Woi Sok [UI SEOK] Oh

High Meadows Environmental Institute
Department of Ecology & Evolutionary Biology
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Research Interests

- Mathematical and agent-based modeling of coupled systems (e.g., coupled natural-human systems, socio-ecological systems, supply chain, etc.)
- Network analysis of complex systems
- Understanding human migration and displacement driven by natural disasters, climate change, or conflicts
- Trade-offs between multiple objectives and policy dilemmas from a management perspective

Academic Appointments

Princeton Univ. **Postdoctoral Research Associate** with Simon A. Levin, High Meadows Environmental Institute and Department of Ecology & Evolutionary Biology — 2021–*present*

Education

Univ. of Florida **Ph.D.**, Agricultural and Biological Engineering — 2017–2021

Dissertation: Navigating Complexity and Multi-dimensionality of the Coupled Natural-Human Systems (Chair: Rachata Muneepeerakul)

Purdue Univ. Pursued MS degree in Lyles School of Civil Engineering — 2015–2017

Transferred to *University of Florida*

Yonsei Univ. **B.S.**, Civil and Environmental Engineering (Military service in 2012–2014) — 2009–2015

Research Experience

Princeton Univ. **Earth Resilience and Sustainability Initiative** (2020–*present*); Postdoctoral Research Associate

Worked on the topic of resilience, adaptation, and risk, focusing on human mobility and urban sustainability. Built collaborative and interdisciplinary research with experts at High Meadows Environmental Institute (HMEI), Stockholm Resilience Center (SRC), and Potsdam Institute for Climate Impact Research (PIK).

AI for Good Simulator

COVID-19 Modeling (2020–2021); Volunteer modeler

Developed an agent-based model of COVID-19 diffusion and mitigation establishments in the Moria refugee camp, Greece (with Shyaam Ramkumar)

Univ. of Florida

ARO-MURI Program (2019–2021); Graduate Assistant

Worked as a **complex system modeler** for the Multidisciplinary University Research Initiative (MURI) project funded by Army Research Office (ARO) entitled "Towards a Multi-Scale Theory on Coupled Human Mobility and Environmental Change"; PI: Rachata Muneepeerakul.

Biocomplexity Lab (2017–2021); Pathfinder Fellow

Worked for the individual research related to modeling and analyzing coupled nature-human systems under Rachata Muneepeerakul.

Gained knowledge in using varying statistical tools such as global sensitivity and uncertainty analysis, and analytical methods such as convergent cross-mapping, and Monte-Carlo filtering.

Purdue Univ.

Individual Research (2017); Graduate Research Assistant

Worked on establishing theories in socio-hydrological systems with David J. Yu.

NSF Pre-research project (2016); Graduate Research Assistant

Researched and reviewed the literature for the NSF (National Science Foundation) pre-submission project named "Sustainable Adequacy Planning in the Residential Building Stock under Deep Uncertainty" led by David J. Yu, Roshanak Nateghi, and Harsha Honnappa.

Combined participatory sensing—considering a human as a sensor which collects data from what people experience by mobile devices—with demand and consumption of energy

Yonsei Univ.

Undergraduate Engineering Research (2012); Senior Undergraduate Student

Presented in the College of Engineering exhibition with Civil Engineering undergraduate students for the research entitled "An Eco-Friendly System of Eliminating Carbon Dioxide Using *Nitrosomonas Europaea* in Concrete Factories."

Cultivated *Nitrosomonas Europaea* for experiments involving carbon fixation to remove carbon dioxide

Honors, Fellowships, & Awards

Univ. of Florida

McNair-Bostick Scholarship, Department of Agricultural and Biological Engineering — 2021

Honorarium, ADBI-Purdue University-University of Tokyo Virtual Workshop on Resilience of Cities to External Shocks: Analysis, Modeling, and Economic Impacts — 2020

Virtual Student Travel Grant, 2020 American Geophysical Union (AGU) Fall Meeting — 2020

2nd Winner, ABE Poster Symposium, Department of Agricultural and Biological Engineering — 2020

KSEA-KUSCO Graduate Scholarship, Korean Scientists and Engineers Association (KSEA) & Korea-U.S. Science Cooperation Center (KUSCO) — 2020

