q. (2022) Investigating water quality under different urban planning scenarios with a combination of empirical and physical hydrological model approach. *Council of Educators in Landscape Architecture (CELA)*, Santa Ana Pueblo, NM

Guan, J., **Wang, R.**, Van Berkel, D., Liang, Z. (2022). Assessing how spatial patterns of urban green space affect its equity in Southeast Michigan. *Council of Educators in Landscape Architecture (CELA)*, Santa Ana Pueblo, NM

Wang, R., Zuo, C., Wu, Q., & Goodspeed, R. (2021). The investigation of fine scale urban form effects on stream water quality in the Huron River Watershed. *American Geophysical Union (AGU) fall meeting*, New Orleans, LA

Wang, R., Liang, Z., Zhao, G., & Currie, W. (2021). Development of the continental urban steam water quality dataset towards a socio-ecological framework. *American Geophysical Union (AGU) fall meeting*, New Orleans, LA

Zuo, Chen., **Wang, R.**, & Wu Q. (2022) Investigating water quality under different urban planning scenarios with a combination of empirical and physical hydrological model approach. *Council of Educators in Landscape Architecture (CELA)* (under review), Santa Ana Pueblo, NM

Ma, Y., **Wang, R.,** Zhou, Y., & Shehab, I. (2022). Investigating climate-water quality relationship and its determinant environmental factors with longitudinal data in the Lake Erie surrounding watersheds. *Council of Educators in Landscape Architecture (CELA)* (under review), Santa Ana Pueblo, NM

Guan, J., **Wang, R.**, Van Berkel, D., Liang, Z. (2022). Assessing how spatial patterns of urban green space affect its equity in Southeast Michigan. *Council of Educators in Landscape Architecture (CELA)* (under review), Santa Ana Pueblo, NM

Wang, R. & Zhao, G. (2020). The synergistic effects of climate variability, streamflow, land cover change, and fertilizer application on long-term stream water quality across *scales*. *American Geophysical Union (AGU) fall meeting* (online)

Guzman, C. B., **Wang, R.**, Muellerklein, O., Eager., C., & Smith, M. (2020). Identifying relationships between urban stormwater signatures and watershed characteristics using interpretable machine learning. *American Geophysical Union (AGU) fall meeting* (online)

Zhong, H., & **Wang, R.** (2020). Spatial Accounting: Decomposing Urban Spatial Changes in the United States. *Association of Collegiate Schools of Planning (ACSP) annual meeting* (online).

Li, M. H., **Wang, R.**, Ellis, C., Lebleu, C. (2020). CELA2020 Centennial Celebration Review: Examining the Past, Present and Future. *Council of Educators in Landscape Architecture (CELA)* (online).

Guzman, C. B., **Wang, R.**, Muellerklein, O., Eager., C., & Smith, M. (2020). The landscape of American Stormwater Pollution. *Council of Educators in Landscape Architecture (CELA)* (online).

Wang, R., Kong., L., & Li, M. H. (2019). Quantifying landscape-water quality nexus and predicting water quality under alternative planning scenarios using machine learning approaches. *American Geophysical Union (AGU) fall meeting*, San Francisco, CA.

Guzman, C. B., **Wang, R.**, Muellerklein, O., Eager., C., & Smith, M. (2019). Urban Stormwater Signatures Across the United States: A Machine Learning Approach. *American Geophysical Union (AGU) fall meeting*, San Francisco, CA.

Wang, R., & Li, M. H. (2019). Exploring Stream Water Quality Management with Hydrologically Sensitive Area (HSA) Approach: A case study in San Jacinto River Basin, Texas. *Council of Educators in Landscape Architecture (CELA)*, Sacramento, CA, Page 129.

Wang, R., Zhao, G., & Li, M. H. (2019). The application of Google Earth Engine to Landscape Architecture Research—An example of data collection and analysis procedure in a water quality study. *Council of Educators in Landscape Architecture (CELA)*, Sacramento, CA, Page 253.

Song, Y., Lecy, E., Fischer, D. & **Wang, R.** (2019). Machine Learning From Las Vegas Analyzing big datasets of online reviews for improved placemaking guidelines. *Council of Educators in Landscape Architecture (CELA)*, Sacramento, CA, Page 158.

