

# Qian ZHANG

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## Research Interest: Industrial Ecology & Environmental and Resources Management

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GHG emission accounting and footprint analysis,  
Sustainable cities and infrastructure in life-cycle thinking,  
Transboundary air pollution and environmental justice,  
Integrated urban water management and water-energy-climate nexus,  
Value-added-oriented resource efficiency for a circular economy,  
Synergies and trade-offs between Sustainable Development Goals (SDGs).

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## Education

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<b>OCT 2012 – SEP 2015</b>	Department of Urban Engineering, <b>The University of Tokyo, Japan</b> <i>Dissertation: Assessment of GHG emissions of water and wastewater utilities in urbanizing China</i>	<b>Ph.D. in Urban Engineering</b> Supervisor: Prof. Yuichi Moriguchi
<b>SEP 2009 – AUG 2012</b>	College of Environmental Sciences and Engineering, <b>Peking University, China</b> <i>Thesis: Trend analysis of ground-level ozone and its precursor concentrations in Beijing in the summertime</i>	<b>MSc in Environmental Science</b> Supervisor: Prof. Min Shao
<b>SEP 2005 – AUG 2009</b>	School of Environmental Sciences, <b>Peking University, China</b> <i>Thesis: Spatial and temporal variations of ambient volatile organic compounds (VOCs) in the Pearl River Delta (PRD) area via grid monitoring</i>	<b>BSc in Environmental Science</b> Thesis advisor: Prof. Min Shao
<b>SEP 2007 – AUG 2009</b>	China Centre for Economic Research, <b>Peking University, China</b>	<b>Minor in Economics</b>

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## Work and Training Experience

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### **APR 2018 – present Postdoctoral Fellow at the University of Victoria**

- ❖ Research on ‘Infrastructure for a Low-carbon Planet’ led by Prof. Christopher Kennedy to understand the transition pathway of infrastructure systems towards deep decarbonization.

### **OCT 2015 – MAR 2018 Project Researcher at The University of Tokyo**

- ❖ Created value-added based indicators to evaluate Japan’s resource efficiency at the sectoral level by combining input-output analysis, material flow analysis, structural pathway analysis, and decomposition approaches.
- ❖ Identified hot-spot characteristics of sulphur dioxide (SO<sub>2</sub>) emissions embodied in supply chains by updating the environmentally extended multi-regional input-output analysis with the source-

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receptor relationship model.

**JAN 2011 - AUG 2012 Research Intern/Consultant (Part-time) at China Office, the World Resources Institute (WRI)**

- ❖ Jointly made a *GHG emission calculation tool (excel-based) for Chinese cities*, and localized WRI's corporate GHG accounting guidelines into Chinese version under the supervision of Dr. Wee Kean Fong (Deputy Country Director for WRI China).
- ❖ Conducted preliminary research for a *GHG emission calculation tool for Chinese power plants*.

**SEP 2007 - AUG 2008 Research Assistant at Peking University**

- ❖ Enrolled in Undergraduate Research & Training Program under the supervision of Prof. Shu Tao and Dr. Jun Cao. The study theme: Bioaccessibility of polycyclic aromatic hydrocarbons (PAHs) in the digestion via in vitro studies.

**Teaching Experience, Research Supervision, and School Services**

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**Teaching Experience**

**SEP 2018 – present Co-Instructor at the University of Victoria**

- ❖ Co-teaching (20%) in two graduate courses with active learning skills: CIVE 510 (*Industrial Metabolism & Global Environmental Challenge*) and CIVE 513 (*Sustainable Cities*).

**JUL 2014 Teaching Assistant at The University of Tokyo**

- ❖ Engaged in the preparation of a summer course *Sustainable Urban Management* and field trips.

**SEP 2010 - FEB 2011 Teaching Assistant at Peking University**

- ❖ Marked the assignments, and managed the internet platform for a core course (*Environmental Sciences*).

**Research Supervision (Assisted)**

- ❖ 1 Master's student at the University of Victoria
- ❖ 1 PhD student at The University of Tokyo
- ❖ 1 Exchange PhD student from Tongji University

**School Services**

**JUL 2019 – JAN 2020 Event Planning Assistant at the University of Victoria**

- ❖ Assisted the coordinator in organizing the first research day for graduate students in the Department of Civil Engineering (29 JAN 2020)

**APR 2019 Table Facilitator at the University of Victoria**

- ❖ Ensured that our faculty members worked together to deliver clear outputs for a collaborative research proposal at the end of the Workshop on Advancing Green Civil Engineering (8-9 APR 2019).

