School of Environment, Resources and Sustainability

FY 2021 Annual Report

(May 2021 – April 2022)

How to Get a Job in Environmental Science Consulting

Join the SERS Sustainable Futures Mentorship Program for a panel discussion on finding employment as an environmental science consultant. The panel will be followed by a climate circle hosted by One Resilient Earth. Grow your network, learn new skills, make new friends, and join this amazing community!

Wednesday, March 30 @ 7:00-9:00 PM EST
During Fiscal Year (FY) 2021 (i.e., May 2021- April 2022 comprising the Spring 2021, Fall 2021 and Winter 2022 Terms) SERS faculty taught 43 undergraduate courses with a total enrollment of 2614 students. In Fall 2021 we took in 79 new first year students and between June and October convocations, we graduated 67 students. The total number of active undergraduate students in SERS during our most recently completed term, Winter 2021, was 384 including 113 Honours students and 271 Honours Co-op students.

In addition, 12 graduate courses were taught with a total enrollment of 130 students. In fall 2021 we admitted 5 new PhD students and 10 Masters students. 13 students graduated with 8 PhDs and 5 MES. We have offers out to 9 new PhD students and 14 new master's students for Fall 2022. In total SERS has approximately 53 PhD students and 39 MES students who are currently active.

May 27, 2021, PhD students Jess Kidd and Kira Cooper kicked off SERS Sustainable Futures Mentorship Program to better support our students by sharing practical information on everything from how to get a job to how to better manage stress (see feature below and a recent advertisement reproduced on the cover of this report).

In June, SERS joined the Green Office Program and achieved Silver Certification in our first year.

Despite the ups and downs of the pandemic, SERS salons returned at various times through 2021-2022. We had an opportunity to share a range of ideas and projects from grad students, faculty and (virtual) visitors. We are looking forward to a return to SERS Salons in person in Fall 2022, and the snacks and coffee/tea as well.

Some Student highlights for FY 2021:

SERS welcomed Chad Walker as a Post-doctoral student working with Ian Rowlands.

Maggie Chang received the Alumni Gold Medal Recipient.

Lowine Hill and Madu Galappaththi received the SERS award for community service. Lowine and Madu (with Sarah Gorphade, PLAN) developed and implemented a workshop series on respectful research for the faculty and have since launched an online course aimed at addressing issues of diversity and inclusion in research.

Oriona Nibbs placed third in the 2021 Latornell Conservation Symposium Poster Competition, Oriona was one of only 12 students selected to enter a poster in the 2021 symposium competition, and then within those 12 she placed 3rd.

Scholarship Awardees included:

NSERC – Dorian Pomezanski, Patrick Lauriault, Mark Saunders
QEII – Jessica Turecek
OGS – Maya Basdeo, Anna Beresford, Kira Cooper, Kelly McLean
Some Faculty highlights for FY 2021:

Dustin Garrick (Associate Professor) and Kelsey Leonard (Assistant Professor, CRC) officially joined the SERS faculty.

Jennifer Clapp was elected in 2021 to the role of Vice-Chair of the High-Level Panel of Experts on Food Security and Nutrition, which is the science-policy interface of the United Nations Committee on World Food Security.

Maren Oelbermann- received 2021 *Journal of Environmental Quality* Editor’s Citation for Excellence for your excellent work in the performance of her duties as an Associate Editor. Also selected as an Editors’ Choice paper in the *Canadian Journal of Soil Science* (CJSS).


Misty Mathews-Roper and Shefaza Esmail are super excited that their research from the LITE Grant has been accepted for publication! This of course would not have been possible without the department's support, so it is a win for SERS!

Feature on the SERS Sustainable Futures Mentorship Program

SERS launched the Sustainable Futures Mentorship Program (SFMP) in May 2021 as a pilot project in response to a recognized need for greater support of our students. Jess Kidd and Kira Cooper—PhD students currently enrolled in SERS—created and administered the SFMP, including leading and presenting content during each session. Simon Courtenay and Robert de Loe provided their support and insights for the creation and execution of the SFMP.

Jess and Kira held SFMP sessions once per month from May 2021 to March 2022. They invited environmental practitioners to each session as guest speakers to share their career journeys with students and offer insights into how to secure full-time employment in their particular sector. Each session also offered students time for discussions and questions relevant to the SERS student experience, as well as resources and practices to support wellbeing and mental health.

Guest speakers included (bolded speaker names indicate UW Environment Faculty alumni):

- **Government**
  - Shona Derlukewich, Fisheries Biologist – Fisheries and Oceans Canada
  - Philip DeWitt, Senior Ecologist and Provincial Wildlife Monitoring Lead – Ontario Ministry of Natural Resources & Forestry
  - Thanya Aathavan, Toronto Region Conservation Authority
  - Heather McMahon, Project Biologist – Ktunaxa Nation Council
  - Stephanie Avery-Gomm, Physical Scientist – Environment and Climate Change Canada
  - Jessie Cunningham, Technology – Environment and Climate Change Canada
  - Stacey Jeffery, Senior Compliance Program Officer, Oceans Protection Plan – Fisheries and Oceans Canada
  - Sydney Allen – Ontario Ministry of Labour, Training and Skills Development
  - Alice Miao – Ministry of Social Development
  - Graham Howell, Protected Areas Officer – Environment and Climate Change Canada

- **Consulting**
  - Jess Kidd, Aquatic Ecologist – Anglerfish Aquatic Science
  - Shaun Toner, Principle Environmental Scientist – Matrix Solutions
  - Noemi Jenni, Wildlife Ecologist – Matrix Solutions
  - Elisabeth Henson – General Manager of the Natural Science Team – Matrix Solutions
  - Quentin Chiotti, Practice Lead Climate Risk and Resilience – Matrix Solutions