Wang, R., Zhao, G., & Li, M. H. (2018). Developing longitudinal models of 20-year water quality in Texas gulf region—A hybrid of remote sensing and machine learning approach. *American Geophysical Union (AGU) fall meeting*, Washington D. C.

Wang, R., & Li, M. H. (2018). Building decision tree classifiers to predict bioretention performance. *Council of Educators in Landscape Architecture (CELA)*, Sacramento, CA, Page 70.

Wang, R., & Li, M. H. (2018). An application of different machine learning techniques for stream water quality prediction: A comparison among decision Tree, support vector machine, and neuron network. Council of Educators in Landscape Architecture (CELA), Blacksburg, VI, Page 252.

Tao, Z., Sohn, W., **Wang, R.**, Cao, L., Newman, G., Li, M. H., Arnold M., & Kim, J. H. (2018). Aggie B.L.U.E. print laboratories: a multi-disciplinary teaching and service learning opportunity. *Council of Educators in Landscape Architecture (CELA)*, Blacksburg, VI, Page 297.

Li, M. H., & **Wang, R.** (2017). Bioretention performance with design parameters using decision tree Model. *Council of Educators in Landscape Architecture (CELA)*, Beijing, China, Page 78.

Wang, R., & Li, M. H. (2016). Bioretention design parameters as predictors of pollutant removal efficiency—a data driven approach *Council of Educators in Landscape Architecture (CELA)*, Logan, UT, Page 93.

Kim, J. H., **Wang, R.**, & Li, M. H. (2016). The effectiveness of hands-on design-build learning opportunities in landscape design studios. *Council of Educators in Landscape Architecture (CELA)*, Logan, UT, Page 61.

Wang, Z., **Wang, R.**, Wang., H. & Jiang., Q. (2014). The Effectiveness of LID applications in Condensed Residential Areas. *Council of Educators in Landscape Architecture (CELA)*, Baltimore, MD, Page 286.

Non Peer-reviewed Conference Abstracts

Wang, R., & Li, M. H. (2019). A systematic review of research trend and critical issues in the field of landscape and water quality research. (2019). *American Association of Geographers (AAG) annual meeting*, Washington D. C.

Zhong, H., & **Wang, R.** (2019). Exploring the Driving Forces of Urban Infill and Fragmentation Development from 1990 to 2010 in the US. (2019). *American Association of Geographers (AAG) annual meeting*, Washington D. C.

Media Coverage

Nov. 6, 2022. Climate change has been an underrated driver of Lake Erie algal blooms. *Toledo Blade*. https://www.toledoblade.com/local/environment/2022/11/06/climate-change-lake-erie-algal-blooms/stories/20221106064

Invited Presentations

2022. Data science approach towards a socio-ecological framework for an investigation into continental urban stream water quality. *Michigan Institute for Data Science (MIDAS)*, Propelling Original Data Science (PODS) Grant showcase presentation, University of Michigan.

2022. Interpret Important and Interaction Effects of Urban Form on Stream Water Quality using Knockoffs and Signed Interactive Random Forest. *MIDAS Workshop on Data Science for Environmental Scientists*

2018. Investigating the impact of landscape factors on stream water quality through a hybrid of statistics and machine learning approach—A case study in Texas gulf region. *Environmental Science and Policy Program 2018 Fall Research Symposium*, Michigan State University.

Teaching Experiences

2020-present |School for Environment and Sustainability, University of Michigan

Modeling for Landscape Planning (EAS 687), Instructor, 2023 Winter

> This class teaches how spatial information can be collected, analyzed, and integrated to generate maps and models that support land planning alternatives; Students learn various landscape planning models and methods (e.g. GIS, remote sensing, scenario development, landscape visualizations, geovisualization, ecosystem service modeling)

Site Engineering (EAS 588), Instructor, 2023 Winter, 2021 Winter

> This class provides a technical background and practical exercises in the fundamental knowledge and skills of landform grading, earthwork, drainage,

hydrology and surface hydraulics, stormwater management and street layout and basic geometric design.