**Skills**

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Language: Chinese (native), English (CEFR C1), and Japanese (JLPT N1)

Microsoft Word/Excel/PowerPoint, ArcGIS, SPSS, MATLAB, Python

### Professional Memberships and Services

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Member, the International Society of Industrial Ecology, 2015 - present

Member, the International Input-Output Association, 2016 - present

Member, the Institute of Life Cycle Assessment, Japan, 2012 - 2015

Co-founder, Chinese Association of Science and Technology at the University of Tokyo, 2015 - 2018

Editorial Board Member, *Journal of Cleaner Production*, 2019 - present

Ad-hoc Reviewer for Journals:

*J. Clean. Prod.* (71 assignments), *Resour Conserv Recy.* (17), *Environ. Sci. Technol.* (2), *Ecol. Model.* (1), *EIA Review* (1), *J. Ind. Ecol.* (3), *Sci. Total Environ.* (6), *Waste Manag.* (3), *J. Mater. Cycles Waste.* (4), *Appl. Energy* (3), *J. Urban Manag.* (2), *BioResources* (1), *Renew. Sust. Energ. Rev.* (1).

### Awards, Grants, and Fellowships

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Japanese Government Ph.D. Scholarship, MEXT of Japan (JPY 5,328,000, 2012-2015)

First-class Scholarship for Excellent Master's Students, Peking University (CNY 15,000, 2009)

Chancellor's Grant for Undergraduate Research, Peking University (CNY 4,000, 2007-2008)

First prize in the *Young Scientist Challenge Competition*, Peking University (2010)

Merit Student, Peking University (2007)

### Publications (Peer-reviewed, underlined as the first author or corresponding author)

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#### Industrial Ecology (Ph.D. and postdoctoral period)

- 1) Zhang, Q.\*, Zhao, X., & Smith, K. (2020). Greenhouse gas emissions associated with urban water infrastructure: Evidence from China. *WIREs Water*. *In preparation for an invited review.*
- 2) Zhang, Q.\*, & Kennedy, C. (2020). Potential savings from the global railway infrastructure towards deep decarbonization. *In review.*
- 3) Zhang, Q.\*, Takagi, S., Nakanishi, S., Nakatani, J., & Moriguchi, Y. (2019). A raw material-oriented indicator of sectoral resource efficiency for Sustainable Development Goals. *In review.*
- 4) Zhang, Q.\*, Kennedy, C., Wang, T., Wei, W., Li, J., & Shi, L. (2019). Transforming the coal and steel nexus for China's eco-civilization. *Minor revision (Journal of Industrial Ecology).*
- 5) Tripathi, I., Zhang, Q.\*, & Froese, T. (2019). How can we leverage the Circular Economy to support sustainable land use? *Revise & Resubmit.*
- 6) Gao, X.\*, Nakatani, J., Zhang, Q., Huang, B., Wang, T., & Moriguchi, Y. (2020). Dynamic material flow and stock analysis of residential buildings by integrating rural-urban land transition: A case of Shanghai. *Journal of Cleaner Production*, 253, 119941.
- 7) Li, L., Liu, D., Zhang, Q., Song, K.\*, Zhou, X., Tang, Z., & Zhou, X. (2019). Occurrence and ecological risk assessment of selected antibiotics in the freshwater lakes along the middle and lower reaches of Yangtze River Basin. *Journal of Environmental Management*, 249, 109396.
- 8) Zhang, C.\*, He, G., Zhang, Q.\*, Liang, S., Zipper, S., Guo, R., Zhao, X., Zhong, L., & Wang, J. (2020). The evolution of virtual water flows in China's electricity transmission network and its driving forces. *Journal of Cleaner Production*, 242, 118336.
- 9) Zhang, Q.\*, Liu, S., Wang, T., Dai, X., Baninla, Y., Nakatani, J., & Moriguchi, Y. (2019). Urbanization impacts on Greenhouse Gas (GHG) emissions of the water infrastructure in China: Trade-offs among Sustainable Development Goals (SDGs). *Journal of Cleaner Production*, 232,