- **Non-profit**
  - Dani Lindamood, Program Manager – Wellington Water Watchers
  - Ashoke Mohanraj, Director of Programming – United Nations Association (also Environment Advisor for the Royal Canadian Mounted Police)
  - Shaun Trainor, Youth Climate Circle Lead – One Resilient Earth

All SFMP sessions were held online via Microsoft Teams. The online sessions allowed Jess and Kira to reach out to their entire network for guest speakers rather than limit the guest list to those who live within close proximity to the university. Session registrants ranged from 8 to 63, with an average of 29 registrants per session.
The gradual and uncertain return to in-person teaching had its ups and downs, but SERS students continued to impress. We tested some new assignments and tried to get students outside a bit more in SERS 400 (Sustainability Approaches), incorporated lots of great guest lectures in SERS 321 (Coastal Systems), and navigated the challenges of thinking about graduate research in an on-going pandemic in SERS 681 while reflecting on our ‘theories of change’.

My research activities and work with amazing graduate students has coalesced in two ways: First, I am devoting a lot of time to the SSHRC-funded partnership grant (led by close colleague Prateep Nayak), the Vulnerability to Viability (V2V) Global Partnership for Small-Scale Fisheries (https://www.v2vglobalpartnership.org/). We have made a lot of progress this year developing plans with 12 country teams across Asia and Africa, compiling situational analysis reports and building the foundations for detailed case study work by country teams. Second, I am investing significant time contributing to the development of an ecosystem-based management process and evaluation tool for Gwaii Haanas through an initiative led by Parks Canada and the Council of Haida Nation. The on-going work in Haida Gwaii is supported through a SSHRC Insight Development Grant and a new contribution agreement with Parks Canada.

I have continued to collaborate on papers for diverse outlets, including the American Naturalist, Maritime Studies, Ecology and Society, FACETS, Current Research in Environmental Sustainability, Frontiers in Ecology and Environment, and Nature. The majority of these papers involve graduate students as contributors or leading the way. And graduate students are all doing great work and making an impact despite the many headwinds they are facing: Maria Battaglia on small-scale fisheries collective action in Italy; Madu Galappaththi on gender and dried fish value chains in Sri Lanka; Lowine Hill on natural disasters and intersectionality in the Caribbean (co-supervised with Jeremy Pittman); Anita Lazurko on water scenarios in Manitoba (co-supervised with Vanessa Schweizer); and Ella-Kari Muhl on knowledge co-production and ecosystem-based management in Haida Gwaii. Two fantastic undergraduate students also wrapped up their honours projects: Cameron Carroll on small-scale fisheries and plastic pollution; and Natasha Winckler on sea level rise and tourism in the Bahama’s.

I remain active in several advisory roles. My role on the Independent Science Panel for New Zealand’s Sustainable Seas National Science Challenge keeps me engaged with lots of cutting-edge work on ecosystem-based management (https://www.sustainableseaschallenge.co.nz/). I am an advisor and member of two Science for Nature and People Partnership (SNAPP) initiatives, including one on climate resilient fisheries (https://snappartnership.net/teams/climate-resilient-fisheries/), and one on coastal outcomes (https://snappartnership.net/teams/coastal-outcomes/). And recently I was appointed to the Scientific Steering Committee for the Integrated Marine Biosphere Research (https://imber.info/), a large global research project which focuses on ocean sustainability in the context of global change. This latter role will keep me active on a number of fronts, and includes my participation in advancing a UN Decade of Ocean Science endorsed project on Fisheries Strategies for Changing Oceans and Resilient Ecosystems (https://gmri.org/projects/fisheries-strategies-changing-oceans-and-resilient-ecosystems-2030-fishscore2030/). Lots of good things on the horizon, but I am looking forward to actually seeing an ocean in 2022/2023...
Returning to SERS after maternity leave, in the middle of a pandemic, has certainly been challenging, but some great things have happened in 2021.

Teaching:
- Getting back into the classroom (both online and virtually) has been a highlight for 2021. In the Fall term, I had the opportunity to teach our first year SERS course (ERS 100). It was exciting to meet our students, who are so energetic and passionate about the environment. Having them participate in some hands-on learning with the help of the Environment Ecology Lab was so nice – especially after many of these students spent much of the previous year online.
- During both the Fall and Winter terms, our new SERS Undergraduate Thesis (ERS 403) course ran. This course gave our undergraduate thesis students a structured approach to their thesis projects. In a tough pandemic year, the structure and support of the course and their supervisor(s) allowed for amazing thesis projects which students were able to showcase in our annual SERS 403 Poster Session.
- In the winter of 2022, I was awarded the Environment Teaching Fellow. I am excited to focus on projects centered about mental health, well-being and an ethos of caring, while developing novel pedagogical mechanisms for integrating Sustainable Living Lab Projects across campus.

