

# Xander Huggins

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## Education

<b>PhD – University of Victoria, Canada</b>	<b>2019-present</b>
Department of Civil Engineering Fast-track entry from MASc in 05/2020 Coursework average: 97%, including courses in: Advanced Physical Hydrogeology (Grant Ferguson) Process-based Hydrological Modeling (Martin Clark) Sustainability in Theory and Practice (Helen Baulch, MJ Barrett)	
<b>Dissertation: <i>Sustainability and data sciences in groundwater-connected systems</i></b> Tentative defence date: 05/2024	
<b>BEng – University of Guelph, Canada</b>	<b>2013-2018</b>
Degree in Water Resources Engineering with Distinction, Co-operative stream	

## Professional experience

<b>Stockholm Resilience Centre, Stockholm, Sweden</b>	<b>2023</b>
Visiting PhD researcher hosted by Juan Rocha and Lan Wang-Erlandsson	
<b>International Institute for Applied Systems Analysis (IIASA), Vienna, Austria</b>	<b>2022-present</b>
Young Scientist Summer Program Fellowship – Water Security Group (2022) Guest Research Scholar; Water Security Research Group (2022-present)	
<b>Global Institute for Water Security, Saskatoon, Canada</b>	<b>2020-present</b>
Graduate student member	
<b>City of Hamilton, Hamilton, Canada</b>	<b>2017</b>
Groundwater Technician Intern (undergraduate co-op placement)	
<b>City of Ottawa, Ottawa, Canada</b>	<b>2016</b>
Water Resources Engineering Intern (undergraduate co-op placement)	
<b>G360 Groundwater Research Institute, University of Guelph, Guelph, Canada</b>	<b>2015</b>
Undergraduate student research assistant (undergraduate co-op placement)	

## Publications

10. **Huggins, X.**, Gleeson, T., Villholth, K.G., Rocha, J.C., Famiglietti, J.S. Global groundwater archetypes: a new typology of groundwater interactions with social and ecological systems and an outlook for sustainable development. *In review at Water Resources Research*. Preprint on EarthArXiv: <https://doi.org/10.31223/X5M382>
9. Rohde, M.M., Albano, C.M., **Huggins, X.**, et al. Mapping groundwater dependent ecosystems globally exposes the fragility of vulnerable ecosystems and communities. *In review at Nature*.
8. Xu, L., Ferris, D., **Huggins, X.**, Wong, J.S., Mohan, C., Sadri, S., Chandanpurkar, H.A., Sanyal, P., Famiglietti, J.S. From coarse resolution to practical solution: GRACE as a science

communication and policymaking tool for sustainable groundwater management. *Journal of Hydrology* 623, 129845.

7. **Huggins, X.** Gleeson, T., Castilla-Rho, J.C., Holley, C., Re, V., Famiglietti, J.S. (In Press). Groundwater connections and sustainability in social-ecological systems. *Groundwater*.
6. Curran, D., Gleeson, T., **Huggins, X.** (In Press). Applying a science-forward approach to groundwater regulatory design. *Hydrogeology Journal*.
5. **Huggins, X.**, Gleeson, T., Serrano, D., Zipper, S., Jehn, F., Rohde, M.M., Abell, R., Vigerstol, R., Hartmann, A. (In Press). Overlooked risks and opportunities in groundwatersheds of the world's protected areas. *Nature Sustainability*.
4. Mohan, C., et al. [including **Huggins, X.**] (2022) Poor correlation between large-scale environmental flow violations and freshwater biodiversity: implications for water resource management and the water planetary boundary. *Hydrology and Earth Systems Sciences*. 26, 6247–6262.
3. **Huggins, X.**, Gleeson, T., Kummu, M., Zipper, S.C., Troy, T.J., Wada, Y., Famiglietti, J. (2022). Hotspots for social and ecological impacts from freshwater stress and storage loss. *Nature Communications* **13**, 439.
2. Diggle, R., Tait, D., Maher, D., **Huggins, X.**, Santos, I. (2019). The role of porewater exchange as a driver of CO<sub>2</sub> flux to the atmosphere in a temperate estuary (Squamish, Canada). *Environmental Earth Sciences* 78, 1–13.
1. **Huggins, X.** Gleeson, T., Eckstrand, H., Kerr, B. (2018). Streamflow Depletion Modeling: Methods for an Adaptable and Conjunctive Water Management Decision Support Tool. *Journal of the American Water Resources Association* 54, 1–15.