- 10)** Yu, L., Moriguchi, Y.\* , Nakatani, J., **Zhang, Q.**, Li, F., He, W.\* , & Li, G. (2019). Environmental impact assessment on the recycling of waste LCD panels. *ACS Sustainable Chemistry & Engineering*, 7(6), 6360–6368.
- 11)** Baninla, Y., Lu, Y.\* , **Zhang, Q.\***, Omotehinse, A., Zheng, X., Zhang, M., Yuan, J., Zhou, Y., Liang, R., & Khan, K. (2020). Material use and resource efficiency of African sub-regions. *Journal of Cleaner Production*, 247, 119092.
- 12)** Baninla, Y., Zhang, M., Lu, Y.\* , Liang, R., **Zhang, Q.**, Zhou, Y., & Khan, K. (2019). A transitional perspective of global and regional mineral material flows. *Resources, Conservation & Recycling*, 140, 91-101.
- 13)** **Zhang, Q.\***, Nakatani, J., Shan, Y., & Moriguchi, Y. (2019). Inter-regional spillover of China's sulfur dioxide (SO<sub>2</sub>) pollution across the supply chains. *Journal of Cleaner Production*, 207, 418-431.
- 14)** Wang, T., Shi, F.\* , **Zhang, Q.**, Qian, X., & Hashimoto, S. (2018). Exploring material stock efficiency of municipal water and sewage infrastructures in China. *Journal of Cleaner Production*, 181, 498-507.
- 15)** Chen, X., Niu, J.\* , Nakagami, K., **Zhang, Q.**, Qian, X., & Nakajima, J. (2018). Green sports supporting a low-carbon society: Inspiration from Japan. *International Journal of Global Warming*, 14(1), 61-80.
- 16)** **Zhang, Q.\***, Nakatani, J., Wang, T., Chai, C., & Moriguchi, Y. (2017). Hidden greenhouse gas emissions for water utilities in China's cities. *Journal of Cleaner Production*, 162, 665-677.
- 17)** **Zhang, Q.\***, Nakatani, J., & Moriguchi, Y. (2015). Compilation of an embodied CO<sub>2</sub> emission inventory for China using 135-sector Input-Output Tables. *Sustainability*, 7(7), 8223-8239.

#### Atmospheric Chemistry (Master's period)

- 18)** Chen, W., Shao, M.\* , Wang, M., Lu, S., Liu, Y., Yuan, B., Yang, Y., Zeng, L., Chen, Z., Chang, C.-C., **Zhang, Q.**, & Hu, M. (2016). Variation of ambient carbonyl levels in urban Beijing between 2005 and 2012. *Atmospheric Environment*, 129, 105-113.
- 19)** Wang, M., Shao, M.\* , Chen, W., Lu, S., Liu, Y., Yuan, B., **Zhang, Q.**, Zhang, Q., Chang, C.-C., Wang, B., Zeng, L., Hu, M., Yang, Y., & Li, Y. (2015). Trends of non-methane hydrocarbons (NMHC) emissions in Beijing during 2002–2013. *Atmospheric Chemistry and Physics*, 15(3), 1489-1502.
- 20)** **Zhang, Q.**, Yuan, B., Shao, M.\* , Wang, X., Lu, S., Lu, K., Wang, M., Chen, L., Chang, C.-C., & Liu, S. C. (2014). Variations of ground-level O<sub>3</sub> and its precursors in Beijing in summertime between 2005 and 2011. *Atmospheric Chemistry and Physics*, 14(12), 6089-6101.
- 21)** Wang, M., Zeng, L.\* , Lu, S., Shao, M.\* , Liu, X., Yu, X., Yuan, B., **Zhang, Q.**, Hu, M., & Zhang, Z. (2014). Development and validation of a cryogen-free automatic gas chromatograph system (GC-MS/FID) for online measurements of volatile organic compounds. *Analytical Methods*, 6(23), 9424-9434.
- 22)** Yuan, B., Shao, M.\* , deGouw, J., Parrish, D. D., Lu, S., Wang, M., Zeng, L., **Zhang, Q.**, Song, Y., Zhang, J., & Hu, M. (2012). Volatile organic compounds (VOCs) in urban air: How chemistry affects the interpretation of positive matrix factorization (PMF) analysis. *Journal of Geophysical Research: Atmospheres*, 117(D24).
- 23)** **Zhang, Q.**, Shao, M.\* , Li, Y., Lu, S., Yuan, B., & Chen, W. (2012). Increase of ambient

formaldehyde in Beijing and its implication for VOC reactivity. *Chinese Chemical Letters*, 23(9), 1059-1062.