Ecological Site Design Studio (EAS 590), Instructor, 2021 Winter

This class introduces a design approach that focuses on how to use aesthetics to support the wellbeing of humans in tandem with healthy environmental goals. Students utilize a decentralized way to manage stormwater onsite by means of green infrastructure, with the consideration of human perception, health consequences, and climate change effects.

Urban Stormwater (EAS 578), Instructor, 2022 Fall

The course describes the major aspects of this problem defining the sources, characterizing the environmental impacts, and characterizing approaches to addressing those impacts by design and management. Working in interdisciplinary teams, students also develop and select appropriate management alternatives based on real-world examples.

2014-2017 |Department of Landscape Architecture and Urban Planning, Texas A&M University.

Digital Communication (URPN 220), Instructor, 2017 Fall, 2016 Spring, 2015 Fall

This class teaches the basic and intermediate skills of design programs such as Google SketchUp, AutoCAD, Adobe Photoshop and Adobe InDesign to students and introduces them to the combinational approach to these software packages and the potential they have in visualizing design and planning schematics.

Landscape Design Studio III (LAND 311), Co-instructor. 2016 Fall

This course emphasizes design process, synthesis and design refinement, investigates problems to stimulate highly creative self-motivated results, and design thinking which integrates behavioral settings into natural and/or built landscape systems. Regional and community scaled designs are executed using a multitude of digital drawing methods.

Advanced Digital Communication (URPN 320), Co-instructor. 2017 Spring

This course is an interdisciplinary class instructing landscape architects, planners, architects, and urban and regional sciences majors. It is an advanced digital representation class which helps students generate a workflow using ArcGIS, AutoCAD, Land F|X, Adobe Creative Suites, and Google SketchUp Pro.

Digital Communication (URPN 220), Teaching Assistant. 2015 Spring, 2014 Fall

Research

Funded Research Projects

2022.10-2024-10 | **PI**, Investigating the role of forest characteristics in mitigating climate change effects on water quality and fish community composition.

Funding Source: USDA NIFA McIntire-Stennis federal forestry research program

Grant Amount: $138,000

Co-PIs: Karen Alof, Bill Currie

2022.5-2022-12 | **PI**, IRISE: Intersecting Research Ideas towards Sustainable Environments-- Improving Built Environment Outcomes in the Face of Increasing Chemical and Pathogen Exposures.

Funding Source: University of Michigan, Bold Challenges Team Formation

Grant Amount: $50,000

Co-PIs: Simone Charles, Allen Burton

2022.2-2023-2 | **PI**, Investigating stream water contamination and prioritizing green stormwater infrastructure in the River Rouge Watershed from a socioecological perspective.

Funding Source: Detroit Urban Research Center

Grant Amount: $5,000

Co-PIs: Matthew Bertrand, Larissa Larsen

2022.8-2023.8, **Co-PI**, Developing an Interdisciplinary Approach to Studying Urban Stream Water Quality.

Funding Source: School for Environment and Sustainability

Grant Amount: $75,000

PI: Sara Hughes

2021.6-2022.6 | **PI**, Data science approach towards a socio-ecological framework for the investigation of continental urban stream water quality pattern.

Funding Source: Michigan Institute for Data Science, University of Michigan.

Grant Amount: $70,000.

Co-PIs: Bill Currie, Yang Chen

Role: Forming research idea, developing partnership, writing and implementing proposal, supervising students

2021.6-2022.1 | **PI**, Urban water quality management towards a sustainable framework— the investigation of fine scale urban form effects on stream water quality.

Funding Source: Graham Sustainability Institute Catalyst Grant Program, University of Michigan.

Grant Amount: $10,000.

Co-PIs: Robert Goodspeed, Joshua Newell, Branko Kerkez, Yang Chen

Role: Forming research idea, developing partnership, writing and implementing proposal, supervising students

2018.6-2020.6| **Co-PI**, Identifying Socio-Environmental Watershed Typologies Based on Stormwater Pollution Using Machine Learning (Graduate Pursuits).

