

Examining Gender Authorship in Aquaculture Journals

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WHY LOOK AT AUTHORSHIP ORDER?

Because authorship in peer-reviewed journals is an important factor in assessing professionals in research and science for promotions, future funding, and tenure-tracked positions. Assigning authorship position can be unclear and hold inherent bias; thus it is important to evaluate the process for assigning authorship position.

Challenges:

- Difficult to objectively determine exactly how much work any contributor has put into a paper (Laurance 2006; Tschardt et al. 2007)
- The number of authors listed per paper has grown over the last few decades (Wren et al. 2007). This could be from increased popularity and pressure to conduct more collaborative and cross-disciplinary research, and more pressure to publish from universities and other research institutions

Authorship order has intent, can be politically motivated, and is culturally embedded within a system and the surrounding publication environment.

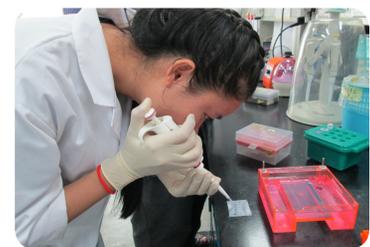
While gender disparities are decreasing in some areas of academia, studies have shown that gender inequities in scholarly literature still persist (West et al. 2013; Breuning and Sanders 2007; Jagsi et al. 2006; Dubey et al. 2016; Arismendi and Penaluna 2016). West et al. (2013) found that men dominate in the first and last authorship positions and women are underrepresented in single-authored papers in more than eight million papers across disciplines in natural sciences, social sciences, and humanities. Other studies have assessed women authorship in disciplines including political science and medicine, and found that a gender gap in published literature still remains and shows levelling off in recent years (Breuning and Sander 2007, Jagsi et al. 2006, and Dubey et al. 2016). While women's representation in science, engineering, technology, and academia has improved in general, studies reveal that women are not remaining in science at the same rate as men – a phenomena called the leaky pipeline (Blickenstaff 2005). This trend could also affect authorship in peer-reviewed literature.

Learning how authorship gender has changed in the aquaculture field over the last few decades is critical for promoting gender equity, for future aquaculture scholarship, and the sustainability of the field.



RESEARCH QUESTION:

Has the growth rate of aquaculture surpassed the proportional growth of women authorship in the field?



OUR APPROACH:

- In the entire JSTOR Corpus (>8 million papers), women hold only 22% of total authorship for papers published between 1665-2011 (West et al. 2013). For aquaculture-related fields such as Ichthyology and Aquatic Ecology, women represent 21% and 9% of total authors, respectively. This research, however, did not explicitly calculate authorship gender for the interdisciplinary field of aquaculture.
- We applied the West et al. (2013) methodology to the field of aquaculture to understand how gender has changed in aquaculture over time. We generated a sub-sample of the JSTOR corpus for aquaculture:
 - 23,000 articles (43,146 authorships) in 8 aquaculture-related journals in the JSTOR Corpus (published since 1913) were assessed for authorship gender.
 - Journals include: *Ambio*, *Copeia*, *Estuaries and Coasts*, *Journal of Coastal Conservation*, *Journal of the North American Benthological Society*, *Limnology and Oceanography*, and *Water and Environment Research*
 - A smaller database of 543 publications in international aquaculture from 121 journals, all published between 1983-2016, was curated for comparison to the two larger JSTOR datasets.
 - The database draws from peer-reviewed papers whose research was supported by four separate international aquaculture programs managed at Oregon State University:
 1. Pond Dynamics/Aquaculture CRSP (1982-1996)
 2. Aquaculture CRSP (1996-2008)
 3. AquaFish CRSP (2006-2013)
 4. AquaFish Innovation Lab (2013-Present)

