

Peijia Ku, Ph.D.

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EDUCATION

- Ph.D. Department of Biology. University of North Carolina at Greensboro. 08/2015-05/2020
 - Major: Environmental Health Sciences
 - Dissertation: Effects of forest fires on mercury biogeochemical cycling in terrestrial and aquatic ecosystems (Committee: [Drs. Martin Tsz-Ki Tsui](#) (Chair), Anne E. Hershey, Dan Royall, Gideon Wasserberg)
- M.S., Department of Ecology, Jinan University, Guangzhou, China. 09/2012-07/2015
 - Major: Environmental Science
 - Thesis: Effects of diclofenac and simvastatin on the expressions of genes in the detoxification system and its action mechanisms in *Mugilogobius abei* (Advisor: Xiangping Nie)
- B.S., School of Environmental Science & Technology, Dalian University of Technology, China. 08/2008-07/2012
 - Major: Environmental Engineering
 - Thesis: Study of sponge-like graphene/pyrrole composite oil sorbents (Advisor: Lifen Liu)

APPOINTMENTS

- Oak Ridge National Laboratory, TN
 - Research Technical Professional Staff, Environmental Sciences Division. 08/2022 - present
 - *Job Focus*: Ecotoxicology and Biogeochemistry research
- Oak Ridge National Laboratory, TN
 - Postdoc Research Associate, Environmental Sciences Division. 08/2020–08/2022
 - *Research Focus*: Advancing and evaluating the effectiveness of mercury remediation technologies on mercury contaminated water environment; Understanding the biogeochemical and microbial controlling factors in alterations of mercury bioavailability and bioaccumulation under amendments, such as using mercury stable isotope tracers to understand the processes of sorption, mercury methylation and demethylation and using ¹⁶s, hgcA sequencing to investigate associated changes of microbial community or mercury methylators (Supervisor: [Dr. Scott Brooks](#))
- University of North Carolina at Greensboro, NC.
 - Research Technician, Department of Biology. 06/2020–07/2020
 - *Role*: Maintain Ecotoxicology/biogeochemistry lab
- University of North Carolina at Greensboro, NC.
 - Research/Teaching Assistant, Department of Biology. 08/2015–05/2020
 - *Role*: 1) Teaching assistant of lectures and instructor of biology labs (5 years)- independently preparing teaching materials, lecturing lab students, grading etc. 2) Guest lecture for "Principle of Ecology" - biogeochemistry topic

HONORS

- 2022 Distinguished Achievement in Science Serving Society Award (Team Award) - ESD, ORNL
- 2018 Student Travel Award – AGU Annual Fall Meeting
- 2018 Summer Assistantship Awards – University of North Carolina at Greensboro
- 2017 Student Travel Award – ICMGP 2017
- 2017 John O'Brien Field Award – University of North Carolina at Greensboro
- 2015 Scholarship for academic performance – Jinan University
- 2014 National Scholarship
- 2014 The First Prize Scholarship for academic performance – Jinan University
- 2013 The First Prize Scholarship for academic performance – Jinan University
- 2011 National Scholarship for Encouragement

RESEARCH INTEREST

- Biogeochemical cycling (fate, transport, transformation and bioaccumulation) of environmental contaminants (i.e., mercury and organic compounds) in biosphere under climate change and underlying mechanisms
- Hydrological transport of heavy metals and nutrients in ecosystems under perturbation
- Responses of aquatic organisms to environmental stressors under dynamic environmental change
- Environmental microbiology associated with environmental biotransformation processes such as mercury methylation and demethylation

