

Xiang Zhao, Ph.D.

Contact Info

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Google Scholar <https://scholar.google.com/citations?hl=en&user=6DnvWFAAAAAJ>

Research Interests

Earth System Science • Environmental Change • Environmental Data Science • Land Use and Land Cover Change • Spatial Optimization • GeoAI • Agent-based Modelling

Education

- Ph.D., Land Resource Management, Wuhan University, China, 2013
- B.S., Land Resource Management (Engineering), Wuhan University, China, 2007

Academic Appointments

Research Scientist, UNC Charlotte, USA, Apr 2025 – Present

Associate Professor, Wuhan University, China, Jan 2021 – Feb 2025

Visiting Scholar, UNC Charlotte, USA, 2016 – 2017

Lecturer, Wuhan University, China, Aug 2015 – Dec 2020

Postdoctoral Researcher, Wuhan University, China, Jul 2013 – Jul 2015

Publications (Selected, Peer-Reviewed)

Peer-reviewed Journal Articles (Corresponding author)*

- [1]. Yun Ji, **Xiang Zhao***, et al. Spatiotemporal dynamics and influencing factors of rural settlement reclamation in mainland China from 2000 to 2020. *Habitat International*. 166, 103597 (2025).
- [2]. Yupiao Pan, **Xiang Zhao***, et al. A large-scale village classification model for tailored rural revitalization: A case study of Hubei province, China. *Journal of Geographical Sciences*. 34, 2364–2392 (2024).
- [3]. **Xiang Zhao**, et al. Identifying potential rural residential areas for land consolidation using a data driven agent-based model. *Land Use Policy*. 145, 10(2024)
- [4]. Haifeng Luo, **Xiang Zhao***, et al. A framework for measuring the implementation of the Sustainable Development Goal 4.2 (Quality Preprimary Education) at the local scale: an empirical study in Nanjing, China. *Sustainable Development*. (2024)

- [5]. Yiqing Zhang, **Xiang Zhao***, et al. Effectiveness and driving mechanism of ecological restoration efforts in China from 2009 to 2019. *Science of The Total Environment*. 910, (2024) **(Hot Paper)**
- [6]. Fang Luo, Yiqing Zhang and **Xiang Zhao***. Understanding the Spatiotemporal Dynamics and Influencing Factors of the Rice–Crayfish Field in Jiangnan Plain, China. *Remote Sensing*. 16, 9(2024)
- [7]. Xiaoya Ma, Xiaoyu Zhang and **Xiang Zhao***. Service coverage optimization for facility location: considering line-of-sight coverage in continuous demand space. *International Journal of Geographical Information Science*. 37, 7(2023)
- [8]. Kong Xuesong, Fu Mengxue, **Zhao Xiang***, et al. Ecological effects of land-use change on two sides of the Hu Huanyong Line in China[J]. *Land Use Policy*, 2022,113. **(Highly Cited Paper)**
- [9]. Wang Qi, **Zhao Xiang***, et al. Optimizing the ultra-dense 5G base stations in urban outdoor areas: Coupling GIS and heuristic optimization[J]. *Sustainable Cities and Society*, 2020,63.
- [10]. **Zhao Xiang**, et al. An adaptive agent-based optimization model for spatial planning: A case study of Anyue County, China[J]. *Sustainable Cities and Society*, 2019,51.
- [11]. **Zhao Xiang**, et al. A Spatially Explicit Optimization Model for Agricultural Straw-Based Power Plant Site Selection: A Case Study in Hubei Province, China[J]. *Sustainability*, 2017,9(5).
- [12]. **Zhao Xiang**, et al. AITSO: A tool for spatial optimization based on artificial immune systems[J]. *Computational Intelligence and Neuroscience*, 2015,2015.
- [13]. Ma Xiaoya, **Zhao Xiang***. Land Use Allocation Based on a Multi-Objective Artificial Immune Optimization Model: An Application in Anlu County, China[J]. *Sustainability*, 2015,7(11):15632-15651.
- [14]. Zheng Minrui, Tang Wenwu, **Zhao Xiang**. Hyperparameter optimization of neural network-driven spatial models accelerated using cyber-enabled high-performance computing[J]. *International Journal of Geographical Information Science*, 2019,33(2):314- 345.
- [15]. Tang Wenwu, Zheng Minrui, **Zhao Xiang**, et al. Big Geospatial Data Analytics for Global Mangrove Biomass and Carbon Estimation[J]. *Sustainability*, 2018,10(2).
- [16]. Liu Dianfeng, Tang Wenwu, Liu Yaolin, **Zhao Xiang**, et al. Optimal rural land use allocation in central China: Linking the effect of spatiotemporal patterns and policy interventions[J]. *Applied Geography*, 2017,86:165-182.

