BETTER TOGETHER

Early Career Aquatic Scientists Forge New Connections at Eco-DAS XV

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INTRODUCTION

A sense of *kuleana* (personal responsibility) in caring for the land and sea. An appreciation for *laulima* (many hands cooperating). An understanding of *aloha ʻāina* (love of the land). The University of Hawai'i at Manoa hosted the 2023 Ecological Dissertations in Aquatic Sciences (Eco-DAS) program, which fostered each of these intentions by bringing together a team of early career aquatic ecologists for a week of networking and collaborative, interdisciplinary project development (Fig. 1).

The Association for the Sciences of Limnology and Oceanography (ASLO) sponsors Eco-DAS, which is now in its 30th year. The program aims to unite aquatic scientists, develop diverse collaborations, and provide professional development training opportunities with guests from federal agencies, nonprofits, academia, tribal groups, and other workplaces (a previous iteration is summarized in Ghosh et al. 2022). Eco-DAS XV was one of the largest and most nationally diverse cohorts, including 37 early career aquatic scientists, 15 of whom were originally from 9 different countries outside the United States (Fig. 2). As the first cohort to meet in-person since the COVID-19 pandemic, Eco-DAS participants convened from 5 to 11 March 2023 to expand professional networks, create shared projects, and discuss areas of priority for the aquatic sciences. During the week-long meeting, participants developed 46 proposal ideas, 16 of which will be further developed into projects and peer-reviewed manuscripts.

KEY CHALLENGES, NEEDS, AND PRIORITIES FOR THE AQUATIC SCIENCES

Throughout the week of discussions and presentations, early-career researchers identified seven recurring themes as priorities for the aquatic sciences:

1. Bridging divides
   - Aquatic scientists tend to operate primarily within their own "research sphere."
   - The future of aquatic science relies on inclusivity and collaboration: between freshwater and marine science; ecologists and modelers; field and remote sensing; data collectors and data users; Western and traditional ecological knowledge; scientists, managers, and society (Lubchenco and Rapley 2020); genders; the Global North and Global South; and different ecological scales. This reliance upon inclusivity and collaboration necessitates creative approaches and continued efforts to close gaps between the groups

FIG. 1. Eco-DAS XV participants enjoyed lively discussions and brainstorming sessions on projects spanning freshwater and marine sciences (photo credit: Phoenix Rogers).

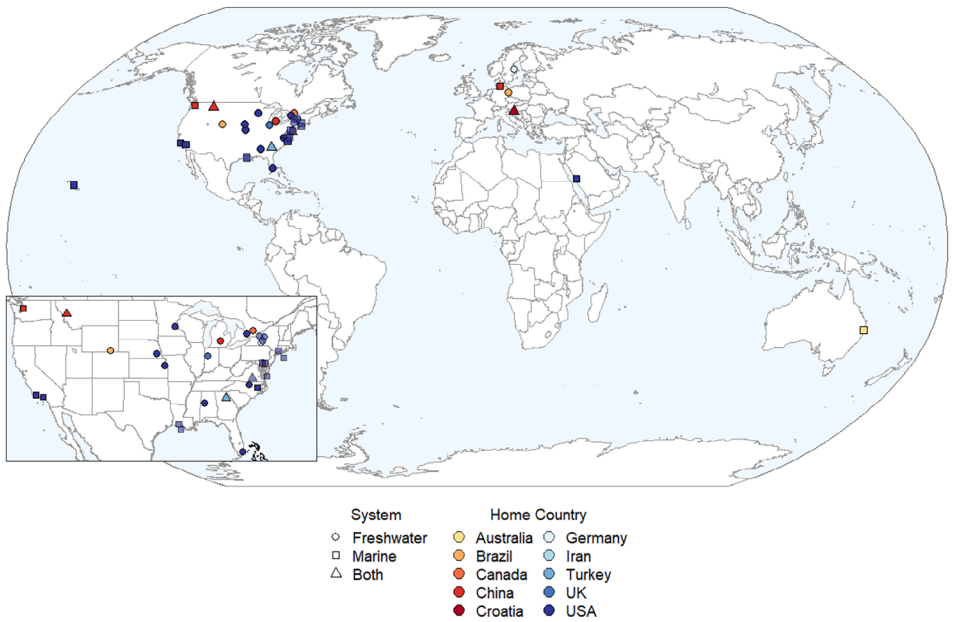

FIG. 2. Current work location of each of the 37 Eco-DAS 2023 participants shown with the study system (shape) and home country (color). Although the Eco-DAS XV cohort was the most diverse in the 30 year program, significant gaps in representation still remain, reflected by participants' home country and current research locale. In particular, there was little to no representation from Africa, the Indo-Pacific, or Central and South America (map credit: Spencer Tassone).