LIST OF PUBLICATIONS

- **Google Scholar:** <https://scholar.google.com/citations?user=lc2MIZ8AAAAJ&hl=en&oi=ao>.
11. Li HH, Tsui MTK, **Ku P**, Chen H, Yin Z, Dahlgren RA, Parikh S, Wei JJ, Toang T, Chow AT, Cheng Z, Zhu XM (2022). Impacts of forest fire ash on aquatic mercury cycling. *Environmental Science & Technology* 56, 11835-11844, doi:10.1021/acs.est.2c01591.
 10. Chen H, Wang JJ, **Ku P**, Tsui MTK, Abney R, Berhe AA, Zhang Q, Burton S, Dahlgren RA, Chow AT (2022). Burn Intensity Drives the Alteration of Phenolic Lignin to (Poly) Aromatic Hydrocarbons as Revealed by Pyrolysis-Gas Chromatography-Mass Spectrometry (Py-GC/MS). *Environmental Science & Technology* 56, 17, 12678-12687, doi:10.1021/acs.est.2c00426.
 9. **Ku P**, Tsui MTK, Liu S, Corson KB, Williams AS, Monteverde MR, Woerndle GE, Hershey AE, Rublee PA (2021). Examination of mercury contamination from a recent coal ash spill into the Dan River, North Carolina, United States. *Ecotoxicology and Environmental Safety* 208: 111469. doi:10.1016/j.ecoenv.2020.111469.
 8. Bao S, He C, **Ku P**, Xie M, Lin J, Lu S, Nie X (2021). Effects of triclosan on the RedoximiRs/Sirtuin/Nrf2/ARE signaling pathway in mosquitofish (*Gambusia affinis*). *Aquatic Toxicology*: 105679. doi:10.1016/j.aquatox.2020.105679.
 7. Wang C¹, **Ku P**¹, Nie X, Ou R, Wang Z, Li K (2019). Effects of simvastatin on the PXR signaling pathway and the liver histology in *Mugilogobius abei*. *Science of the Total Environment* 651: 399-409. (¹ co-first author) doi:10.1016/j.scitotenv.2018.09.133.

6. **Ku P**, Tsui MTK, Nie X, Chen H, Hoang T, Blum J, Dahlgren RA, Chow AT (2018). Origin, reactivity, and bioavailability of mercury in wildfire ash. *Environmental Science & Technology* 52: 14149-14157, doi: [10.1021/acs.est.8b03729](https://doi.org/10.1021/acs.est.8b03729). (highlighted by A.C.S. for press coverage “Wildfire ash could trap mercury”)
5. **Ku P**¹, Wang C¹, Nie X, Ou R, Li K (2018). Regulation of pregnane-X-receptor and microRNAs on detoxification-related genes expressions in *Mugilogobius abei* under the exposure to diclofenac. *Environmental Pollution* 233: 395-406. (¹ co-first author) doi:[10.1016/j.scitotenv.2018.09.133](https://doi.org/10.1016/j.scitotenv.2018.09.133).
4. Bao S, Nie X, Ou R, Wang C, **Ku P**, Li K (2017). Effects of diclofenac on the expression of Nrf2 and its downstream target genes in mosquito fish (*Gambusia affinis*). *Aquatic Toxicology* 188: 43-53. doi:[10.1016/j.aquatox.2017.04.008](https://doi.org/10.1016/j.aquatox.2017.04.008).
3. Wang L, Peng Y, Nie X, Pan B, **Ku P**, Bao S (2016). Gene response of *CYP360A*, *CYP314*, and *GST* and whole-organism changes in *Daphnia magna* exposed to ibuprofen. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology* 179: 49-56. doi:[10.1016/j.cbpc.2015.08.010](https://doi.org/10.1016/j.cbpc.2015.08.010).
2. **Ku P**, Wu X, Nie X, Ou R, Wang L, Su T, Li Y (2014). Effects of triclosan on the detoxification system in the yellow catfish (*Pelteobagrus fulvidraco*): expressions of *CYP* and *GST* genes and corresponding enzyme activity in phase I, II and antioxidant system. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology* 166: 105-114. doi:[10.1016/j.cbpc.2014.07.006](https://doi.org/10.1016/j.cbpc.2014.07.006).
1. Liu L, Li H, Chen H, Yang F, **Ku P**, Li R (2012). Preparation method of a porous foam graphene/polypyrrole composite material efficient in oil absorption. CN Patent no. CN102617853.

