Name: Heidi L Gough, PhD, PE
Work address: University of Washington
School of Environmental and Forest Sciences
Mail Stop 352100
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Education:

Doctor of Philosophy in Environmental Engineering. "The impact of metal contamination on anaerobic freshwater sediment microbial populations: community structure and function." Northwestern University. 2004.
Master's of Science in Environmental Engineering. Northwestern University. 1998.
Bachelor of Science in Environmental Health Engineering. Northwestern University. 1993.

Employment:

Associate Professor – University of Washington, School of Environmental and Forest Sciences, Seattle, WA (2018 – present)
Associate Research Professor – University of Washington, Department of Civil and Environmental Engineering, Seattle, WA (2017 – 2018)
Assistant Research Professor – University of Washington, Department of Civil and Environmental Engineering, Seattle, WA (2011 – 2017)
Research Associate, Postdoctoral Scholar – University of Washington, Department of Civil and Environmental Engineering, Seattle, WA (2004 – 2011)
Research Assistant -Northwestern University, Department of Civil and Environmental Engineering, Evanston, IL (1997 – 2004)
Environmental Engineer – Terracon Environmental, Inc. Naperville, IL (1993 – 1997)

Professional Recognition (Societies, honors and awards):

Past-Chair, Women Water Nexus Technical Committee, Environmental and Water Resources Institute, American Society of Civil Engineering
Member, Publication Committee, Association of Environmental Engineering and Science Professors.
Excellence in Global Engagement, Nominee 2023, University of Washington
Outstanding Teaching Award, 2016, University of Washington
Dissertation Fellowship, 2004, American Association of University Women
Student Travel Grant Awardee, 2003, American Society for Microbiology.
Associated Western Universities Fellowship, 1999, Pacific Northwest National Laboratories
Murphy Fellowship, 1997, Northwestern University

Graduate students and post-doctorates supervised:

Indrajit Chakraborty, post doc 2022-2023. University of Washington
Abigail Kargol. MS 2021. University of Washington. Title: Biodegradation of Trace-level Organic Contaminants by Rhizosphere Microbial Communities.
Yash Chaudhary. MS 2019. University of Washington. Title: Influence of Combined Heat and Lime on Biosolids Stabilization.

Jennifer Kersh. MS 2018. University of Washington. Title: Impact of Boat Waste on Wastewater Treatment Plants.

Nicolette Zhou. PhD 2015. University of Washington. Title: Bioaugmentation for treatment of Trace-Level Contaminants in Wastewater Treatment. Awards: CH2M/AEESP Outstanding Doctoral Dissertation Award – Honorable Mention; Valle Scholar.

I-Chieh Chien. PhD 2013. University of Washington. Title. The study of viruses of *Methanosaeta*, a key acetoclastic methanogen for di-gestion process stability.

Selected publications:

Gough, H.L. A.K. Kargol, D.A.C. Beck, B.G. Therrien, B.M. Dahal, M.D. Marsolek, (in revision) Microbial community structures in family anaerobic digesters compared to a regional municipal digester reveal potentially differing community functional capacity. Environmental Engineering Science.

Kargol, A., S. Burrell, I. Chakraborty and H.L. Gough (in revision) Synthetic wastewater feed from commercial dog food. PLOS Water.

El-Husseini, H., A.N. Chowyuk R.R. Gustafson; H.L. Gough; R. Bura (in revision) Reduced Biomass Costs and Lower Stormwater Pollution Loadings Achieved by Roadside Vegetated Filter Strips. Journal of Environmental Management.