Research:
- As a continuing lecturer, conducting research is not the general focus of my time, however 2021 was an exciting year, as I was awarded a SSHRC Partnership development grant as a Co-PI with Dr. Sarah Wolfe. Our research will look at the affective load of concepts, objectives, and pedagogical approaches associated with interdisciplinary environmental studies and science. Due to delays with COVID, our research will begin with two new SERS Masters students in the Fall.
Jennifer Clapp

May 2021-April 2022 was another busy year, mostly online (again):

- I continued to conduct research during my Killam Research Fellowship, which has given me the time to do a deep dive into my research on corporate power in the food system.
- I was reappointed for a two-year term as a member of the Steering Committee of the High Level Panel of Experts on Food Security and Nutrition (HLPE), the science-policy interface of the UN Committee on World Food Security and I was elected Vice Chair of the HLPE in October.
- I had my first full year as a member of the International Panel of Experts on Sustainable Food Systems and took a lead role in a policy brief on food systems governance and science-policy interfaces.
- I took part in the ‘Science Days’ of the United Nations Food Systems Summit, speaking on science-policy interfaces for food security.
- I gave many presentations at high-level policy events throughout the year on themes of food security and food systems sustainability and food systems and covid-19 implications for food security.
- I published scholarly articles on themes related to excessive herbicide use in agriculture, corporate concentration and power in food systems, food security, and food security governance in the following journals: Global Environmental Change, Food Policy, Nature Food, Development and Conservation Letters. I also published a slew of book chapters as well as policy papers.
- I was excited to see the Food and Agriculture Organization of the UN take up some of the key concepts around the six dimensions of food security from the HLPE report on which I was lead author in 2020 and featured in an article this year with colleagues in Food Policy.
- I was a contributing author on Chapter 5 (food systems and climate adaptation) of the IPCC 6th assessment report.
- I was interviewed for four different podcasts on a variety of themes including food system sustainability, food security and the challenge of meeting SDG2 (zero hunger), and science-policy advice for food systems governance.
- My SERS student, Phoebe Stephens, successfully defended her PhD in September 2021 – and she landed a tenure-stream job at Dalhousie University. Yay for Phoebe!
- Three of my master’s students successfully completed their MRPs in Global Governance.
- I served as an external examiner on two PhDs, one at University of Oxford, and the other at Wageningen University in the Netherlands.

Some images from the year:
Viewpoint

The case for a six-dimensional food security framework

Jennifer Clapp a, b, *, William G. Moseley, c, Barbara Burlingame, c, Paola Termine d

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c School of Public Health, Massey University, New Zealand
d Secretariat of the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security and American University of Rome, Italy
Andrea Collins

Research
While continuing my work on gender and global food and agricultural governance, I have also recently submitted two new papers looking at the politics of global climate governance.

New Articles and Book Chapters


I was also invited to participate in several virtual presentations related to my research on gender, food systems and climate change this year, including:

- People’s Counter-Mobilization to Transform Corporate Food Systems: Feminist economic alternatives for a systemic transformation of the food system, July 2021.

Teaching

- I continued teaching in an online, interactive format in Fall 2021, bringing in guest lecturers and hosting weekly live Q&A sessions with my students.
- Created new online materials for ERS 201 and ERS 604/PSCI 604/GGOV 620 – Global Environmental Governance. Both were opportunities to try out new modes of online pedagogy and flexibility in delivery methods.
- Two of my graduate students completed their MRPs, one in Social and Ecological Sustainability and one in Global Governance.

Misc.

- Promoted to Associate Professor, July 1, 2021.
- Featured as the faculty profile for the inaugural SERS student newsletter.
- Associate Editor, *Canadian Journal of Development Studies*
Congrats Grad Students!
Dr. Ho-Tassone  (Andrew Trant)
July 2021. Now:
PDF Algoma U.
Lilia Schoot
Uiterkamp MCC-MRP Fall 2021
Jessica Tureček (PhD)
Joined lab June 2021
Michèle Banks (PhD)
(Rob Moir)
began Sept 2021
UNB-SJ

Welcome New Grad Students!

Congrats Honours BES & BSc Students! (Co-supervisors)
Claire Li
ERS 403
(Maria Strack)
Hayley Austin
ERS 403
(Claire Goodwin)
Alicia Wong
Biol 499
(Nat Bergbusch)
Ning (Selena) Xu
Biol 499
(Mark Saunders)

Publications:


Service
I served as Associate Director, Undergraduate during the reporting period (May 1, 2021, to April 30, 2022). Completion of the Academic Review report was a major focus during this time. Through the process of developing and writing the Academic Review report, we identified numerous priorities for action that we are addressing even in advance of the reviewers’ visit. For example, we are rethinking individual courses and the entire curriculum relative to our new learning outcomes and related indicators.

Teaching
With the departure of Dr. Wolfe at the end of 2021, we needed someone to take over ERS 101, one of our three core first-year courses. I agreed to take over this course in late December and re-developed it from the ground up to reflect priorities that emerged during the Academic Review process. Course development was informed by the work of the ERSSA Undergraduate Education Committee, which undertook several extremely helpful initiatives during the reporting period. These included a review of equity, diversity, inclusion and justice themes in our program; a survey of challenges and opportunities for enhancing communication in the SERS curriculum; and an assessment of the previous three offerings of ERS 101 (each delivered by a different instructor). I built a new version of ERS 101 that reflected these priorities, and directly linked to the new learning outcomes.

In Fall, 2021, I offered ERS 318 Photography for Sustainability in a hybrid format. I redesign the course to work better for larger classes (24 students, up from 12). I divided the class between two in-class sessions, moved foundational material to pre-recorded videos that students watched before class, and moved the in-person labs to a synchronous online model. This design worked extremely well and will allow me to increase the class size again, from 24 students to 30 students.

My third teaching assignment was the development of a new second-year online course titled Images and Environmental Decision Making. I worked on this project throughout the reporting period but had to cancel it in fall because I was unable to keep up with the CEL course development schedule due to family health circumstances.

Research
The focus of my research program during the reporting period was divided between completing work related to my former water governance research program, including helping my PhD students and post-docs complete their work and publish their findings, and advancing my new program focused on using art-science approaches based on photography to catalyze engagement around water and environmental challenges. Water governance work was published in *Environmental Politics* and the *International Journal of the Commons*.

