WHICH AUTHOR IS WHICH?

Gender Authorship Position as a Proxy for the Status of Gender Integration in Aquaculture Literature

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While gender disparities are decreasing in some areas of academia, studies show gender inequities in scholarly literature still persist[1,2,3,4].

Learning how gender authorship has changed in the aquaculture discipline is a critical component for promoting gender equity in the academic discipline and broader field of aquaculture.

WHY LOOK AT AUTHORSHIP ORDER IN AQUACULTURE?

Publications are an important factor for assessing professionals in research and academia for promotions, future funding, and tenure-tracked positions.

The process of assigning authorship is NOT always straightforward AND authors listed first or last generally receive the most credit.[5,6]

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

Research Question: Are women publishing in the field of aquaculture proportionate to their involvement in the field?

OUR APPROACH

We generated a subsample of the JSTOR corpus[13] (beginning in 1665) for aquaculture journals (first major journal started in 1913) and corrected for unknown gender designations.

We determined authorship position in 543 international aquaculture publications in a curated database (IACD)[4] from 1983-2016.

We generated a Web of Science subsample of aquaculture journals according to the most reputable journals in the field from 1980-2016 (to contextualize IACD findings), taking impact factor into consideration.

We applied the West et al. (2013) methodology to the JSTOR subsample and Web of Science subsample -- assigning gender in peer-reviewed literature according to U.S. Social Security Database of names.

We analyzed the IACD alongside the JSTOR and Web of Science subsamples and the JSTOR Corpus.

We contextualized the data from the IACD, JSTOR, and Web of Science with the population of women graduates with aquaculture-related degrees over time, the historical context of the aquaculture discipline, and the establishment of discipline-specific journals. As aquaculture degrees were not conferred widely or until relatively recently in academia, assumptions were made to cover the wide range of academic disciplines that could relate to aquaculture (see Figure 1).

WHAT WE KNOW ABOUT GENDER AND AUTHORSHIP IN SCIENTIFIC LITERATURE

Fisheries Discipline	1665-1989	1990-2011
Ichthyology	5.5% Women	13.9% Women
	94.5% Men	86.1% Men
Aquatic Ecology	12.7% Women	24.6% Women
	87.3% Men	75.4% Men

Table 1. Data from West et al. (2013)[1] for Fisheries. Men predominate in first and last positions and women are underrepresented. Data from JSTOR corpus begins 1665; 1989-1990 represents the mid-point for the total number of papers published in the JSTOR corpus.

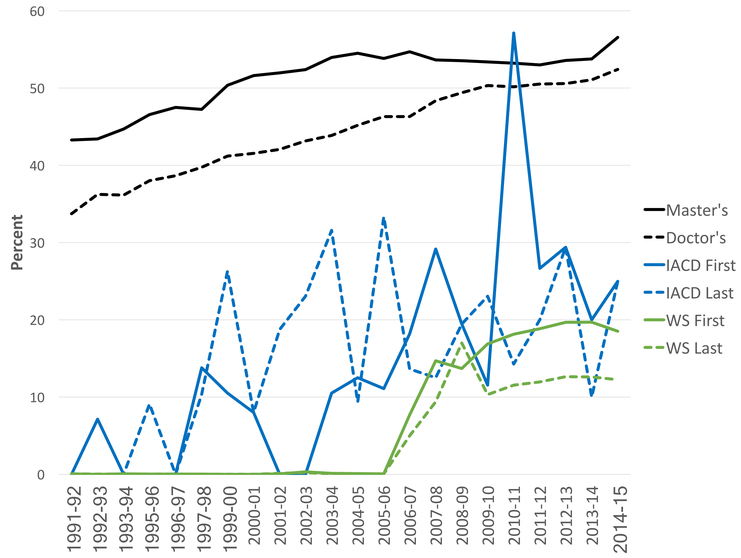

Figure 1. Percent women graduates in science alongside percent first and last authorship positions in IACD (n=1706) and Web of Science (n=496,745) datasets. The percent female graduates are those in agricultural, biological, natural, and social sciences who earned Bachelor's, Master's, and PhD's in the U.S. from 1991-2015. These numbers are from the U.S. Department of Education's National Center for Education Statistics[14].

No studies have assessed gender authorship for aquaculture, but we have applied baseline knowledge of participation in biological sciences and authorship in fisheries science.

- Arismendi and Penaluna 2016[8] found that while women represent roughly half of all biological scientists, their representation as full faculty and managers is much lower, suggesting the perpetuation of a **leaky pipeline**.
- Women have been found to be less likely to be promoted, publish less, receive less grant funding and fewer patents than their male colleagues[9,10,11].

FINDINGS

- While it appears the gap in women authorship is closing, these results still suggest that gender inequities in aquaculture exist, specifically of peer-reviewed literature, as 8-15% is low considering that the proportion of women authorships across the full JSTOR corpus is 22%.
- The information in these data sets can be used by other studies to assess major influences on gender equity in the field of aquaculture including but not limited to funding availability, faculty rank, and other metrics that influence authorship.

Dataset	# Journals	# Articles	#Authorship	Time Period	% Women	% Genders Unknown
JSTOR	2227	1.8 million	2.8 million	1666-2011	16.1%	26.7%
JSTOR Sub-sample	8	23,381	43,146	1913-2016	13.8%	23.7%
IACD	121	543	1706	1983-2016	15.7%	<1%
Web of Science	185		496,745	1980-2016	8.5%	69%

Table 2. Comparison of journal databases used for this study.

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7. International Aquaculture Curated Database is a compilation of over 500 peer-reviewed publications supported by four international aquaculture programs developed by Oregon State University researchers including : (1) Pond Dynamics/Aquaculture Collaborative Research Special Program (CRSP) (1982-1996); (2) Aquaculture CRSP (1996-2008); (3) AquaFish CRSP (2006-2013); and (4) AquaFish Innovation Lab (2013-Present).
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12. JSTOR Corpus journal areas include: cultural studies, arts, business and economics, history, humanities, law, medicine and health, sciences and mathematics, and the social sciences. Aquaculture is within the science and mathematics category.
13. Journals included in JSTOR Subsample: Ambio, Copeia, Estuaries and Coasts, Journal of Coastal Conservation, Journal of the North American Benthological Society, Limnology and Oceanography, and Water and Environment Research.
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