CONFERENCE PRESENTATIONS

13. **Ku P**, Washburn SJ, Carrell A, Ogbughalu O, Cregger M, Pouil S, Mathews TJ, Brooks SC (2022). Mercury bioavailability in contaminated freshwater sediment amended with carbon-based sorbents. ICMGP - Mercury Conference 2022. Virtual meeting (talk)
12. Tsui MTK, Blum JD, Johnson MW, Coleman JS, Kwon SY, **Ku P**, Ulus Y, Chong JH, Farmer TM, Chow AT, Amatya D, Trettin CC (2022). Mercury isotopic compositions in paired experimental forest watersheds with long-term forest management. ICMGP - Mercury Conference 2022. Virtual meeting (talk)
11. **Ku P**, Tsui MTK, Farmer T, Chen H, Amatya D, Trettin CC, Chow AT (2021). Effects of long-term forest management on mercury bioaccumulation in aquatic food webs. 21st Biennial Southern Silvicultural Research Conference. Virtual meeting. (talk)
10. **Ku P**, Tsui MTK, Boggs, J, Robinson H, Sun G, Trettin CC, Chow AT* (2020). Effects of forest thinning on stream mercury exports in North Carolina Piedmont. Soil Science Society of America Annual Meeting. Virtual Meeting. (poster)
9. **Ku P**, Tsui MTK, Webster J, Matiasek S, Robinson H, Rhew R, Chow AT* (2020). Changes of mercury concentrations in streamwater after a destructive wildfire (Camp Fire 2018) and a prescribed burning in northern California. American Chemical Society National Meeting. Virtual Meeting. (poster)
8. **Ku P**, Tsui MTK, Dahlgren RA, Chow AT (2020). Mercury in ash materials and fluvial transport of mercury in watersheds following wildfire. Goldschmidt2020. Virtual Meeting. (talk)
7. Tsui MTK, **Ku P**, Dahlgren RA, Chow AT (2019). Biogeochemical interactions of mercury with wildfire ash derived-dissolved organic matter. American Chemical Society National Meeting. Orlando, FL. (poster)
6. **Ku P**, Tsui MTK, Morales K, Ulus Y, Ersan MS, Karanfil T, Chow AT (2018). Effects of wetland salinization on mercury cycling in low-lying coastal wetlands: A microcosm experiment incubating coastal wetland soils with water of different salinities. AGU Fall Meeting. Washington, DC. (poster)
5. **Ku P**, Tsui MTK, Robinson H, Chen H, Farmer T, Corbett J, Chrisp J, Angelin M, Amatya D, Trettin C, Chow AT (2018) Effects of long-term forest management on total mercury and methylmercury in stream water and

biota. AGU Fall Meeting. Washington, DC. (poster)

4. **Ku P**, Tsui MTK, Liu S, Hershey A, Parke R, Corson K, Williams A (2017). Is there mercury contamination in Dan River (North Carolina/Virginia) due to coal ash spill in February 2014? 13th International Conference on Mercury as a Global Pollutant. Providence, Rhode Island. (poster)
3. **Ku P**, Tsui MTK, Uzun H, Karanfil T, Dahlgren RA, Chow AT (2017). Fluvial transport of mercury from two burned watersheds in northern California. 13th International Conference on Mercury as a Global Pollutant. Providence, Rhode Island. (poster)
2. **Ku P**, Tsui MTK, Nie X, Hoang T, Blum J, Dahlgren RA, Chow AT (2017). Concentration, reactivity, bioavailability and isotopic compositions of mercury in wildfire ash. 13th International Conference on Mercury as a Global Pollutant. Providence, Rhode Island. (poster)
1. **Ku P**, Wu X, Nie X, Ou R, Wang L, Su T, Li Y (2013). Effects of triclosan on the detoxification system in the yellow catfish (*Pelteobagrus fulvidraco*). Urban Environmental Pollution 2013, Asian Edition. Beijing, China. (poster)

PRESS COVERAGE (SELECTED)

- “Wildfire ash could trap mercury” [ACS link](#).
- “Wildfire ash traps mercury and keeps it in a non-reactive form” [Earth.com News link](#).
- “Wildfire ash could bind to, trap mercury” [UPI Science News link](#).
- “Wildfire ash could trap mercury” [ScienceDaily News link](#).