Kargol, A., C. Cao, C.A. James, and H.L. Gough. (2022) Wastewater reuse for tree irrigation: influence on rhizosphere microbial communities. Resources, Environment, and Sustainability, 9:100063. doi.org/10.1016/j.resenv.2022.100063

Waldo, N.B., L. Chistoserdova, D. Hu, H.L. Gough, R.B. Neumann* (2022) Impacts of the wetland sedge Carex aquatilis on microbial community and methane metabolisms. Plants and Soil, 471(1):491-506. doi: 10.1007/s11104-021-05238-7

Chowyuk, A.N., H. El-Husseini, R.R. Gustafson*, N. Parker, R. Bura, H.L. Gough (2021) Economics of growing poplar for the dual purpose of biorefinery feedstock and wastewater treatment. Biomass and Bioenergy. 153:106213. doi:10.1016/j.biombioe.2021.106213

Chaudhary, Y.K., Gough, H.L. (2021) Combining lime and heat treatments for biosolids stabiliza-tion. Journal of Environmental Management. 282:111900. doi: 10.1016/j.jenvman.2020.111900

Tobin, T., Gustafson, R., Bura, R. and Gough, H.L. (2020) Integrated wastewater treatment for lignocellulosic biorefineries. Biotechnology for Biofuels. 13(1):24.

Kersh, J., James, C.A., Gough, H.L. (2020). Impacts of high strength boat waste on activated sludge processes. Journal of Environmental Engineering. 146(5): 04020023. doi: 10.1061/(ASCE)EE.1943-7870.0001679

Martinkosky, L. J. Barkley, G. Sabadell, H.L. Gough, and S.K. Davidson (2017) Earthworms (*Eisenia fetida*) demonstrate potential for use in soil bioremediation by increasing the degradation rates of heavy crude oil hydrocarbons. Science of the Total Environment. 540: 734-743.

Zhou, N.A. and H.L. Gough. (2016) Enhanced Biological Trace Organic Contaminant Removal (EBTCR): a lab scale demonstration with bisphenol A-degrading bacteria *Sphingobium* sp. BiD32. Environmental Science and Technology. 50(15): 8057-8066. doi: 10.1021/acs.est.6b00727

Gough, H.L., and D.A. Stahl (2011) Microbial community structures in anoxic freshwater lake sediments along a metal contamination gradient. ISME Journal 5(3):543-558.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Yen-Chu Weng

eRA COMMONS USER NAME (credential, e.g., agency login): yweng

POSITION TITLE: Lecturer in Program on the Environment

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
National Taiwan University	BS	06/2003	Geography
University of Wisconsin-Madison	MS	09/2005	Geography
University of Wisconsin-Madison	PhD	12/2011	Geography, Landscape Architecture
University of Washington	Postdoctoral	06/2015	Environmental Studies

A. Personal Statement

As a geographer, I have always been interested in exploring the connections between human societies and the environment. I received broad trainings in both the biophysical sciences and the social sciences and integrated quantitative, qualitative, and GIS methods into my research. My thesis analyzed the spatio-temporal changes of urban landscape patterns in response to urbanization, with a focus on green space conservation and landscape ecology. In my doctoral research, I explored different perspectives on ecological restoration from the standpoints of scientists, professional practitioners, and volunteers. Based on case studies from Wisconsin and Michigan, I cross-examined the meanings of science, nature, and public participation embedded in restoration ideologies and practices.

Currently as a lecturer in the Program on the Environment at the University of Washington (UW), my primary role is undergraduate education, through which I experiment with innovative teaching strategies. My current research projects include comparing student learning outcomes between in-person and online formats of the same course, methods for cross-cultural learning experience through virtual collaboration, and case study pedagogy. I am an active member of the UW Center for Teaching and Learning. Externally, I am involved in the National Socio-Environmental Synthesis Center's program on "Teaching Socio-Environmental Synthesis with Case Studies." I frequently present my work at conferences by associations such as the American Association of Geographers, Association for Environmental Studies and Sciences, and North American Association for Environmental Education.

