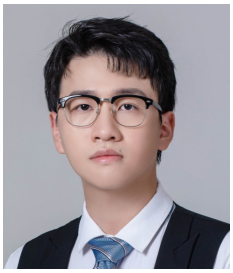
Wang Yao (王曜)



Postdoctoral Research Fellow

E: wang.yao@ntu.edu.sg / yao009@e.ntu.edu.sg
ORCID [link] | Google Scholar [link] | Personal Website [link]

Professional experience

Nanyang Technological University, Postdoctoral Research Fellow *Feb 2026-Now*

- **Supervisor:** Associate Prof. Xunchang Fei

Education

Nanyang Technological University, Ph.D. in Environmental Engineering *Aug 2022–Jan 2026*

- **Supervisor:** Associate Prof. Xunchang Fei
- **Advisory Committee:** Prof. Lim Teik Thye, Associate Prof. Grzegorz Lisak
- **Thesis**: The biogeochemical dynamics of major elements in municipal solid waste landfills

Nanyang Technological University, M.Eng. in Environmental engineering *Aug 2020–Jul 2022*

- **Supervisor:** Associate Prof. Xunchang Fei
- **Thesis**: The degradation processes of municipal solid waste in landfills

Tongji University, B.S. in Environmental science *Sep 2016–Jun 2020*

- **Supervisor:** Prof. Daqiang Yin, Prof. Hongtao Wang
- **Thesis**: QSAR modeling of chlorinated paraffin in aquatic ecosystems

Research interests

My research focuses on advancing sustainable waste management by understanding the cradle-to-grave fate of waste, with the goal of reducing carbon emissions and pollution from waste management system. My current main research topics include:

AI-driven decision-making for sustainable waste management.
I develop a local-to-global waste inventory using interpretable machine learning, enabling more detailed scenario planning and policy evaluation from national down to city scales. Future research will extend to satellite-based detection of global dumpsites and waste management facilities, aiming to deliver high-resolution assessments of human health risks.
Related publication(s): FA-2, FA-5, CA-6. Additional manuscripts in preparation.

Greenhouse-gas accounting and MRV for waste systems.
I develop bottom-up models tailored to local conditions and reconcile them with observations to correct biases in default inventories. The results reveal underestimation hotspots and prioritize cost-effective mitigation portfolios. Future research will focus on elucidating the fundamental mechanisms of GHG emissions, with the goal of enabling more targeted control strategies.
Related publication(s): FA-3, FA-4, CA-2, CA-3, CA-1.

Climate–waste interactions and resilience of land-disposed waste.
I quantify element biogeochemical dynamics in landfills and diagnose how climate variability and extremes alter the emission / leakage pathways. The findings translate into design principles for climate-resilient waste infrastructure. Future work will sepcify site-specific climate change impact on waste management facilities.
Related publication(s): FA-1, CA-5, CA-11.

Fates of plastics and microplastics in disposal sites.
I investigate the behavior, fragmentation and degradation mechanisms, transport, and environmental leakage of plastics in waste management systems. The results inform monitoring protocols, risk assessment, and end-of-life strategies. Future research will focus on the formation mechanisms, characteristics, and environmental impacts of plastiglomerates, a unique plastic–rock composite that can develop under landfill conditions.
Related publication(s): FA-6, CA-4, CA-8, CA-9, CA-10.

Publications

Google Scholar Total citations = 390, **H-index** = 9, **Average IF per paper** = 21.8 Latest update: Mar/2026

First author

FA-1 **Yao Wang**, Zhou, C., Zhang, H., Ma, S., Lou, Z., Raskin, L., Skerlos, S., Coulon, F., Zekkos, D., Hussain, A., Hussain, A., Lisak, G., Fang, M., Yin, K., He, H., Yuan Wang, Fei, X.*, 2025. Biogeochemical dynamics of major elements in municipal solid waste landfills can induce health risks for nearly 1 billion people. **One Earth** (IF=16.1), 8(9), 101418. https://doi.org/10.1016/j.oneear.2025.101418 (Citations: **4**)

FA-2 **Wang, Y.**, Yin, K., Fang, M., Fei, X.*, 2025. Underappreciated majority of solid waste: insufficient data and unclear impacts. **The Innovation** (IF=25.7), 6(3), 100776. https://doi.org/10.1016/j.xinn.2024.100776 (Citations: **4**)

FA-3 **Wang, Y.**, Fang, M., Guo, Y., Pi, X., Wang, Y.J., He, H., Lou, Z., Yin, K.*, Fei, X.*, 2024. Methane emissions differentially underestimated from landfills worldwide. **Nature Sustainability** (IF=29.2), 7, pp.496–507. https://doi.org/10.1038/s41893-024-01307-9 (Citations: **103**, ESI Highly Cited Paper).