### Selected Conference Presentations (Peer-reviewed, underlined as the presenter)

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- 1) Zhang, Q., *et al.* The coal and steel nexus in China's evolving infrastructure sectors. **Oral** presentation at *the 10th Biennial Conference of the International Society for Industrial Ecology: Industrial ecology for Eco-civilization*, Beijing, China, 7-11 JUL 2019.
- 2) Zhang, Q., & Kennedy, C. Transforming the coal and steel nexus for China's eco-civilization. Poster presentation at *the ISEVic Energy Vision (EnVision) 2019 Conference: Accelerate energy system transformation*, Victoria, Canada, 2-3 MAY 2019.
- 3) Zhang, Q., & Moriguchi, Y. Sustainable Development Goals (SDGs) Call for New Indicator of Resource Efficiency for Japan. **Oral** presentation at *the 13th International Conference on EcoBalance: Nexus of ideas: Innovation by linking through life cycle thinking*, Tokyo, Japan, 9-12 OCT 2018.
- 4) Zhang, Q., & Moriguchi, Y. New Resource Efficiency Indicator for Better Corporate Engagement in Japan. **Oral** presentation at *the 2018 International Conference on Resource Sustainability*, Beijing, China, 27-29 JUN 2018.
- 5) Zhang, Q., *et al.* Impacts of urban configuration on resource and energy efficiency of water infrastructure in China. Poster presentation at *the 9th Biennial Conference of the International Society for Industrial Ecology and the 25th annual conference of the International Symposium on Sustainable Systems and Technology (ISSST): Science in support of sustainable and resilient communities*, Chicago, USA, 25-29 JUN 2017.
- 6) Zhang, Q., *et al.* Environmental impact assessment of China's sulfur dioxide pollution through the supply chains. Poster presentation at *the 12th International Conference on EcoBalance: Responsible value chains for sustainability*, Kyoto, Japan, 3-6 OCT 2016.
- 7) Zhang, Q., *et al.* Analysis of CO<sub>2</sub> emissions embodied in the urban water use in China. **Oral** presentation at *the 24th International Input-Output Conference*, Seoul, Republic of Korea, 4-8 JUL 2016.
- 8) Zhang, Q., *et al.* Integrated evaluation of GHG emissions of water utilities in China. **Oral** presentation at *the 6th IWA-ASPIRE Conference & Exhibition: Sustainable water environment and water use*, Beijing, China, 20-24 SEP 2015.
- 9) Zhang, Q., *et al.* Low carbon development of urban water utilities in China. Poster presentation at *the 8th Biennial Conference of the International Society for Industrial Ecology: Taking stock of industrial ecology*, Guildford, UK, 7-10 JUL 2015.
- 10) Zhang, Q., *et al.* Compilation of embodied CO<sub>2</sub> emission inventory using China's input-output tables: Implication for environmental public utilities. Poster presentation at *the 11th International Conference on EcoBalance: Creating benefit through life cycle thinking*, Tsukuba, Japan, 27-30 OCT 2014.

### Invited Presentations in Workshops, Seminars, and Other Events

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- 1) Zhang, Q., A Glance of 20-year Governance for the Circular Economy in Japan. *Urban Metabolism in Policy and Practice Seminar*, Metabolism of Cities funded by the Urban Studies Foundation, Tsinghua University, Beijing, China, 6 JUL 2019.  
<Information available at <https://seminars.metabolismofcities.org/beijing>>

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2) **Zhang, Q.**, Water-Energy-Climate nexus: Experiences from China's urban water sector.  
*Sustainability Seminar Series in Civil Engineering (Fall 2018)*, Department of Civil Engineering,  
University of Victoria, Victoria, Canada, 19 SEP 2018.