## Manuscripts in preparation

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1. **Huggins, X.**, Gleeson, T., Froese, T. *In preparation*. Embedding equity across an undergraduate civil engineering curriculum through environmental justice, sustainability science, and anti-racism modules and program-wide organization.
2. **Huggins, X.**, Gleeson, T., & J.S. Famiglietti. DIGITS: A curated, interdisciplinary database for global analysis of groundwater as a social-ecological system.
3. Jaramillo, F., et al. (including **Huggins, X.**). Hydrogeodesy for addressing key hydrological questions and water resource sustainability.

## Chapters and reports

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1. Gleeson, T., **Huggins, X.**, Connor, R., Arrojo-Agudo, P., Vázquez Suárez, E. (2022). Groundwater and Ecosystems, Chapter 6 of *UNESCO Water Development Report 2022: "Groundwater: Making the invisible visible"*.
2. **Huggins, X.** (2022). Global archetypes of groundwater interactions in social-ecological systems. IIASA Young Scientist Summer Program Fellowship Report.

## Awards (all values in CAD)

<b>Mikhalevich Award</b> (~\$8,000)	<b>2023</b>
International Institute for Applied Systems Analysis	
<b>President's Research Scholarship</b> (\$5,000 per year awarded)	<b>2021, 2022, 2023</b>
University of Victoria	
<b>Young Scientists Summer Program Fellowship</b> (N/A)	<b>2022</b>
International Institute for Applied Systems Analysis	
<b>Alexander Graham Bell Doctoral Scholarship - Doctoral</b> (\$105,000)	<b>2021</b>
Natural Sciences and Engineering Research Council of Canada	
<b>Fall Meeting Outstanding Student Presentation Award</b> (\$250)	<b>2019</b>
American Geophysical Union	
<b>Alexander Graham Bell Canada Graduate Scholarship – Masters</b> (\$17,500)	<b>2018</b>
Natural Sciences and Engineering Research Council of Canada	
<b>Professor Ross W. Irwin scholarship in Water Resources</b> (\$1,000)	<b>2018</b>
University of Guelph	
<b>Raymond Theodore Guther Memorial Scholarship</b> (\$2,000)	<b>2018</b>
University of Guelph	
<b>Undergraduate Student Research Award</b> (\$6,000)	<b>2015</b>
Natural Sciences and Engineering Research Council of Canada	

## Conference presentations

<b>Huggins, X.,</b> Gleeson, T., Villholth, K.G., Rocha, J.C., Famiglietti, J.S. Global groundwater system archetypes: a data-driven typology of social, ecological, and Earth system interactions with groundwater at the global scale. <i>6<sup>th</sup> International Research Workshop on Archetypes in Sustainability Research</i> . Lund, Sweden. (Oral)	<b>2023</b>
<b>Huggins, X.,</b> Gleeson, T., Villholth, K.G., Rocha, J.C. Famiglietti, J.S. Global groundwater archetypes: a new typology of groundwater interactions with social and ecological systems and an outlook for sustainable development. <i>EGU General Assembly</i> . Vienna, Austria. (Highlighted oral)	<b>2023</b>
<b>Huggins, X.,</b> Gleeson, T., Serrano, D., Zipper, S., Jehn, F., Rohde, M.M., Abell, R., Vigerstol, R., Hartmann, A. Overlooked risks and opportunities for global protected areas revealed by mapping groundwatersheds. <i>World Water Week</i> . Stockholm, Sweden. (Solicited oral)	<b>2022</b>
<b>Huggins, X.,</b> Gleeson, T., Kumm, M., Zipper, S.C., Troy, T.J., Wada, Y., Famiglietti, J.S. Vulnerable basins for global prioritisation: Hotspots for social and ecological impacts from freshwater stress and freshwater storage loss. <i>EGU General Assembly</i> . Vienna, Austria. (Invited oral)	<b>2022</b>
<b>Huggins, X.</b> Gleeson, T., Castilla-Rho, J.C., Holley, C., Re, V., Famiglietti, J.S. (2022). Groundwater in complex adaptive social-ecological systems. Canadian Water Resources Association National Conference. Canmore, Canada. (In-absentia poster).	<b>2022</b>
<b>Huggins, X.,</b> Gleeson, T., Famiglietti, J. (2021). An open-access interdisciplinary database to facilitate data science on cross-cutting global groundwater sustainability challenges. Delft International Conference on Sociohydrology. (Oral, online). Delft, the Netherlands	<b>2021</b>
Gleeson, T., <b>Huggins, X.,</b> & T. Froese. Teaching human- and sustainability-centered design: A civil engineering design spine supported by sustainability muscles and a heart	<b>2021</b>

of anti-racism, equity, diversity, and inclusion. (*Pre-recorded oral*). Let's Talk About Teaching.