FA-4 **Wang, Y.**, Zhou, C., Lou, Z., Zhang, H., Hussain, A., Zhan, L., Yin, K., Fang, M., Fei, X.*, 2024. Underestimated methane emission from solid waste disposal sites reveals missed greenhouse gas mitigation opportunities. **Engineering** (IF=10.1), 36, pp.12-15. https://doi.org/10.1016/j.eng.2023.12.011 (Citations: **17**)

FA-5 **Wang, Y.**, Ruiz-Acevedo, A., Rameez, E., Raghavan, V., Hussain, A.* and Fei, X.*, 2024. Toward sustainable waste management in small islands developing states: integrated waste-to-energy solutions in Maldives context. **Frontiers of Environmental Science & Engineering** (IF=6.7), 18(2), p.24-37. https://doi.org/10.1007/s11783-024-1784-7 (Citations: **11**)

FA-6 **Wang, Y.**, Lu, X. and Fei, X.*, 2021. Property changes of conventional plastic waste mixed with municipal solid waste after 10-year degradation experiments simulating landfill conditions. **Journal of Hazardous Materials Letters** (IF=6.6), 2, p.100047. https://doi.org/10.1016/j.hazl.2021.100047 (Citations: **22**)

Contributing author

CA-1 Yin, K.*, Zhu, J., Wu, M., Zhang, H., Ling, X., Cai, M., Ren, S., Zhao, X., Ling, C., Yu, L., Tong, H., He, C., **Wang, Y.**, and Fei, X.* (2026). Misbehaviour dominates GHG emissions from food loss and waste. **Nature Climate Change** (IF=30.3). https://doi.org/10.1038/s41558-026-02596-y (Citaions: **NA**)

CA-2 Ye, R., Yin, K., Yang, Z., Zhang, C., Huo, W., **Wang, Y.**, Zhang, H.*, Fei, X.*, 2026. A Novel Semi-Empirical Model for Multi-Scenario Estimations of Nitrous Oxide Emissions from Municipal Solid Waste Landfills. **Environmental Science & Technology** (IF=11.3), 60, 1, 595–608. https://doi.org/10.1021/acs.est.5c08871 (Citations: **NA**)

CA-3 Yang, Z., Yin, K., Ye, R., Zhang, C., **Wang, Y.**, Zhang, H.*, Fei, X.*, 2025. Revealing hidden methane mitigation opportunities from legacy dumping and landfilling of municipal solid waste in rural China. **Journal of Environmental Management** (IF=8.4), 394, 127244. https://doi.org/10.1016/j.jenvman.2025.127244 (Citations: **1**)

CA-4 Yadav, V.*, Fei, X., Arora, M., van Emmerik, T.H., **Wang, Y.** and Laurent, A., 2025. Gaps in quantifying environmental losses of plastics impede effective solutions. **Nature Reviews Materials** (IF=79.8), pp.1-3. https://doi.org/10.1038/s41578-025-00802-5 (Citations: **2**)

CA-5 Wang, Y., Pi, X., Yadav, V., Hussain, A., Liu, Q., **Wang, Y.**, Guo, Y., Zhang, Y. and Fei, X.*, 2025. Leaching model of an expanding coastal dumpsite considering climate change. **Waste Management** (IF=8.1), 200, 114772. https://doi.org/10.1016/j.wasman.2025.114772 (Citations: **NA**)

CA-6 Zhang, Z., Wang, J., Li, J., **Wang, Y.**, Yin, K. and Fei, X.*, 2024. Impacts of regional socioeconomic statuses and global events on solid waste research reflected in six waste-focused journals. **Waste Management** (IF=8.1), 182, pp.113-123. https://doi.org/10.1016/j.wasman.2024.04.028 (Citations: **5**)

CA-7 Pi, X., Fei, X.*, **Wang, Y.**, Sun, X. and Guo, Y., 2023. Global void ratio of municipal solid waste for compression indices estimation. **Waste Management** (IF=8.1), 160, pp.69-79. https://doi.org/10.1016/j.wasman.2023.02.003 (Citations: **12**)

CA-8 Lu, X., He, H., **Wang, Y.**, Guo, Y. and Fei, X.*, 2023. Masses and size distributions of mechanically fragmented microplastics from LDPE and EPS under simulated landfill conditions. **Journal of Hazardous Materials** (IF=13.6), 445, 130542. https://doi.org/10.1016/j.jhazmat.2022.130542 (Citations: **26**)