RESEARCH PROJECTS

• Awarded proposals

9. Sep 2019–Dec 2019. The role of food web structure in mercury bioaccumulation in aquatic food webs in a managed forested watershed. *UNCG Biology Graduate Research Support*. **Ku P**. \$300
8. Jan 2019–April 2019. Understanding mechanism of enhanced mercury bioaccumulation in managed forested watershed. *UNCG Biology Graduate Research Support*. **Ku P**. \$500
7. Sep 2018–Dec 2018. Effects of prescribed burning on mercury bioaccumulation in aquatic food webs in southeastern US. *UNCG Biology Graduate Research Support*. **Ku P**. \$498
6. Jan 2018–April 2018. Effects of prescribed burning on mercury content and reactivity in forest floor. *UNCG Biology Graduate Research Support*. **Ku P**. \$500
5. April 2017–April 2018. Examination of wildfire ash deposition and mercury bioavailability in sediment layers in wildfire-impacted watershed. *John O’Brien Field Award*. **Ku P**. \$1000
4. Sep 2017–Dec 2017. Effects of wildfire ash on mercury methylation and bioavailability to algae. *UNCG Biology Graduate Research Support*. **Ku P**. \$500
3. Jan 2017–April 2017. Investigating the removal capacity of different mercury species by wildfire ash. *UNCG Biology Graduate Research Support*. **Ku P**. \$624
2. Sep 2016–Dec 2016. Evaluation of mercury bioavailability in wildfire ash by anoxic incubation experiments. *UNCG Biology Graduate Research Support*. **Ku P**. \$500
1. Sep 2016–Dec 2016. Using sequential extraction procedure to investigate mercury speciation in wildfire ash and soil. *UNCG Biology Graduate Research Support*. **Ku P**. \$500

- **As a Key Personnel**

3. Current project. Mercury Remediation Technology Development for Lower East Fork Poplar Creek. Principal Investigator: Drs. TJ Mathews, MA Mayes, SC Brooks, LM Stevenson, C DeRolph, A Johs, and others
2. 2018–2022. USDA-NIFA: Storage, Reactivity, and Bioavailability of Mercury in Managed Forests-Balancing Mercury Toxicity and Wildfire Risks through Effective Fuel Reduction Techniques, Principal Investigator: Drs. A Chow, MTK Tsui and others
1. 2019–2024. NSF: Response of Mercury Cycling to Disturbance and Restoration of Low-gradient Forested Watersheds, Principal Investigator: Drs. J. Blum, A. Chow, MTK Tsui and others

TECHNIQUES AND SKILLS

- **Analytical chemistry** skills including total mercury and methylmercury analyses on Cold Vapor Atomic Fluorescence Spectrometry (CVAFS), Cold Vapor Atomic Absorption Spectrometry (CVAAS) Lumex RA 915+, Direct Mercury Analyzer (DMA-80), and dilution-gas chromatography-inductively coupled-mass spectrometry (ID-GC-ICP-MS); C, H, N analysis on CHN elemental analyzer; Molecular organic matter composition on Pyrolysis-Gas Chromatography- Mass Spectrometry (Py-GC-MS); Dissolved organic carbon (DOC) and total nitrogen (TN) analysis on DOC/TN analyzer; Trace element analysis on Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)
- **Molecular biology** skills including RNA/DNA extraction, PCR, Quantitative PCR (RT-qPCR), Primers design
- **Statistical or visualization software** including R programming language, ArcGIS, SPSS, Sigmaplot, Origin Lab, MS Office, Vector NTI, Primer Premier 5.0, MEGA (Molecular Evolutionary Genetics Analysis) software