Working within the constraints imposed by the Office of Research on field-based research activities, I worked with partners in two local water management organizations to develop and submit an Insight Development Grant to SSHRC. I also continued the work relating to my small internal HSS grant, received in the previous year.
Shefaza Esmail

Teaching
Delivered a novel special topics film course called Environment & Popular Culture (ERS 275), engaging students in online learning with films, reflections, and discussions. Students also had the opportunity to create their own films; one film created by students in the class centered on Eco-Anxiety and was published in the April 2021 issue of the Radicle: https://theradicle.home.blog/2021/04/30/short-film-feature-eco-anxiety/. This course was also the subject of a LITE Seed Grant study, which was recently published in Frontiers Higher Education: Esmail, S. and Matthews-Roper, M. (2022). Lights, Camera, Reaction: Evaluating Extent of Transformative Learning and Emotional Engagement through Viewer-Responses to Environmental Films. Frontiers in Education: Higher Education

Ran another successful online field course term (ERS 340) with synchronous lectures and individual fieldwork. Students also gained certification in OBBN. This was again possible through lots of support from the Ecology Lab (Anne and Bev). Students also worked in groups to creatively mobilize knowledge they had learned in the course. There were submissions ranging from recipes for making tea from foraged plants, a comic about gypsy moth impacts, a handbook for protecting pollinators, and a video on how to monitor birds.

Delivered two iterations of Introduction to Environmental Assessment (ERS 215), one in Winter 2021 and one in Spring 2021. In Fall 2021, delivered two different courses: Urban Water and Wastewater Systems (ERS 316) and Forest Ecosystems (ERS 234). Engaged the students in student-centered learning through interactive weekly tutorials, which were in-person, while content delivery was online. Implemented a new form of examination – group oral exams for ERS 234 where students had the opportunity to confer with their peers to synthesize responses to the exam questions.

Projects
Conducted research to evaluate student emotional and cognitive engagement through films and viewer-response activities. Funding for this research was received from a Learning Innovation and Teaching Enhancement (LITE) Grant.

Managed the environmental stewardship initiative with colleague Tim Alamenciak for which funding was received from the Sustainability Action Fund Grant. Developed an interactive campus map highlighting ecological areas on campus along with the current management strategies. Designed a website to share the Ecomap within University of Waterloo.
Field research in the Fedy Lab of Wildlife and Molecular Ecology continued to be on hold due to University COVID-related travel restrictions throughout the 2021 field season. However, we were able to maintain some progress on sage-grouse research in Wyoming and capture and radio-tag some new birds through collaboration with local Wyoming-based consultants. We also conducted limited field work in collaboration with the Canadian Wildlife Services and captured and radio-tagged our annual sample of sandhill cranes in the fall of 2021.

Master's student Marie Racioppa defended her thesis and graduated and is now pursuing a wildlife-related PhD at the University of Saskatchewan. Multiple manuscripts associated with Marie's research and the other three recent graduates from 2020 are making their way through the peer-review process and I currently have 10 manuscripts in review or revision. Additionally, we collectively gave 12 conference presentations and 4 invited talks in the past year.

Much time and effort were spent strategizing, planning, and recruiting students for the initiation of a major new research effort in Wyoming focused on sage-grouse predators and I'm happy to say that as of April 2022, students are in the field, and we are beginning to gather necessary data again.

In addition to the major setbacks associated with travel restrictions, Plant Operations at the University of Waterloo cleaned out one of my lab freezers that had grown mold in response to an undetected and long-term power outage. While cleaning the freezer they indiscriminately disposed of hundreds of genetic samples that I had collected over the past 9 years. 2022 will be a year of rebuilding.
Dustin Garrick

2021 was a year of transition with a trans-Atlantic move, not an easy feat amidst the pandemic. I have met a handful of SERS colleagues and really look forward to meeting the rest soon.

- **Mentorship**: I currently supervise 7 PhD students, including 6 still based in Oxford. Dr Jesper Svensson (Oxford) successfully completed his PhD viva on water markets in China in February 2022 and will take up a postdoc in China (weighing options) later this year. His first two lead-authored papers have received honorable mention. Sophie Erfurth and Gina Gilson both received competitive grants from the Royal Geographical Society (UK) for their doctoral research at Oxford. Charles Wight (Oxford) published his first paper. A major highlight was recruiting my former Oxford MSc student, Isabel Jorgensen, to do her PhD in SERS, and she has been off to a great start. Provisionally, another PhD student, Elisha Ocheng will join SERS in Sept 2022, joining us from Nairobi, where he has been working on emergency responses to expand water access in informal settlements during Covid-19.

- **Research**: I am working on a book project, Uncommon Markets, due to Oxford University Press on January 31st, 2023. The project examines the political economy and governance of environmental and water markets across a network of formal and informal markets from Algeria to Australia. Our group has published papers in: Review of Environmental Economics and Policy, Journal of Environmental Management, Environmental Research Communications, Ecology and Society (the latter is in press with Isabel Jorgensen, Fabiola Alverado and Rob de Loe, all with SERS links). The highlight of early 2022 is work on a collaborative paper across my research group on the spread and evolution of water markets, which will be a global review, targeted for a high impact journal. I am also lead special issue editor for a themed collection in Environmental Research Letters on markets and the commons, and I am serving as co-editor for a collection on conservation philanthropy in Conservation Science and Practice. Finally, I have also started a transition from UK to Canadian research funding. I am continuing UK-based projects, highlighted by my role as Director of Research for the European Commission Innovative Training Network on water governance (through 2024). I also have UK-based projects addressing water, agriculture and development, one with The Nature Conservancy, and the other with the Global Challenges Research Fund, a program of the UK research councils. Since arriving, our group has submitted a large, multi-lateral bid on Thirsty Cities examining conflict and cooperation over water between cities and rural regions. Later this year we will start a two-year project on Mapping Canada’s Water Governance Capacity and Gaps, bringing Dr Graham Epstein back to SERS from August 2022.