CA-9 Fei, X.*, He, H., Pi, X., Lu, X., Chen, Q., Ma, J., **Wang, Y.**, Fang, M., Wu, C. and Feng, S., 2023. The distribution, behavior, and release of macro-and micro-size plastic wastes in solid waste disposal sites. **Critical Reviews in Environmental Science and Technology** (IF=12.6), 53(3), pp.366-389. https://doi.org/10.1080/10643389.2022.2054649 (Citations: **46**)

CA-10 Fei, X.*, Guo, Y., **Wang, Y.**, Fang, M., Yin, K. and He, H., 2022. The long-term fates of land-disposed plastic waste. **Nature Reviews Earth & Environment** (IF=71.5), 3(11), pp.733-735. https://doi.org/10.1038/s43017-022-00354-0 (Citations: **53**)

CA-11 Fei, X.*, Fang, M. and **Wang, Y.**, 2021. Climate change affects land-disposed waste. **Nature Climate Change** (IF=30.3), 11(12), pp.1004-1005. https://doi.org/10.1038/s41558-021-01220-5 (Citations: **81**)

Note: * indicates the corresponding author. Full list of publications on:
ORCID: https://orcid.org/0000-0003-2373-0201
Google Scholar: https://scholar.google.com/citations?hl=en&user=aTPoRrMAAAAJ.

Grants

- **Participant**, "Breaking the ground" in Semakau Landfill: technological solutions for site investigation and material reuse, Singapore National Environment Agency (NEA), 3,000,000 SGD (2,400,000 USD)
- **Participant**, Long-term environmental behaviour for treated incineration bottom ash, Singapore National Environment Agency (NEA), 6,000,000 SGD (4,800,000 USD)
- **Participant**, Tackling microfibres at source: investigating opportunities to reduce microfibre pollution from the fashion industry through textile design and manufacturing innovation, United Naions Development Program (UNDP), 56,250 USD

Service

Editorial role

- Young Editorial Board Member, *The Innovation Geoscience* [link]
- Young Editorial Board Member, *DeCarbon* [link]

Reviewer

- Nature Communications
- Journal of Environmental Management
- 9th International Congress on Environmental Geotechnics (ICEG)

Talk

- 2024 Frontiers of Environmental Science & Engineering (FESE) Young Talent Forum, Tsinghua University

Teaching

- CV0003 Introduction to Data Science and Artificial Intelligence, NTU, Y24/25, Semester 2
  Led tutorials on Python programming, data analysis, and machine learning fundamentals.
- CV1014 Introduction to Computational Thinking, NTU, Y24/25, Semester 1
  Led tutorials on algorithmic thinking and introductory programming.
- EG0001 Engineers & Society, NTU, Y23/24, Semester 1 & 2
  Facilitated discussions on engineering ethics, and supported assessment and feedback.

Student supervision

- Koh Xin Li, NTU, Environmental Engineering, Year 4, Final Year Project: Climate change effects on landfills.
- Steffi Rei Wong Shi Qi, NTU, Environmental Engineering, Year 4, Final Year Project: Carbon emissions from solid waste in Southeast Asia.
- Sim Zu Da Joel, NTU, Civil Engineering, Year 4, Final Year Project: Estimating landfill carbon stocks and emissions.
- Hou Tianyuan, NTU, Environmental Engineering, Year 4, Final Year Project: GHG emissions from waste sector.
- Soo Wei Song, NTU, Environmental Engineering, Year 4, Final Year Project: Method refinement for estimating carbon stock in landfills

Scholarships & Awards

- **Frontiers Planet Prize**, 2026
  Selected as Singapore's sole National Champion and one of 25 National Champions worldwide for a sole-first-author *Nature Sustainability* paper on landfill methane emissions. The Frontiers Planet Prize is a major global scientific award described as "the world's biggest prize in scientific solutions for planetary health".
- **Chinese Government Award for Outstanding Self-Financed Students Abroad**, 2025
  A prestigious scholarship established by the Chinese government to recognize outstanding non-CSC funded Chinese students studying abroad. Only 650 recipients are selected worldwide each year for their exceptional academic and research achievements.
- **Nanyang Technological University Research Scholarship**, 2022–2026
  A full scholarship awarded to outstanding Ph.D. students, covering full tuition fees and providing a monthly living allowance.
- **Nanyang Technological University Research Scholarship**, 2020–2022
  A full scholarship awarded to outstanding Master's students, covering full tuition fees and providing a monthly living allowance.
- **NTU CEE Best Research Poster Award (Bronze)**, 2025
- **Tongji Scholarship of Excellence**, Tongji University, Academic Years 2016–2017, 2017–2018, 2018–2019