listed above. At Eco-DAS XV, many of the concepts discussed and adapted into collaborative projects spanned the "salty divide" between freshwater and marine sciences, covered broad spatiotemporal gradients, and involved researchers with diverse expertise and interests.

2. Global and local perspectives
   - Scientific research requires inclusivity across countries, particularly in supporting researchers in the Global South (Rogers et al. 2023).
   - Scientists should contextualize their work and try to "see the bigger picture" beyond their specific area of research. Having said that, place-based science can be especially meaningful for scientists and the communities within which they work (Winter et al. 2020).
3. Mentorship and collaboration
   - Early career researchers benefit from mentorship (Rida et al. 2023), but face challenges in fostering these connections, including: limited in-person networking opportunities during the COVID-19 pandemic, short timeframe of postdoctoral appointments, and being "siloed" in disconnected departments or isolated locations (Gushulak et al. 2023).
   - Eco-DAS helps develop professional networks, skills, and collaborations among the next generation of scientists. The Eco-DAS requirement that participants develop interdisciplinary projects fosters continued collaboration beyond the one week symposium.
4. New tools for aquatic monitoring
   - Within the aquatic sciences, there is a need to develop and utilize cross-ecosystem approaches for monitoring freshwater and marine environments, including but not limited to: water probes and sensors, autonomous vehicles and floats, computer programming and machine learning, 'omics approaches, and remote-sensing (Beatty et al. 2021).
   - New tools have already been developed in marine ecosystems and are increasingly applied and adopted within freshwater sciences (e.g., Bagshaw et al. 2021).
5. Impacts of environmental stressors
   - There is a growing need for research to understand and predict the individual and joint impacts of multiple stressors in the Anthropocene.
   - Many Eco-DAS XV participants research critical environmental stressors spanning freshwater and marine environments, including extreme climatic events, browning, and contaminants.
6. Big data management, equity, and access
   - Making data accessible for researchers and the public is often neglected, even when datasets are published.
   - Data availability is only the first step towards open and inclusive science. Further cultural barriers—including language—can limit data accessibility. For example, scientists in some countries may be protective of their data, particularly if the data was difficult to collect due to lack of equipment or funding and/or high competition for limited resources. Prior bad experiences with "parachute scientists" from the Global North can also make people understandably reluctant to share their data. Fostering a sense of community within and across limnology and oceanography is essential to develop more inclusive and equitable scientific disciplines.
7. Precise, shared language
   - There is a need for defining broadly used terms that may have different meanings depending on the field or context (e.g., hot spots, hot moments, ecological "function," extreme, long term).
   - As a field, we should work to define these terms and help dismantle language barriers that limit the sharing of knowledge between scientists, especially non-English speakers.

CONCLUSION: MOVING FORWARD TOGETHER

Although many of these themes are not novel, they reiterate the challenges and opportunities that emerging aquatic scientists face. Importantly, these themes prevail in the global field of aquatic ecology and highlight the need to continue collaboratively exploring the way forward.

Participants were highly enthusiastic to continue to develop ideas collaboratively and there is no doubt that novel contributions to science will be made in the coming years as a result of this symposium. However, Eco-DAS XV was more than just science, networking, and proposals; it was a constructive experience and marked the beginning of a big *ohana* (family). Our cohort was not only a group of like-minded researchers at similar career stages, but also a group that quickly connected with one another on different levels beyond "science and careers." It was a group of amazing people who will have a brilliant future in aquatic sciences together—because the connections created during the week will last a year (Kelly et al. 2017), decades, or even a lifetime!

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