KSEA-GFC Scholarship, Korean Scientists and Engineers Association (KSEA) Gainesville Chapter — 2020

Grinter Fellowship, Department of Agricultural and Biological Engineering — 2017

Pathfinder Fellowship, Department of Agricultural and Biological Engineering — 2017–2021

Yonsei Univ. **Dean's List**, Civil and Environmental Engineering — 2011

Publications

Peer-reviewed Journal Publications

Oh W, Carmona-Cabrero A, Munoz-Carpena R, & Muneepeerakul R (2022) On the interplay among multiple factors in an agent-based model: effects of factor configuration in a proof-of-concept migration model. *Journal of Artificial Societies and Social Simulation*. 25 (2) 7

Oh W, Yu DJ & Muneepeerakul R (2021) Efficiency-fairness trade-offs in evacuation management of urban floods: The effects of the shelter capacity and zone prioritization. *PLoS ONE*. 16 (6)

Yu DJ, Chang H, Davis T, Hillis V, Marston L, **Oh W**, Sivapalan M, Waring TM (2020). Socio-hydrology: Insights into the Interplay of Engineering Design and Self-organization in a Multi-level World. *Ecology and Society*. 25 (4)

Oh W, & Muneepeerakul R (2019). How do substitutability and effort asymmetry change resource management in coupled natural-human systems?. *Palgrave Communications*

Dissertation

Oh W (2021). Navigating complexity and multi-dimensionality of the coupled natural-human systems.

Conference Presentations

** indicates that the presenter of the work was another person.*

Invited Talks

Oh W (2022) Climate and conflict on internal displacement: network analysis of Somali case. Colloquium on the Biology of Populations Seminar Series, Princeton University

Oh W (2021) Modeling decision-making processes in human mobility problems: When and where?. Weber Lab Seminar, Princeton University

Oh W (2021) How do substitutability and effort asymmetry change resource management in coupled natural-human systems?., Levin Lab Tea, Princeton University

Oh W, Yu DJ, Muneepeerakul R (2020) Policy dilemma between efficiency and fairness in urban flood evacuation: incorporating structural and nonstructural features in a conceptual agent-based model. In ADBI-Purdue University-University of Tokyo Virtual Workshop on Resilience of Cities to External Shocks: Analysis, Modeling, and Economic Impacts (Virtual due to COVID-19).

Oral Presentations

Oh W, Muneepeerakul R, Rubenstein D, Homayounfar M, & Levin SA (2022). Water and conflict on internal displacement: network analysis of Somali case. In EGU Fall Meeting Abstracts.

Munoz-Carpena R*, Carmona-Cabrero A, **Oh W**, & Muneepeerakul R (2019). Disentangling drivers of emergent behaviour from agent-based models: application to a "toy" model of environmentally driven human migration. In AGU Fall Meeting 2019.

Oh W, Yu DJ, Davis T, Hillis V, & Waring TM (2017). Towards generalizing co-evolutionary dynamics of socio-hydrology: Theoretical frameworks of cultural evolution and robustness-fragility trade-off. In AGU Fall Meeting Abstracts.

Poster Presentation

Oh W, Carmona-Cabrero A, Munoz-Carpena R, & Muneepeerakul R (2021). On the interplay among multiple factors in an agent-based model: Effects of factor configuration in a proof-of-concept migration model. In AGU Fall Meeting 2021.

Oh W (2021). Local culture versus hurricane evacuation policies in Galveston, Texas: Are the policies really effective? In AGU Fall Meeting 2021.

Oh W, Carmona-Cabrero A, Munoz-Carpena R, & Muneepeerakul R (2020). It Matters "How", Not Just What, Factors Are Included: a Case Study of a Migration Agent-Based Model. In AGU Fall Meeting 2020.

Munoz-Carpena R*, Carmona-Cabrero A, **Oh W**, Muneepeerakul R (2020) Disentangling Drivers of Emergent Behavior from Agent Based Models: Application to a Proof-of-Concept Model of Environmentally Driven Human Migration. In AGU Fall Meeting 2020.

Griffith D*, Muneepeerakul R, **Oh W**, Suarez G, & Guerry G (2020) Internal Displacement, International Migration, and Environmental Change. In AGU Fall Meeting 2020.