FIELD WORK EXPERIENCE

- 2022, Sediment core collection in Lower East Fork Poplar Creek (a historically industrially contaminated watershed)
- 2020, Post-treatment aquatic food web sampling in Research Triangle Park paired watersheds, NC, leading and working with UNCG research group
- 2019, Groundwater and aquatic biota sampling in Santee Experimental Forest watersheds, leading and working with UNCG research group and Clemson University research group
- 2019, Konza Prairie Biological Station (KPBS) for terrestrial and aquatic food web sampling, working with UNCG research group guided by KPBS
- 2019, Pre-treatment sampling of aquatic and terrestrial food web in Research Triangle Park paired watersheds, NC, leading and working with collaborators from Clemson University and USDA Forest Service Southern Research Station
- 2018-2019, Seasonal aquatic food web sampling at Santee Experimental Forest watersheds, SC, leading and working with collaborators from Clemson University as well as researchers at USDA Forest Service Southern Research Station
- 2017, Post wildfire soil core sampling in burned forest, CA, working with UC-Davis collaborators
- 2017, Sampling sediment and water in coastal wetlands, SC, working with collaborators from Clemson University Baruch Institute of Coastal Ecology and Forest Science
- 2016, Sediment and biota sampling along Dan River after coal ash spill, NC, working with UNCG research group

TEACHING

- 2020, Guest lecturer, Principles of Ecology (BIO301), UNCG
- 2016-2020 (8 semesters), Lab instructor, Major Concepts in Biology Lab (BIO105L), UNCG
- Spring 2017, Lab instructor, Principles of Biology Lab (BIO111L), UNCG
- Spring 2017, Lecture Teaching Assistant, Principle of Biology (BIO111), UNCG

MENTORING

- 2022, Mentor in undergraduate internship funded by DOE SULI program at ORNL
- 2021, Co-Mentor in undergraduate internship funded by DOE SULI program at ORNL
- Spring 2019, Mentor in undergraduate student research (BIO499) at UNCG
- Spring 2019, Mentor of high school student intern in Science Research Internship program at the American Hebrew Academy, Greensboro, NC
- Fall 2018, Mentor in undergraduate student research (BIO499) at UNCG
- 2017, Mentor of high school student intern in Science Research Internship program at the American Hebrew Academy, Greensboro, NC
- 2016, Mentor in undergraduate student research internship at UNCG

SERVICES IN RESEARCH SOCIETIES

- Reviewer for scientific journals
 - *Environmental Ecotoxicology and Safety*
 - *Chemosphere*
 - *Environmental Science and Pollution Research*
 - *Journal of Environmental Quality*
 - *BMC Pharmacology and Toxicology*
 - *Experimental Biology and Medicine*
- Judge for student presentations in ICMGP 2022 international conference, July 2022
- Members in Research Societies
 - American Geophysical Union (AGU)
 - American Chemical Society (ACS)
 - Society of Environmental Toxicology and Chemistry (SETAC)
 - American Association of University Women Greensboro (NC) Branch (AAUW)

OUTREACH AND VOLUNTEER ACTIVITY

- 2019, Volunteer, North Carolina Science Olympiad
- 2019, Organizer for AAUW Tech Savvy Event (Trained high school student-instructors in Biomathematics session) in Greensboro, NC

- 2018, UNCG Science Everywhere – Game on Mercury (Outreach for promoting science in K9 students)
- 2018, Volunteer, AGU Fall Meeting, Washington, DC
- 2018, Student Representative to the Peabody Park Preservation Committee, UNCG
- 2018, Volunteer, North Carolina Science Olympiad
- 2018, Presenter, AAUW Tech Savvy Event for High School Girls, Greensboro, NC
- 2017, Volunteer, 13th International Conference on Mercury as a Global Pollutant, Providence, Rhode Island.