Funding Source: National Science Foundation, National Socio-Environmental Synthesis Center (SESYNC)

Grant Amount: $10,000 and the associated travel funding

PI: Celina Balderas Guzman, Matthew Smith

Role: Mainly responsible for designing machine learning clustering and classification algorithms to identify stormwater signatures and typologies in the United States

Research Assistant Projects

2019-2020| Leading Research Assistant, Algorithm for Inventory and Spatial Analysis in Natural Resources Management, Institute for Water Resources (W912HZ-19-SOI-0002)

Funding Source: U.S. Army Engineer Research and Development Center (ERDC)

Grant Amount: $150,000

Role: Involved in the task of shoreline management and boundary management. Mainly responsible for acquiring land characteristics data, designing land cover change detection algorithms, and predicting future land use along the shoreline.

2015-2018| Research assistant, Aggie B.L.U.E. print laboratories: building lasting university Environments.

Funding Source: Tier One Program (TOP) Interdisciplinary Education Grant, Texas A&M University

Grant Amount: $300,000

Role: Involved in the rain garden construction and monitoring. Mainly responsible for installing and operating the ISCO sampler (6712 Full-Size Portable Sampler), collecting stormwater samples and analyzing hydrographs.

2012-2014| Leading Research assistant, The Research and Demonstration of Urban Water System Construction Techniques in Liangjiang New Area, Chongqing (2012ZX07307001-03)

Funding Source: Chinese Ministry of Science and Technology

Grant Amount: $70,000

Role: Using remote sensing techniques to investigate urbanization patterns. Building hydrological models to simulate runoff and water quality under alternative planning scenarios. Advising residential design patterns in the mountainous city.

Service

University service

2022| Faculty search committee, CIGLR Research Scientists in hydrology and hydrodynamics, University of Michigan

2021| Ph.D review committee, School for Environment and Sustainability, University of Michigan

2021| Session moderator, Sustainable Water Systems, 2021 Transatlantic Conversations Series, Berkeley Institute of European Studies

2020-present| Leader, Chinese graduate students recruiting program, School for Environment and Sustainability, University of Michigan

2020-present| Panelist, Graduate student instructor information panel, School for Environment and Sustainability, University of Michigan

2018 | Student Volunteer, Landscape Anniversary Program, School of Planning, Design and Construction, Michigan State University

2014-2016 | Student Organizer and Web developer, Schob Nature Preserve, Texas A&M University

2016 | Student Volunteer, The Big Event of community service, Texas A&M University

2012 | Survey Initiative, The inventory of culture heritages in Tuchen, China, Peking University

2011 | Survey Investigator, People's University-Peking University co-workshop of the migrants in urban villages, Shenzhen, China, Peking University

Professional service

2020-present| Reviewer for Natural Science Foundation Hydrological Science (HS) program, Natural Science Foundation EPSCoR Research Infrastructure Improvement Program

2019-present| Reviewer for Landscape and Urban Planning, Water Research, Science of the Total Environment, Journal of Hydrology, Environmental Research Letter, Communications Earth & Environment, Journal of Environmental Management

Students and postdocs advised

Postdoctoral fellows advised:

Maria Copeland, 2022-present, University of Michigan

Ph.D. students committee chaired:

Jinxing Guan, 2021-present, University of Michigan

Master theses chaired:

Jianxing Guan, 2020-2022

Chen Zuo, 2021-present

Yuhan Zhou, 2021-present

Qifan Wu, 2021-present

Yiyi Liu, 2022-present

Tianshu Lin, 2022-present

Affiliations

Student Research Fellow, National Socio-Environmental Synthesis Center (2018-present)

Member, Council of Educators in Landscape Architecture (CELA) (Since 2020, Student Member since 2014).

Member, American Geophysical Union (AGU) (Since 2018).

Member, American Association of Geographers (AAG) (Since 2019).

Professional Skills

Design: AutoCAD, Adobe Illustrator, Adobe Photoshop, Adobe InDesign, Google SketchUp, Rhino

Spatial analysis: ArcGIS, Fragstats

Remote sensing: Google Earth Engine, ENVI, eCognition

Hydrological modeling: SWAT, SWMM

Programming: Python, R, MATLAB, JavaScript, SQL

Statistical software: SAS, Stata, SPSS