

Gender Bias Also Contributes to the Attrition of Women in Science

Author: Corinne A. Moss-Racusin

Source: BioScience, 63(5) : 318

Published By: American Institute of Biological Sciences

URL: <https://doi.org/10.1525/bio.2013.63.5.22>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

intended to deter forest managers from cautiously exploring AM as a tool for climate change adaptation. In fact, as the climate changes, plantations regenerated using local seed sources are also expected to experience suboptimal growing conditions and changes in the frequency and magnitude of extreme events such as droughts and heat waves; thus, risks exist in the absence of AM, as well. The issues raised here underline the importance of managing risks at reforestation sites through recognized strategies such as employing multiple seed sources, using established field trials to guide seed movements, and exercising caution and humility when calculating migration distances.

JOHN H. PEDLAR
DANIEL W. MCKENNEY
ISABELLE AUBIN
LOUIS R. IVERSON
RICHARD S. WINDER
CATHERINE STE-MARIE
GREGORY A. O'NEILL

John H. Pedlar (john.pedlar@nrcan-rncan.gc.ca), Daniel W. McKenney, Isabelle Aubin, Richard S. Winder, and Catherine Ste-Marie are affiliated with the Canadian Forest Service, part of Natural Resources Canada: JHP, DWM, and IA are with the Great Lakes Forestry Centre, in Sault Ste. Marie, Ontario; RSW is with the Pacific Forestry Centre, in Victoria, British Columbia; and CS-M is located in Ottawa, Ontario. Louis R. Iverson is affiliated with the Northern Research Center, US Department of Agriculture Forest Service, in Delaware, Ohio. Gregory A. O'Neill is affiliated with the Kalamalka Research Station, under the British Columbia Ministry of Forests, Lands and Natural Resource Operations, in Vernon, British Columbia, Canada.

References cited

- Gu L, Hanson PJ, Post WM, Kaiser DP, Yang B, Nemani R, Pallardy SG, Meyers T. 2008. The 2007 eastern US spring freezes: Increased cold damage in a warming world? *BioScience* 58: 253–262.
- Pedlar JH, McKenney DW, Aubin I, Beardmore T, Beaulieu J, Iverson L, O'Neill GA, Winder RS, Ste-Marie C. 2012. Placing forestry in the assisted migration debate. *BioScience* 62: 835–842.

Reyer CPO, et al. 2013. A plant's perspective of extremes: Terrestrial plant responses to changing climatic variability. *Global Change Biology* 19: 75–89.

Seneviratne SI, et al. 2012. Changes in climate extremes and their impacts on the natural physical environment. Pages 109–230 in Field CB, et al. eds. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Cambridge University Press.

Sillmann J, Kharin VV, Zhang X, Zwiers FW, Bronaugh D. 2013. Climate extremes indices in the CMIP5 multimodel ensemble: Part 1. Model evaluation in the present climate. *Journal of Geophysical Research: Atmospheres*. (4 March 2013; <http://online.library.wiley.com/doi/10.1002/jgrd.50203/abstract>)

doi:10.1525/bio.2013.63.5.21

Gender Bias Also Contributes to the Attrition of Women in Science

I read with interest the recent article by Adamo (2013). The underrepresentation of women across many subfields of academic science and medicine is a pressing issue, with serious implications for the future of our national competitiveness and scientific progress. Therefore, I was pleased to see this article exploring potential factors contributing to the attrition of women within the biological sciences and attempting to draw valuable lessons from the comparatively successful retention efforts in medical fields. However, I was struck by the author's omission of a discussion of gender bias as a potential factor contributing to the scarcity of women.

Recent research conducted by me and an interdisciplinary team of coauthors (Moss-Racusin et al. 2012) builds on a large body of social science work and demonstrates that both male and female science faculty members exhibit robust, measurable gender biases benefiting their male students. More specifically, biology, chemistry, and physics faculty members at research-intensive universities across the United States judged a female student to be less competent, less hireable, and less deserving of mentoring than an identical male student and also paid the female student almost \$4000 per year less for a lab manager position. These data suggest that, in addition

to the workload and motherhood factors discussed by Adamo, subtle gender biases favoring men may contribute to the gender disparity within science fields.

Indeed, gender bias may play a direct role in driving women out of science (e.g., if they encounter an obviously biased professor) but could also be playing a more subtle role (e.g., if women's motivation and enthusiasm for science are undercut by inadequate mentoring, unfair pay, and downgraded evaluations of their competence). Therefore, although I wholeheartedly agree that the scientific community should work to identify and interrupt the processes that undermine women's full participation in science, I would argue that gender bias should be considered as a potential cause for the loss of women in science, along with the other variables that Adamo considered.

CORINNE A. MOSS-RACUSIN
Corinne A. Moss-Racusin (corinne.moss-racusin@yale.edu) is a postdoctoral associate with Yale University, in New Haven, Connecticut.

References cited

- Adamo SA. 2013. Attrition of women in the biological sciences: Workload, motherhood, and other explanations revisited. *BioScience* 63: 43–48.
- Moss-Racusin CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J. 2012. Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences* 109: 16474–16479.

doi:10.1525/bio.2013.63.5.22

Too Many Biologists: A Reply from Adamo

I am in complete agreement with Moss-Racusin that gender bias remains a barrier to women's participation in science. This problem was nicely demonstrated in her and her colleagues' paper (Moss-Racusin et al. 2012) and has also been shown previously (e.g., Wennerås and Wold 1997). My article was not meant to be an exhaustive survey of the various factors that impede women scientists. I wanted to focus on one critical issue that I think has been neglected—that is, that the oversupply