- **Teaching**: I have started teaching on the Collaborative Water Program and started to develop a Winter 2023 course on Economics and Sustainability, ERS 320, examining the economics of sustainability transitions in energy, agriculture and cities. I have continued as a research fellow and member of the teaching team at Oxford’s MSc in water science, policy and management, contributing 3-4 weeks of virtual teaching. I have also run a virtual elective in Oxford on markets and the commons. I am phasing out most of the Oxford teaching. Since arriving in Waterloo I’ve contributed to the curriculum committee of the Collaborative Water Program and recently joined the SERS graduate committee. My other current teaching interests include developing and strengthening doctoral training networks (developing a proposal for a DTN on global water policy) and learning from the Covid-19 pandemic in terms of new modalities for blended learning and drawing in more diverse and global networks of expertise into the virtual classroom.

- **Engagement**: I have completed (with Isabel Jorgensen) a background paper for the World Bank on water conflict and reallocation to the Middle East and North Africa. I am serving on the Technical Committee of the Global Water Partnership where I am designing a capacity building and leadership training initiative across a 3000-person network of water practitioners. I am working with The Nature Conservancy on a series of initiatives related to Nature-based Solutions and the design of incentives for more sustainable agricultural practices. Finally, and separately from my “day job” I have started a social enterprise with my partner, Heather Garrick. We incorporated Water Cycles Expeditions in early March 2022 to connect people with rivers through cycling, envisioning a set of summer camps, river touring expeditions (locally and globally), and a retreat centre that convenes kids and other networks around water and cycling. The social impact will focus initially on broadening access to underprivileged populations and supporting citizen science and digital innovations in mapping water courses, including the human connections to rivers. A summer camp and a handful of rivers cycling expeditions are likely for summer 2023, following watersheds from headwaters downstream, leveraging strong local and global networks (including the Grand). An exploratory route-finding expedition will happen in the Grand in late summer 2022 to develop and digitize a guided path from Dundalk to Lake Erie. We are also working to develop a theory of change about how cycling near water can help to address local and global water challenges (everything from changing the way we value water to decreasing water collection times in remote and rural areas, which disproportionately affect women and girls).
Once again, 2021-20 was a year of pushing impact assessment law and practice to deliver positive contributions to sustainability. Earlier work helped persuade the Canadian federal government to incorporate a sustainability agenda in its 2019 Impact Assessment Act, along with provisions that could strengthen other core elements of next generation assessment. Unfortunately, most implementations have been timid, delayed or counterproductive.

This inspired continued happy collaborations with a diversity of colleagues and hopeful delivery of yet more analyses and exhortations for scholarly, professional and institutional audiences – book chapters in the leading law-based review of the new Act, a paper on next generation assessment for the main international professional association’s impact assessment journal, conference and workshop presentations to practitioners, briefing notes on policy guidance needs for the Impact Assessment Agency of Canada, and submissions on individual assessment cases.

Perhaps eventually enough light will find its way through the many cracks.

Meanwhile, another generation of intrepid graduate students has been doing great things:

**Kiri Staples** is completing her doctoral research on sustainability and co-governance in approaches to cumulative effects in cooperation with the Tr'ondëk Hwëch'in First Nation and concerning their territories in the Yukon.

**Ignacio Aguilar**’s dissertation work has built a sustainability assessment framework for examining electrical energy systems facing transformation pressures and tests it in applications to the contrasting systems of Ontario and Costa Rica.

**Kira Cooper**’s doctoral research is exploring the extensive and potentially rich common ground, conceptual and practical, at the nexus of the most advanced versions of mindfulness and sustainability.

**Jordan Bean**’s master’s thesis on collaborative impact assessments led by Indigenous and non-Indigenous authorities includes learning from collaboration in the assessments of the Voisey’s Bay nickel mine in Labrador and the NICO Cobalt-Gold-Bismuth-Copper project in the Northwest Territories.

**Eve Norberg**’s masters research examines whether and, if so, how mining for rare-earth elements in Canada could contribute to sustainability for communities in mining regions as well as in the public interest at the larger national and global scales.

**Giulia Cricenti** is devoting her masters work to a comparative sustainability assessment of coal phase-out policies in Germany and Canada, including attention to just transition considerations.

**Rosalind Snyder**’s cheerful masters research examines three exemplary sustainability success stories in the Ontario Greenbelt, involving farmers markets, tall grass prairie restoration and meaningful engagement of Indigenous communities in land use planning.

**Kevin Easton**’s thesis will identify and assess possibilities for expanding the benefits and influence of Indigenous participants in project-level impact prediction and monitoring.

**Fatema Zaman**’s masters’ project centers on development and assessment of especially the socio-economic aspects of plans for end of life mine closure in Nunavut.
The Associate Dean – Undergraduate role again took the majority of my time, especially with continued COVID adjustments. My ADUG report will be posted on the Faculty website.

In spring 2021, I again taught remote versions of two courses that would otherwise have had an intensive field component, Field Ecology (ENVS200) and Ontario Natural History (ERS283). For the latter, I created exercises so students could engage with natural history wherever they were based and post their findings on a community forum in Piazza.

Rachael Edwards, my student based in Planning, defended her PhD in Fall 2021. The three papers from her dissertation have been accepted or published and she has just begun a position as a Research Fellow in the Social Science Research Unit in the Institute of Education at University College London.