- [17]. Xie Peng, Liu Yaolin, He Qingsong, **Zhao Xiang**, et al. An Efficient Vector-Raster Overlay Algorithm for High-Accuracy and High-Efficiency Surface Area Calculations of Irregularly Shaped Land Use Patches[J]. *ISPRS International Journal of Geo-information*, 2017,6(6).
- [18]. Liu Yaolin, Xie Peng, He Qingsong, **Zhao Xiang**, et al. A New Method Based on Association Rules Mining and Geo-filter for Mining Spatial Association Knowledge[J]. *Chinese Geographical Science*, 2017,27(3):389-401.
- [19]. Liu Dianfeng, Liu Yaolin, Wang Mingze, **Zhao Xiang**. Multi-objective Network Optimization for Soil Monitoring of the Loess Hilly Region in China[J]. *Discrete Dynamics in Nature and Society*, 2014,2014.
- [20]. Liu Yaolin, Wang Hua, Ji Yingli, Liu Zhongqiu, **Zhao Xiang**. Land Use Zoning at the County Level Based on a Multi-Objective Particle Swarm Optimization Algorithm: A Case Study from Yicheng, China[J]. *International Journal of Environmental Research and Public Health*, 2012,9(8):2801-2826.

Peer-reviewed Book Chapters (2)

- [1].Ma, Xiaoya and **Zhao, Xiang** and Jiang, Ping and Liu, Yuangang. High-Performance Pareto-Based Optimization Model for Spatial Land Use Allocation. In: Tang, W., Wang, S. (eds) High Performance Computing for Geospatial Applications. Geotechnologies and the Environment, vol 23. Springer, Cham. https://doi.org/10.1007/978-3-030-47998-5_11
- [2].Zheng, Minrui and Tang, Wenwu and Lan, Yu and **Zhao, Xiang** and et.al. Parallel Generation of Very High-Resolution Digital Elevation Models: High-Performance Computing for Big Spatial Data Analysis. In: Roy, S., Samui, P., Deo, R., Ntalampiras, S. (eds) Big Data in Engineering Applications. Studies in Big Data, vol 44. Springer, Singapore. https://doi.org/10.1007/978-981-10-8476-8_2

Research Grants & Projects (Selected)

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- [1].PI, **Natural Science Foundation of China**: Adaptive agent-based land use optimization model for collaborative land use decision-making, 2020~2023
 - [2].Co-PI, **National Key Research and Development Program of China**: Research on the key technologies for evaluating the development potential of villages and towns in county areas, 2018~2022
 - [3].PI, **Natural Science Foundation of China**: Spatial optimization model for land use based on parallel multi-agent and artificial immune algorithm, 2014~2017
 - [4].PI, **China Postdoctoral Science Foundation Grant**: Spatial optimization model for land use allocation based on multi-agent and artificial immune system, 2014~2015

- [5]. Co-PI, Natural Resources and Planning Bureau of Yicheng City, Hubei Province, China:
Spatial Planning Compilation and Information Platform Construction Project of Yicheng
City, 2020~2024

Teaching Experience

School of Resource and Environmental Sciences, Wuhan University, China (2015 – 2024)

- **Advanced Techniques for Surveying and Monitoring Natural Resources** (*Graduate, Fall Semester, 2024, 20 students/year*)
- **Database Principles** (*Undergraduate, Fall Semester, 2015–2023, 20~30 students/year*)
- **Land Economics** (*Undergraduate, Spring Semester, 2015–2022, 25~40 students/year*)

Undergraduate Mentorship

- Supervised 10+ research projects in GIS, remote sensing, and land-use modeling.
- Guided students through data analysis, academic competitions, and publication.
- Mentored students who published in *Sustainable Cities and Society* and *Habitat International*.
- Advised student teams winning multiple national competitions in GIS and land valuation.

Graduate Supervision & Advising

- Primary advisor for five master's students; all published in SCI/SSCI-indexed journals.
- Committee member for 50+ master's and doctoral theses in GIScience and land management.

Professional & Scholarly Service

- Reviewer for *Environmental and Sustainability Indicators*, *Urban Forestry & Urban Greening*, *Building and Environment*, *International Journal of Digital Earth*, *Sustainable Development*, *Sustainable Cities and Society*, *Science of the Total Environment*, *Ecological Modelling*, *IJGIS*, *Journal of Environmental Management*, *Remote Sensing*, *Land*, and *others*.
- Anonymous grant reviewer, National Natural Science Foundation of China (NSFC), 2014–2024.

Technical & Analytical Skills

- **GIS Software & Platforms:** ArcGIS Pro, ArcGIS Online, ArcGIS Enterprise, QGIS
- **Programming & Scripting:** Python, SQL, C/C++/C#

- **Database Management:** PostgreGIS, SQL Server, Oracle, File Geodatabase
- **Spatial Analysis & Data Processing:** Remote sensing, Geostatistics, Spatial Modeling, Spatial Optimization, GeoAI, UAV (Unmanned Aerial Vehicle) for Aerial Surveying, Orthophoto Creation, and 3D modeling (DJI Terra, PIX4D, Bentley Context Capture).
- **AI & Algorithms:** Large Language Models, Transformer, Artificial Immune System, Genetic Algorithms, etc.