Oh W, Muneepeerakul R, Munoz-Carpena R, & Carmona-Cabrero A (2020). Effects of combing social and hydrological factors in water scarcity-induced migrations: application to a "toy" agent-based model. In the University of Florida (UF) Water Institute Symposium

Oh W, Muneepeerakul R, Munoz-Carpena R, & Carmona-Cabrero A (2019). Exploring effects of factor configurations in a "toy" migration agent-based model. In AGU Fall Meeting 2019.

Carmona-Cabrero A*, Munoz-Carpena R, **Oh W**, Schon J, Muneepeerakul R., & Johnson JC (2019). Detecting important network drivers with global sensitivity analysis: application to refugee flows. In AGU Fall Meeting 2019.

Oh W, & Muneepeerakul R. (2018). Effects of substitutability and asymmetry on natural resource management with centralized governance structure. In AGU Fall Meeting Abstracts.

Oh W, & Muneepeerakul R. (2018). On managing multiple natural resources through centralized governance structure. In ASABE Annual International Meeting Abstracts.

Sung K*, Yu DJ, **Oh W**, & Sangwan N (2016). Land Sea Level Difference Impacts on Socio-Hydrological System. In AGU Fall Meeting Abstracts.

Teaching Experience

Univ. of Florida **ABE 6649C Advanced Biosystems Modeling** (2021); Teaching Assistant

ABE 5648/4641 Modeling Coupled Natural-Human Systems (2020); Teaching Assistant

ABE 6933 Agent-Based Modeling for Biological Systems (2020); Course Designer

ABE 6933 Stochastic Modeling in Ecology and Hydrology (2018); Teaching Assistant

Purdue Univ. **CE 522 Computer Applications in Construction** (2016); Grader

Activities

Princeton Univ. **KSEA New Jersey Chapter** (2022–*present*); Outreach Director

Frontier in Climate (2022–*present*); Review Editor in Climate Mobility topic

AGU Global Environmental Change (GEC) Roster of Leadership (2022–*present*); Outstanding Student Presentation Award (OSPA) committee

AAAS Annual Meeting 2022 (2022); Poster Judge

Univ. of Florida **UF Journal of Undergraduate Research** (2021); Volunteer Reviewer

Reviewed undergraduate papers in the field.

UF Water Institute Symposium (2020); Organizing Member

Organized a special panel and networking events at the symposium.

Helped students interact more with people from industries and research institutions.

KSEA-GFC (2018–2021); Student Council Member

Organized and participated in several KSEA-GFC events.

UF Korean Student Association (2018–2020); Student Council Member

Organized and participated in several events as a representative of the Koreans in the UF Agricultural and Biological Engineering (ABE) department.

Junior Preview in the College of Engineering (2018); Graduate Mentor

Interacted with prospective visiting students of Agricultural and Biological Engineering.

Discussed what I do in our lab and the advantages of being a graduate student in the UF ABE.

Mentor-mentee program in UF ABE (2017–2019); Mentor and Mentee

Interacted with my mentee in my first Ph.D. year and helped a new international graduate student to easily adapt to UF and ABE department in the second year.

Purdue Univ. **Purdue University Korean Civil Engineering Student Association** (2016–2017); Vice President

Helped Korean undergraduate and graduate students in Civil Engineering at Purdue University.

Yonsei Univ. **Korean Society of Civil Engineering** (2012); Student Council Officer

Participated in monthly meetings as a representative of Yonsei University.

Actively planned student activities of KSCE events (e.g., student competitions in KSCE conferences).

Professional Associations

European Geophysical Union (EGU)	2022–*present*
American Association for the Advancement of Science (AAAS)	2021–*present*
American Geophysical Union (AGU)	2016–*present*
Korean Scientists and Engineers Association (KSEA)	2017–*present*
American Society of Agricultural and Biological Engineering (ASABE)	2017–2018

Skills

Programming languages	Python, Java, MatLab
Modeling software	NetLogo
Statistical analysis software	R, SimLab
Geographical software	ArcGIS, Google Earth Engine
High-Performance Computing (HPC)	
Modeling Methods	Dynamical system modeling, network-based modeling, and agent-based modeling
Analysis Methods	Stability analysis, Network analysis, Convergent cross-mapping, Global sensitivity and uncertainty analysis, Monte-Carlo Filtering

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