**Huggins, X.**, Gleeson, T., Kummu, M., Zipper, S.C., Troy, T.J., Wada, Y., Famiglietti, J. (2020). **2020**  
Sustainability hotspots of changing global freshwater availability. Invited lighting talk at  
the American Geophysical Union Fall Meeting. (*Invited oral, online*). San Francisco, USA.

**Huggins, X.**, Gleeson, T., Zipper, S.C., Troy, T.J., Wada, Y., Famiglietti, J.S. Human **2019**  
dimensions of changing global freshwater availability. *AGU Fall Annual Meeting*. San  
Francisco, CA. (*Oral*) [Awarded outstanding student presentation award](#).

**Huggins, X.**, Gleeson, T., Eckstrand, H., Kerr, B. Streamflow depletion modeling: Methods **2018**  
for an adaptable and conjunctive water management decision support tool. *Canadian*  
*Water Resources Association Annual Conference*. Victoria, Canada (*Oral*)

## Invited talks

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**Graduate Hydrogeology Course, Arizona State University, Tempe, USA** **2023**  
Talk title: Groundwater sustainability in social-ecological systems: putting relationships  
and system interactions at the center of the discourse

**Global Groundwater Group, The Nature Conservancy** (*online*). **2022**  
Talk title: Overlooked risks and opportunities for global protected areas revealed by  
mapping groundwatersheds.

**Water and Development Research Group, Aalto University, Espoo, Finland** **2022**  
Talk title: Groundwater connected systems: A new approach for groundwater science  
and sustainability in social-ecological systems

**Water Security Research Group, IIASA, Vienna, Austria and online** **2022**  
Talk title: Groundwater-connected systems as complex adaptive social ecological systems

**Annual Water Research Roundup, POLIS Water Sustainability Project, Victoria, Canada** **2022**  
Talk title: The global vulnerability of humans and ecosystems to insufficient freshwater  
availability

## Abilities/Skills

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Programming Languages (by proficiency): R, Python, Shell/Bash

Software proficiency: Affinity Designer, ArcGIS, QGIS, Inkscape

Reviewer for scientific journals: *Groundwater, Ecology and Society,*  
*Geophysical Research Letters,*  
*Water Resources Research*

Languages: English (*native*), French (*intermediate*)

## Teaching

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**Curriculum development**, Department of Civil Engineering, University of Victoria.

A funded initiative to integrate core sustainability science and environmental justice theory across the undergraduate Civil Engineering program.

Selection of resources developed for instructors [[link here](#)]:

1. **Huggins, X.**, and Gleeson, T. Slide deck 1.3 on *HydroShare*: Sustainability Fundamentals for Groundwater Hydrologists.
2. Gleeson, T., and **Huggins, X.** Slide deck 6 on *HydroShare*: Groundwater Resources and Global Change.
3. Gleeson, T., Mohan, C., Okibe, S., Horoscoe, N., **Huggins, X.**, Ng, C., Jacoby, A. Slide deck 1.2 on *HydroShare*: Environmental Justice Fundamentals for Groundwater Hydrologists.

Teaching assistant positions (University of Victoria):

**2019** Sustainable Water Resources, 300 level course, Teaching assistant & lab lecturer

**2020** Fluid Mechanics, 200 level course, Teaching assistant & guest lecturer

**2020** Hydrology and Hydraulics, 400 level course, Teaching assistant & lab lecturer

**2020, '21** Groundwater Hydrology, 400 level course, Teaching assistant & guest lecturer

**2021** Capstone Engineering design, 400 level course, Guest lecturer

## Selected science outreach

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### **Water Day on the Hill**

**2020**

Inaugural event to bring scientists from across Canada to meet with parliamentarians and senior federal officials to raise awareness around water security in Canada.

### **waterunderground blog**

**2016-**

Managing editor of the groundwater blog "waterunderground" which is hosted by both the European Geosciences Union and American Geophysical Union's respective blogospheres.

**2021**