At the UW, I am also a core faculty member of the Taiwan Studies Program. I lead a summer study abroad program to Taiwan with the theme on exploring environmental and social resilience. In the course "Environmental Issues in East Asia", we survey contemporary environmental issues in China, Japan, South Korea, and Taiwan through a comparative lens. Every Winter Quarter, I organized a lecture series focusing on Contemporary Environmental Issues in East Asia. In addition to teaching and research, I advise students on Capstone projects, including topics about environmental education, greenway infrastructure, sustainability design, community outreach, clean-up site prioritization and many others.

B. Positions, Scientific Appointments, and Honors

2015 – Present	**Lecturer**, Program on the Environment, University of Washington Affiliations: Center for Environmental Politics, School of Marine and Environmental Affairs, the Henry M. Jackson School of International Studies
2018 – 2020	**Coach**, Evidence-Based Teaching Program, UW Center for Teaching and Learning
2019	**Program Director**, UW Study Abroad Program, Taiwan: Exploring Environmental and Social Resilience
2018	**Distinguished Teaching Award Nominee**, University of Washington
2013 – 2015	**Postdoctoral Teaching Fellow**, Program on the Environment, University of Washington

Grants and Awards

2020, 2021	UW Global Innovation Fund: Teaching and Curriculum Awards ($2,000)
2018, 2019	UW Taiwan Studies Course Development Grant ($2,00; $1,000)
2018	UW Global Innovation Fund ($10,000)
2018	UW College of the Environment Cross Unit Teaching Incentive Fund ($3,420)
2018	Nominee, Distinguished Teaching Award, University of Washington
2017	UW Video Captioning Service Grant, UW DO-IT Accessible Technology Services
2016	Technology Teaching Fellow, University of Washington ($2,000)
2015	Winner of Commendation for Exemplary S-E Synthesis Case Study. National Socio-Environmental Synthesis Center Case Study Collection ($1,250)
2009 – 2011	Study Abroad Scholarship, Ministry of Education, Taiwan ($32,000)
2009	Whitbeck Graduate Dissertator Award, University of Wisconsin-Madison ($6,000)
2009	Clarence W. Olmstead Award for Outstanding Teaching Assistant, University of Wisconsin-Madison
2008 – 2010	NSF Doctoral Dissertation Research Improvement Award (DDRI # 0802627) ($11,982)

C. Contributions to Science

1. I pioneered a research framework that analyzes landscape patterns through spatial and temporal gradients.

Traditional studies of landscape patterns either used spatial gradients (urban-to-rural) or temporal scales (longitudinal research) to measure landscape change. My research combined both gradients to analyze landscape change both spatially and temporally. This research involved land-use classification based on aerial photographs with ERDAS IMAGINE, landscape metric analysis (both composition and configuration) with FRAGSTATS, and landscape change analysis with ArcGIS.

Combining methods and theories in landscape ecology and regional planning, this research identified key landscape metrics for signaturing different stages of urban development: the urban core, suburban, and rural areas. My seminal paper published in 2007 has provided the standard research framework for detecting landscape change in response to urbanization in other fast-growing metropolitan areas.

a. Weng, Y.-C. (2007) “Spatiotemporal Changes of Landscape Pattern in Response to Urbanization”, *Landscape and Urban Planning*. **81** (4): 341-353.

b. Weng, Y.-C. (2005) *Spatiotemporal Changes of Landscape Pattern in Response to the Process of Urbanization: A Case Study of the Madison Area, Wisconsin, USA*, Master Thesis, University of Wisconsin-Madison

2. I promoted the critically engagement between Political Ecology, Science Studies, and the study of Public Participation by examining the diverging perspectives on ecological restoration through institutional comparison.

Environmental volunteering has long been portrayed as a win-win partnership between the public and environmental organizations for promoting mutual benefits. My research unveiled the hidden politics of participation by addressing the institutional hierarchy, perceptions of nature and science, and the power dynamics between volunteers, professional practitioners, and scientists. In this research, I applied mixed methods, involving participant participation, interviews, focus group discussion, surveys, publication analysis, and vegetation survey to interrogate the meanings of ecological restoration to different stakeholder groups. My research identified gaps in understanding and opportunities for collaboration.