REFERENCES

- Arismendi, I. and B.E. Penaluna. 2016. Bioscience 1.
Blickenstaff, J.C. 2005. Women and science careers: leaky pipeline or gender filter? *Gender and Education* 17: 369-386.
Breuning, M. and K. Sanders. 2007. Gender and journal authorship in eight prestigious political science journals. *PS: Political Science & Politics* 2: 357-351.
Dubey, D., A. Sawhney, A. Atluru, A. Amritphale, A. Dubey, and J. Trivedi. 2016. Trends in authorship based on gender and nationality in published neuroscience literature. *Neurology India* 64(1): 97-100.
Jagsi, R., D. Phil, E.A. Guancial, C.C. Worobey, L.E. Henault, Y. Chang, R. Starr, N.J. Tarbell, and E.M. Hylek. 2006. The "gender gap" in authorship of academic medical literature -- a 35-year perspective. *The New England Journal of Medicine* 355: 281-287.
Laurance, W. 2006. Second thoughts on who goes where in author lists. *Nature* 442: 26.
Tschardt, T., M.E. Hochberg, T.A. Rand, V.H. Resh, and J. Krauss. 2007. Author Sequence and Credit for Contributions in Multiauthored Publications. *PLoS Biol* 5(1): e18. doi:10.1371/journal.pbio.0050018.
West, J.D., J. Jacquet, M.M. King, S.J. Cornell, and C.T. Bergstrom. 2013. The Role of Gender in Scholarly Authorship. *PLOS*. DOI: 10.1371/journal.pone.0066212.
Wren, J.D., K.Z. Kozak, K.R. Johnson, S.J. Deakne, L.M. Schilling, and R.P. Dellavalle. 2007. The write position. *EMBO Reports* 8: 988-991.



PRELIMINARY FINDINGS AND NEXT STEPS :

%WOMEN AUTHORS IN VARIOUS POSITIONS In Three Databases of Peer-Reviewed Literature

	International Curated Aquaculture Database	JSTOR - Aquaculture	JSTOR - ALL (West et al. 2013)
Any position	16% (7% genders unknown)	14% (20% genders unknown)	22% (23% genders unknown)
Single Author	>1990: 11%	15.8%	All years: 17% <1990: 12% >1990: 26%
First Author	14%	15.8%	19.2%
Last Author	14%	16.5%	19.6%

Table 1: Percent of authors that are women in the International Aquaculture Curated Database, aquaculture journals in JSTOR, and all journals in the JSTOR Corpus according to all authorship positions, single authored papers, and first and last position.

WOMEN AUTHORSHIP BY POSITION OVER TIME: International Aquaculture Curated Database



Figure 1: Rolling average counts of authorship position by gender for three-year periods (1983-2015).

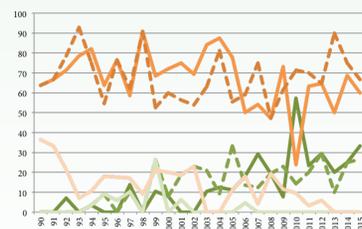


Figure 2: Authorship position as a percent of total papers per year (1990-2015) by gender.

- *Any position:* In the entire JSTOR Corpus, women represent 22% of authorship in all positions. Meanwhile, within the aquaculture literature, the percentage of women authors was consistent for the JSTOR aquaculture journals (14%) and the journals in the International Curated Aquaculture Database (16%).
- *Single-authorship:* The JSTOR Corpus shows a decline in single-authored papers. However, there has been an increase in single paper authorship by women. In the JSTOR-Aquaculture journals, women represent 15.8% of single-authored papers. Meanwhile the result for single authorship by women in the International Curated Aquaculture Database is 11%. Therefore, men were found to be 12x more likely to be a single author than a women in that database.
- *First and last position:* Percentages of first and last authorship positions were comparable for the publications in the International Curated Aquaculture Database and JSTOR-Aquaculture: 14% and 16%, respectively for first authors and 14% and 16.5%, respectively for last authors. First and last author results from the overall JSTOR Corpus for all fields were slightly higher than for the field of aquaculture at 19.2% and 19.6%, respectively.

Based on this analysis, women remain underrepresented as authors in any position in aquaculture journals as compared to the overall JSTOR Corpus.

NEXT STEPS

- Compare the gender of authorship positions over time in the JSTOR Corpus and JSTOR-Aquaculture database with those in the International Aquaculture Curated Database
- Contextualize data from the International Aquaculture Curated Database and JSTOR with the population of women graduates with aquaculture degrees in that time period. For the International Aquaculture Curated Database, genders of both funded personnel and students within each of the four international aquaculture programs will be analyzed.

All photos are courtesy of the AquaFish Innovation Lab.

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