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Editorial: Women at the frontier of freshwater science

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Editorial on the Research Topic

Women at the frontier of freshwater science *florianne*

1 Introduction

The Research Topic “Women at the Frontier of Freshwater Science” presents ten examples of recent contributions by women to freshwater science. In this editorial, we provide an overview of the papers and reflect on our experiences as women freshwater scientists in different continents (e.g., Europe, South America and Australia).

2 Overview of the Research Topic

The coupling of ecological and human systems is an overarching and integrative theme in the papers for this Research Topic. Angela Arthington’s challenge paper calls for a global freshwater conservation strategy, with four main priorities: 1) assessment and research; 2) restoration; 3) protected areas; and 4) socioecological science and governance. She expands on [Tickner et al.’s \(2020\)](#) Emergency Recovery Plan for freshwater biodiversity to guide policy responses that “bend the curve” of freshwater biodiversity loss. Her main message is that without shared knowledge, trust, understanding and respectful partnerships in these human–ecological systems it is not possible to live in harmony with nature.

[Meghan Halabisky et al.](#) validated the application of the Australian Water Observations from Space (WOfS) algorithm to the Landsat archive for Africa. This enables near real-time spatial data on surface water dynamics, supporting better understanding of Africa’s water resource changes and long-term water security.

Five papers focus on water quality and pollution.

- Eugenia [López-López et al.](#) investigated water quality changes in Basin of Mexico lakes by comparing historical data from Alexander von Humboldt (a European

naturalist who visited the Americas in 1799–1804) with modern data and noted significant declines due to urbanization and land use change.

- [Eva Bacmeister et al.](#)'s microcosm study showed that in USA streams, suspended sediment concentration has a positive nonlinear effect on nitrogen uptake, which varies by sediment source and size.
- [Jordyn Wolfand et al.](#) modelled contaminants of emerging concern in the Los Angeles River (USA) and reported that increased wastewater reuse reduces contaminant concentrations downstream.
- [Katharine Owens et al.](#) combined scientific data and community input in Uganda, Indonesia, and the USA, discovering stakeholder perceptions of pollution closely matched debris measurements.
- [Camila Campos et al.](#) studied Brazilian Savanna streams, identifying conductivity as the key factor influencing ecological metrics and highlighting that nonlinear responses need to be considered when setting monitoring guidelines.

Three papers address environmental flows and water use efficiency

- [Xiaoying Liu et al.](#) found that environmental water from an irrigation canal helped sustain refuge habitats in ephemeral Thule Creek and boosted productivity in the downstream Wakool River, Australia.
- [Christina Morrisett et al.](#) reported that improved irrigation efficiency in Idaho increased crop yields but also raised water use and reduced river return flows, leading them to recommend a holistic management approach.
- [Meegan Judd et al.](#) surveyed Australian water managers to determine how uncertainty affects decision making, highlighting that more work is required to establish robust decision-making frameworks for environmental water management.

3 Reflections

The Research Topic provides an opportunity to reflect on diverse contributions women are making to freshwater science. It also invites reflection on broader gender dynamics within the field, for which we draw on our own experiences as women in freshwater science in Europe, Latin America and Australia, and relevant literature.

Women have significantly shaped freshwater science research since the 19th century, contributing important insights into ecology and conservation ([Downes and Lancaster, 2020](#); [Togood et al., 2020](#); [Catalán et al., 2023](#)). Today many women are active in freshwater science, including in academia and research; application of freshwater science through policy, planning and management; and leadership of professional associations. The papers in the Research Topic showcase the breadth of their contributions: thought leadership ([Arthington](#)), technical advances ([Halabisky et al.](#)), foundational research ([Bacmeister et al.](#)), applied science ([Campos et al.](#), [Lopez-Lopez et al.](#), [Wolfand et al.](#), [Liu et al.](#), and

[Morrisett et al.](#)), management ([Judd et al.](#)) and community engagement ([Owens et al.](#)).

Despite underrepresentation, women have recently played key roles in freshwater policy and research in Europe and Australia, with rising productivity and a narrowing publication gender gap. However, persistent gender barriers continue to limit women's full participation and advancement ([Downes and Lancaster, 2020](#); [Lester and Rosten, 2020](#)). Fieldwork can present logistical challenges for women, including safety and harassment concerns. Although female enrolment in environmental science programs has increased, women are underrepresented in senior academic and leadership positions, perhaps constrained by the so-called "glass ceiling" effect ([Sánchez-Montoya et al., 2016](#); [Lester and Rosten, 2020](#); [Slobodian et al., 2021](#)). In Latin America, these issues are especially challenging and compounded by patriarchal cultural norms, limited institutional support, and political instability ([Rico, 1998](#); [Márquez-García et al., 2024](#)).