My 2015 paper is a critical addition to the literature in first world urban political ecology and has been cited for studies in the fields of ecological restoration, invasion ecology, citizen science, sustainability, and resource management.

a. Weng, Y.-C. (2015) "Contrasting Visions of Science in Ecological Restoration: Expert-lay Dynamics between Professional Practitioners and Volunteers", Geoforum. 65: 134-145.

b. Weng, Y.-C. (2005) *The Dynamics of Public Participation in Ecological Restoration: Professional Practitioners, Volunteers, and Institutional Differences*, PhD Dissertation, University of Wisconsin-Madison

3. I contributed to the use of case studies in teaching complex socio-environmental synthesis. I authored several open-source curricular materials shared for educators in the fields in environmental sciences and studies.

Since 2014, I have collaborated with both UW faculty and external partners through the National Socio-Environmental Synthesis Center's (SESYNC) program on "Teaching Socio-Environmental Synthesis with Case Studies". I co-authored a case study based on the "geoduck aquacultural controversy" in the Puget Sound region. In this case study, students are guided to analyze the different stakeholder perspectives involved through a system thinking approach. The case study background, class materials, assignments, and assessments are all available on the SESYNC's website.

In addition, I also collaborated with QUBES (Quantitative Undergraduate Biology Education and Synthesis) on using case studies to teach data analysis and research methods. My involvement in these open-source educational projects demonstrates my commitment to innovative teaching and student success.

a. Weng, Y.-C. (2018) "Visualizing Global CO2 Emissions", Investigating socio-environmental issues with data, QUBES Teaching Resource. https://qubeshub.org/qubesresources/publications/521/1

b. Weng, Y.-C. (2018) "Globally endangered sea turtles of the Palmyra Atoll National Wildlife Refuge: A Focus on Scientific Analysis", Investigating socio-environmental issues with data, QUBES Teaching Resource. https://qubeshub.org/qubesresources/publications/421/1

c. Weng, Y.-C., J. Delgado-Acevedo, and T. Roth (2018) "Investigating Socio-environmental Issues with Data: A Case Study Approach – Roundtable Discussion", North American Association for Environmental Education Annual Conference, October 9-13, Spokane, Washington.

d. Weng, Y.-C. (2018) "Case Study Pedagogy: Practicing Analytical Skills with Environmental Cases", North American Association for Environmental Education Annual Conference, October 9-13, Spokane, Washington.

e. Weng, Y.-C. (2016) "Teaching Systems Thinking Framework with Environmental Case Studies", UW Center for Teaching and Learning Symposium, April 19, Seattle, Washington. (Poster)

f. Deaton, M. L., C. A. Wei, C. A., and Y.-C. Weng (2016) "Concept Mapping: A Technique for Teaching about Systems and Complex Problems." National Socio-Environmental Synthesis Center (SESYNC) Case Study Teaching Resources. https://www.sesync.org/concept-mapping-a-technique-for-teaching-about-systems-and-complex-problems

g. Mulvaney, K., S. Pulver, C. Ryan, and Y.-C. Weng (2015) “Using systems maps to analyze complex social-environmental issues: A case study of geoduck aquaculture in the Puget Sound”, Association for Environmental Studies and Sciences Conference, June 24-25, San Diego, California.

h. Mulvaney, K., S. Pulver, C. Ryan, and Y.-C. Weng (2014) “Using systems maps to analyze complex social-environmental issues: A case study of geoduck aquaculture in the Puget Sound.” National Socio-Environmental Synthesis Center (SESYNC) Case Study Collection. Winner of Commendation for Exemplary S-E Synthesis Case Study. https://www.sesync.org/using-system-maps-to-analyze-complex-social-environmental-issues-a-case-study-of-geoduck-aquaculture

For a full list of publication and academic experience, please see my CV:
https://washington.academia.edu/YenChuWeng/CurriculumVitae