In addition to papers with Rachael, and several other ongoing projects, I published a collaborative paper with a philosopher and a psychologist, “Should we connect children to nature in the Anthropocene?” [People and Nature 4: 53-61. http://doi.org/10.1002/pan3.10267]

As domain editor for “Climate, Ecology and Conservation,” I commissioned several integrative papers for WIREs Climate Change.

Finally, in preparation for concluding my ADUG role (June 30, 2022), I carved out time at the end of the year to submit an Insight Development Grant to SSHRC to help fund the next phase of my research.
I joined SERS in May of 2021 and have found the community very welcoming and rewarding as a new faculty member. Some of the highlights from 2021-2022 include:

- I was awarded a CRC Tier 2 in Indigenous Waters, Climate and Sustainability in January 2021 and have been actively building out my research program and lab.
- In July 2021 I was selected as co-chair and lead author for the Water Resources Chapter of the New York Climate Impact Assessment.
- In September 2021 I was selected as a chapter author for the U.S. Fifth National Climate Assessment Tribes and Indigenous Peoples chapter.
- In November 2021 I became the first Indigenous scientist to be appointed to the National Academies of Science, Engineering, and Medicine Committee on Environmental Science and Assessment of Ocean Energy Management.
- In January 2022 I was successful in receiving a Canada Foundation for Innovation (CFI) - JELF award to build the WAMPUM mobile laboratory.
- In Winter Term 2022 I returned to the classroom teaching ERS 365 Water Governance which covered topics such as water affordability and the human right to water. The course culminated with a powerful guest lecture on water colonialism and community displacement in El Río Grande by UCLA scholar Alana de Hinojosa.
- The year has been filled with numerous journal article publications and virtual guest lectures. I am looking forward to in-person gatherings returning and the opportunity to get back into community for engaged research.
Dan has several inter-related community-based projects that kept him busy from May 2021-April 2022:

Co-reclamation in the Oil Sands
This was to be the third year of a 5-year funded project that is a collaboration between the Fort McKay First Nation, Suncor Energy Company and Universities of Waterloo and Calgary. Unfortunately, due to COVID and related downsizing at one of the key partners, Suncor, this project has come to an early end. The intent of the project was to transform, and begin the process of healing, the relationship between the Fort McKay First Nation (FMFN) and the Suncor Energy Company around reclamation while attempting to heal the land. The first phase was to re-establish relationships and engage the community in a respectful, relevant, reciprocal and responsible manner. As with any process of reconciliation, this has been a challenging but rewarding journey. The relationships developed during this project have been maintained and an ongoing working relationship with FMFN has been revitalized. Our team has pivoted to ensure that the work done to this point will benefit the FMFN and new foci have emerged around community-based monitoring and Indigenous Guardian programs as well as frameworks for corporate/Indigenous relations. Several publications have been published and several more are in various stages of production and review.

Reconciliation, Education and Research on Haida Gwaii
This SSHRC-funded project in collaboration with the Haida Gwaii Institute and the Haida Gwaii Museum and the Universities of Waterloo, British Columbia, Lethbridge and Alberta. This research aims to explore, support, and inform a precedent setting intercultural social innovation through an Indigenous research collaboration in one of Canada’s most renowned reconciliation contexts - Haida Gwaii. Social innovations are initiatives that challenge and change the defining social structures of broader social systems. For the purposes of this research, we consider intercultural social innovations to be grounded in a shared responsibility to reciprocally and respectfully navigate the evolving landscape of reconciliation in Canada. In the context of the COVID-19 pandemic, we have hired two research associates from the Skidegate and Old Massett communities on Haida Gwaii to support continued research on behalf of the HGI and the Haida Gwaii Museum. Research continues on the pre-feasibility of a Haida-led research institute and Haida-led research protocols, supported by our research team and the grant. A new collaboration is emerging between Dan, here at the University of Waterloo, Vanessa Andreotti, at the University of British Columbia, the Haida Gwaii Museum and the HGI around the theme of building capacity within university research communities in Canada to more effectively engage with the Haida Nation and Indigenous Nations in Canada. We are developing a SSHRC proposal to hopefully be submitted this fall.

Waterloo Institute for Social Innovation and Resilience (WISIR) Incubating the Turtle Island Institute
WISIR has been incubating an Indigenous-led social innovation think-and-do-tank which has now been established as Turtle Island Institute (TII), an independent entity on the TIDES Platform. TII has received over $3 million dollars in support, mainly from the Suncor Energy Foundation and the J.W. McConnell Foundation as well as other funders such as the MasterCard Foundation. This incubation work came to an end at the end of 2021 with TII becoming a completely independent entity but collaborations between WISIR and TII continue. Melanie Goodchild, TII’s founder and SERS PhD student, has stepped away from TII but continues to her PhD work and we are currently building a collaborative research project with Jean Becker, Associate Vice-President, Indigenous Relations here at UW, in support of her work on Indigenization at UW.

Transformation in the Food and Agriculture Systems in Southern Ontario: Oak Ridges Institute for Applied Sustainability (ORIAS) and Mount Wolfe Farm
This ongoing project has been developed in collaboration with the owners of Mount Wolfe Farm, the Save the Oak Ridges Moraine (STORM) Coalition and the University of Waterloo and Queen’s University to explore transformations in the food and agriculture system of southern Ontario in the context of the land use and conservation planning context in the Greater Golden Horseshoe. Part of this work is to explore the development of the ORIAS as a vehicle for cross-scalar innovations or transformations. This work has continued virtually in the context of COVID-19 with a MITACS-supported master's student and an undergraduate thesis being completed this year to support the ongoing work of ORIAS.