Affirmative action and positive discrimination are helping to address these imbalances. Sector-specific initiatives in the last decade have included Australia's Peter Cullen Water and Environment Trust "Women in Water Leadership" program (Australia)¹, Brazil's "Ictiomulheres" and "Mulheres na Zoologia" collectives, and the recent establishment of the "Red Latinoamericana de Ictiólogas" as part of the Global Network of Women in Ichthyology.

Collections of papers like this Research Topic support greater recognition of women's scientific contributions. All papers in this Research Topic have a woman as first author, with women comprising 52% of all co-authors across all five continents, a significantly higher proportion than in other *Frontiers* freshwater science Research Topics not specifically targeting women. This Research Topic showcases the breadth of subjects women are tackling, often with integrative and interdisciplinary perspectives ([Figure 1](#)). The majority of women contributors to this Research Topic are from the Global North², with only five women contributors from the Global South. This reflects the underrepresentation of women from the Global South in the international literature on freshwater science.

1 Peter Cullen Water and Environment Trust 'Women in Water Leadership Program', <https://www.petercullentrust.org.au/women-in-water/>, viewed 19/07/2025.

2 The United Nations uses the terms 'Global North'; and 'Global South' to refer to the socioeconomic and political differences between developed countries (North) and developing and emerging countries (South) (United Nations Department of Economic and Social Affairs 'What is 'South-South cooperation' and why does it matter?', <https://www.un.org/pl/desa/what-%E2%80%98south-south-cooperation%E2%80%99-and-why-does-it-matter>, viewed 19/07/2025).



FIGURE 1
Keyword cloud³ of the papers in the Research Topic “Women at the Frontier of Freshwater Science”; locations were excluded to avoid bias due to few keywords with locations.

4 Conclusion

The collection of papers in this Research Topic provides some examples of the spectrum of contributions made by women to freshwater science. Collaborative work among researchers and scholars with their students coming from different countries and areas of expertise is quite well represented.

Although the gender gap has been narrowing, partly due to affirmative action, barriers persist, particularly in Latin America and in Africa. It is paramount to identify and celebrate the stories and contributions of women in science in general, and in freshwater science in particular, to raise the visibility of our work and affirm our role in shaping a more sustainable world.

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Generative AI statement

The author(s) declare that Generative AI was used in the creation of this manuscript. WordClouds (<https://www.wordclouds.com/>) was used to generate a word cloud of keywords for the Research Topic papers.

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3 Prepared using WordClouds (<https://www.wordclouds.com/>).

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References

- Catalán, N., Anton-Pardo, M., Freixa, A., Rodríguez-Lozano, P., Bartrons, M., Bernal, S., et al. (2023). Women in limnology: from a historical perspective to a present-day evaluation. *WIREs Water* 10 (1). doi:10.1002/wat2.1616
- Downes, B. J., and Lancaster, J. (2020). Celebrating women conducting research in freshwater ecology and how the citation game is damaging them. *Mar. Freshw. Res.* 71, 139–155. doi:10.1071/MF18436
- Lester, R. E., and Rosten, C. M. (2020). Women in freshwater science: challenges and solutions for achieving equity. *Mar. Freshw. Res.* 71 (2), i–v. doi:10.1071/MFv71n2_ED
- Márquez-García, M., Nuñez-Godoy, C., Eguren, A., Segovia-Salcedo, C., Carrasco-Rueda, F., Püschel, N., et al. (2024). Overcoming gender-related challenges and supporting women in conservation in Latin America. *Biol. Conserv.* 294, 110625. doi:10.1016/j.biocon.2024.110625
- Rico, M. N. (1998). Women in water-related processes in Latin America: current situation and research and policy proposals. *Int. J. Water Resour. Dev.* 14 (4), 461–471. doi:10.1080/07900629849097
- Sánchez-Montoya, M. M., Pastor, A., Aristi, I., del Arco, A., Antón-Pardo, M., Bartrons, M., et al. (2016). Women in limnology in the Iberian Peninsula: biases, barriers and recommendations. *Limnetica* 35 (1), 61–72. doi:10.23818/limn.35.05
- Slobodian, V., Soares, K. D. A., Falaschi, R. L., Prado, L. R., Camelier, P., Guedes, T. B., et al. (2021). Why we shouldn't blame women for gender disparity in academia: perspectives of women in zoology. *Zool. (curitiba)* 38, 1–9. doi:10.3897/zoologia.38.e61968
- Tickner, D., Opperman, J. O., Abell, R., Acreman, A., Arthington, A. H., Bunn, S. E., et al. (2020). Bending the curve of global freshwater biodiversity loss: an emergency recovery plan. *BioScience* 70, 330–342. doi:10.1093/biosci/biaa002
- Toogood, M. D., Waterton, C. J., and Heim, M. W. (2020). Women scientists and the Freshwater Biological Association, 1929–1950. *Arch. Nat. Hist.* 47 (1), 16–28. doi:10.3366/anh.2020.0618