Some of the Co-reclamation in the Oil Sands Team
The Conservation and Restoration Ecology (CaRE) research group led by Stephen Murphy saw 2021 as a time of planned and necessitated transition. Projects focus on strategic planning and large-scale replication of conservation and restoration ecology research and applications across the world, with partnerships focused on Western North America and the European Union. Taking note of UW’s unique approach to research during the pandemic, the CaRE group has partners and loci that are committed to evidence-driven research and all that it entails. Meanwhile, back at UW, Murphy focused on processing many of the stored samples from long-term projects – a very labour-intensive process aided by some satellite facilities – to set up a series of forthcoming manuscripts. From 2021, we have about a dozen publications completed or in press, ranging from ones focused on the implementation of the United Nations Decade on Ecosystem Restoration to ecological monitoring of large scale projects (former student Dr. Jonas Hamberg and in collaboration with Profs. Derek Robinson, Roydon Fraser, and Andrew Trant) to local scale well replicated projects on techniques to restore forests, prairies and alvars (former students Dr. Heather Cray, Dr. Michael McTavish, Tomm Mandryk MES, and Amanda [Shamas] Draves MES and former post-doc Dr. Justin Gaudon).
Over the past year I’ve enjoyed supervising 10 Teaching Assistants, 4 Online Learning Assistants, 2 master’s students (Thy Huynh, Claudia Jurado), and one SERS Undergraduate Thesis (Nathalie Heyden). I have been actively involved with FAUW’s Climate Justice Working Group, the Living Labs initiative, and supporting faculty across campus to implement alternative forms of grading (e.g., specifications grading). I enjoyed acting as a judge for the 2022 Ontario High School Ethics Bowl and providing keynote talks for student-driven conferences such as the Ontario Science Case Competition and Impact Alliance’s UOWaterloo X SDGs.

My focus during this past difficult pandemic year has been on creating social learning opportunities for students. For my course Sustainability: The Future We Want (ENVS205), we created an opportunity for students to participate in a virtual social simulation that taught complexity and systems thinking, sustainability governance and the SDGs. Called The World’s Future, this social simulation offered students a chance to meet and engage with each other in synchronous learning at a time when little of this was taking place due to pandemic constraints.

Organizing simulations across various time zones so that students from around the world could participate was a challenge. But over three semesters we had 238 students participate across thirty simulations. I would like to thank the Teaching Assistants (Carl Tutton and Sid Heeg) and Online Learning Assistants (Leroy Li, Harry Yu, Murphy Tse) as well as Cate Pershonke (Dean of Engineering’s Office) who I trained as moderators for these simulations. I would also like to thank Jon Beale from SDSN for introducing me to the simulation developers at the Centre for Systems Solutions in Warsaw and for their technical support.

As part of my course Communications for Environmental Professions (ENVS131) this winter, students participated in service-learning opportunities with campus clubs and organizations. After being away from campus for two years, this gave students the time to learn about extra-curricular and student life opportunities at UW while developing and contributing their communication skills. I’d like to thank all the clubs and organizations that made this learning possible, such as Imprint, ENVigorate, ESS, WEBS, Fashion for Change, Impact Alliance, ENVigorate, Conversation Partners Program, MATES, Fossil Free UW, Pride Club, Women in Finance, and many others.
Fig. 2 ENVS131 Students who organized the UW Thrift Fashion Show
Maren Oelbermann

- Received 2021 Journal of Environmental Quality Editor’s Citation for Excellence.
- Selected as an Editors’ Choice paper in the Canadian Journal of Soil Science (CJSS).

**Editors' Choice - Canadian Journal of Soil Science**

*Biochar in temperate soils: opportunities and challenges*¹

Vicky Lévesque, Maren Oelbermann, and Noura Ziad

Promising avenues of biochar in temperate agricultural soils

In this review, the authors gave an overview of the challenges and opportunities of using biochar as an agricultural amendment and presented the most up-to-date information on biochar application to improve soil quality and crop productivity in temperate environments. Specifically, the authors proposed a broad view of biochar as a temperate soil amendment, moving beyond our current focus on crop productivity, and instead target its capacity to improve soil properties. They explored biochar’s benefits in remediating low productive agricultural lands, and its environmental benefits through long-term carbon sequestration and reduced nutrient leaching while curtailing our reliance on fertilizer input. They also discussed the persistence of beneficial impacts of biochar in temperate field conditions. According to the authors, biochar displays great prospective to improve soil quality and its productivity, enhance plants stress resilience, mitigate greenhouse gas emissions, and restore degraded soils in temperate agriculture.

- **Associate Directorships**
  - Waterloo Centre for Microbial Research (Associate Director)

- **Editorial activities**
  - Associate Editor: Agroforestry Systems
  - Associate Editor: Journal of Environmental Quality
  - Guest Associate Editor: Agriculture, Ecosystems and Environment special issue: *Agroforestry and climate change*
  - Guest Associate Editor: Canadian Journal of Soil Science special issue: *Biochar amendments for sustainable soil management*
  - Editorial Board: Environmental Management
  - Guest associate Editor: Geoderma Regional special issue: *Transitioning to healthy soils with agroforestry*

- **Main session organizer** (with J. Whalen McGill and S. Chang U Alberta) and convener on *Transitioning to Healthy Soils* at the 5th World Congress of Agroforestry (forthcoming in July 2022).

- **Publications**
  - 9 peer-reviewed publications
  - 1 book chapter case study (production on recarbonizing soils by the FAO [https://doi.org/10.4060/cb6598en](https://doi.org/10.4060/cb6598en))

- **Knowledge mobilization**
  - 2 Scientific reports (AAFC, OMAFRA)
  - 6 conference presentations (virtual)

- Collaboration with colleagues across global circumpolar regions in the development of a network for northern
agriculture

- Field research continued under covid-19 on two projects
  - Greenhouse gas emissions and soil carbon speciation in perennial bioenergy crops on low productive agricultural land (Guelph Bioenergy Research Station)
  - Soil health and greenhouse gas emissions with biobased amendments (Elora Research Station)
  - New project: On-farm bioaugmentation of indigenous mycorrhizal inoculum for more sustainable and profitable production systems (field work in Sault Ste. Marie and New Liskeard)
Stephen Quilley

Publications

Books:
Kish, K. and Quilley, S. 2021 *Ecological Limits of Development: Living with the Sustainable Development Goals* (London: Routledge)
https://doi.org/10.4324/9781003087526

Articles


Graduate Students


Research

March 31st - April 3rd, 2022: Research trip to Halifax to conduct first round of interviews for SSHRC project ‘Winemaking or placemaking? The role of the craft wine industry in rural Revitalization’ with Claudia de Fuentes, St Mary’s University

Conference Presentations:

‘Health in the Anthropocene – With Katharine Zywert . The 2021 Planetary Health Annual Meeting, Co-hosted by University of São Paulo, Brazil, April 25-30, 2021

‘Towards a pattern language for the maintenance and revival of traditional piping’ INTERNATIONAL BAGPIPE CONFERENCE 11th -13th March2022 – with Anna Beresford,


We presented it on January 13, 2022.
During 2021-2022, most of my time was spent upon my work as the University’s Associate Vice-President, International. Nevertheless, I still engaged in a little bit of teaching and supervisory activity in SERS (and did a little bit of research too!).

Welcoming Dr. Chad Walker, as he begins his AMTD Fellowship, based in SERS

Dane Labonte’s PhD defence on 26 August 2021 – virtually at 3:45pm (Dane informed of the result), and in-person at 5:45pm (the two of us celebrating the result).

SERS-related publications:


Like all of us, this year was a challenging one for me from a teaching perspective. As a newcomer to teaching after joining Faculty in Winter 2020, mounting two new courses for the Fall Term fully online was a lot of fun and a lot of learning but occasionally demanding. In 2021 the fully online format for my grad/4th year course focused on fish, forest and wildlife conservation made it impossible to mount our annual two-day field trip to Ottawa but to my great pleasure, Minister Wilkinson, Elizabeth May and Members of Parliament Arnold, Beech, Cannings and Chagger all joined us online over the semester as did Megan Leslie from WWF and Josh Laughren from Oceana as well as Daniel Quan-Watson, Deputy Minister of Crown Indigenous Relations. They joined us for no other reason than to be helpful in a way that I think very few people fully appreciate about our politicians of the day.

In 2021 I was also fortunate enough to work with colleagues at Wilfrid Laurier and University of Toronto to move three publications to the review stage and working with SERS colleagues I have a couple more on the way. For someone who has never really published before, this has been a great learning experience both in terms of the substance of the papers but also in terms of how publishing and so on works.

And finally, in happy news for me professionally, my appointment with the University was renewed in 2021 and I will be able to continue to contribute to SERS and the Faculty more generally into 2025 and hopefully beyond. I am looking forward to taking on some more long-term focused work now and am keen to join colleagues in their projects and also to work with graduate students and honours thesis students as well. Lots of great stuff lies ahead!

And best of all, I looooved being a new grandpa in 2021!
Andrew Trant

It has been an exciting year in the Trant Ecological Legacies Lab.

Every year, we work on a group paper with everyone in the lab. This past summer, we published our lab paper in the *Proceedings of the National Academy of Sciences* (PNAS) on how Indigenous fire stewardship (aka. good fire) increases biodiversity. It made a big splash in the media with coverage in >50 media outlets including the CBC, Toronto Star, and the Waterloo Record. The best part was that co-authors included three SERS undergrads, four SERS grads, and two SERS postdocs! A version of the paper intended for a younger audience is coming out this summer in *Frontiers for Young Minds* and will be integrated into middle school curriculum.

We even managed to get out and do some fieldwork in Coastal BC (Photo 1), rare Charitable Research Reserve (Photo 2), southern Labrador (Photo 3), and Northern Nunatsiavut, Labrador (Photo 4).

*Photo 1*: Wuikinuxv Territory, Coastal British Columbia. Work led by PhD student, Sara Wickham.

Photo 3: Southern Labrador field site (NunatuKavut). Work led by PhD student Patrick Lauriault with support from MES student Alex Johnson, undergraduate student Siobhan Mullally, research associate Nhu Le.
Photo 4: Northern Nunatsiavut, Labrador (Torngat Mountains National Park). Work led by Andrew Trant (notice the 2 m spacing).

Publications and reports from the lab from the past year:
2021-2022 brought continued transitions with staff changes in the school with Amanda Campbell enjoying time off with her little girl while on parental leave and the return to working on campus in a hybrid model in Fall and Winter. SERS welcomed Cynthiya Subramaniam, on a contract filling in for Amanda’s leave in July in which she has done an excellent job in supporting both students and faculty alike in the role. SERS wishes her the best as she started a permanent position in April as Administrator, Graduate Studies for the Faculty of Environment. We look forward to welcoming Amanda back in June.

To our Adjuncts, Sessional Lecturers, Alumni and Students, we thank you all for your contributions and for keeping us posted on your accomplishments.

Thanks are due to our student representative:

Grad Student Reps: Kyle Schang, Mary-Rosalind Snyder, Liya Murray, James Hannay
Undergraduate Reps: Ishani Dasgupta