

directly related to deforestation and poverty creates accumulations of poorly consolidated coastal sediment, with elevated fluid pressures that make seismically induced landslides inevitable: the Haitian tsunamis of 10 January 2010 were anthropogenic.

Three hundred years of complex interactions in Haiti between humans and their environment culminated in a disaster of unprecedented magnitude. Earth scientists are needed to determine the frequency and magnitude of the causative hazards, yet interactions with anthropogenic factors must be considered in complex disasters. Seismometers, palaeoseismic

reconstructions and effective building codes are essential to reducing future risks. However, socioeconomic and environmental vulnerabilities must be factored in, to provide the best data for effective disaster risk reduction⁷.

References

1. <http://www.nature.com/ngeo/focus/haiti/index.html>
2. Moreau de Saint-Méry, M. L. E. *Description Topographique, Physique, Civile, Politique et Historique de la Partie Française de l'Isle Saint-Domingue* (Société de l'Histoire des Colonies Françaises et Librairie Larose, 1958).
3. Farmer, P. *London Review of Books* **26**, 28–31 (15 April 2004).
4. Lundahl, M. *Peasants and Poverty: A Study of Haiti* (St. Martin's, 1979).
5. Crane, K. et al. *Building a More Resilient Haitian State* (The Rand Corporation, 2010).
6. Hornbach, M. et al. *Nature Geosci.* **3**, 783–788 (2010).
7. Turner, B. et al. *PNAS* **100**, 8074–8079 (2003).

Acknowledgements

Field work for this project was completed under grants awarded to L. Comfort, University of Pittsburgh, by the Widgeon and US National Science Foundations, and additional support came from a NSF Partnership for International Research and Education grant (OISE-0530151), and the Vassar College Environmental Research Institute. M. Morissaint and B. Marcelin provided field logistics. We thank N. Krenitsky, J. Augenstein and M. Siciliano for their valuable insights.

Brian G. McAdoo^{1*} and
Lisabeth Paravisini-Gebert²

¹Department of Earth Sciences and Geography, Vassar College, Poughkeepsie, New York 12601, USA, ²Department of Hispanic Studies, Vassar College, Poughkeepsie, New York 12601, USA.

*e-mail: brmcadoo@vassar.edu

Published online: 13 March 2011

Closed ranks in oceanography

To the Editor — Between 2001 and 2005, women earned 28% of awarded PhDs at the 17 US institutions with physical oceanography graduate programmes, yet only one out of eight talks was given by a female presenter in many of the relevant sessions at the February 2010 American Geophysical Union 'Ocean Sciences' meeting. An analysis of the type of jobs held by physical oceanography PhDs in the United States reveals that for those who earned PhDs from 1980 to 1995, the chances of attaining a tenure-track position were almost equal between men and women. Since then, the situation has deteriorated: for those who earned their PhD between 1996 and 2009, the fraction of women in the tenure track was only about a third of the fraction of men who passed that hurdle.

To investigate the observed gender dichotomy between the research and tenure tracks, we examined career paths of men and women in physical oceanography. Specifically, we conducted a retrospective analysis of individuals who obtained PhDs from six main US oceanographic institutions between 1980 and 2009. We determined the present (or terminal, if retired) position of these 257 men and 92 women by performing searches of university, laboratory and corporate web pages; we located all but ten men and one woman. We sorted individuals into seven categories based on job title and function: tenured or tenure-track faculty, academic research faculty, civil/contract employee at a government laboratory, private sector

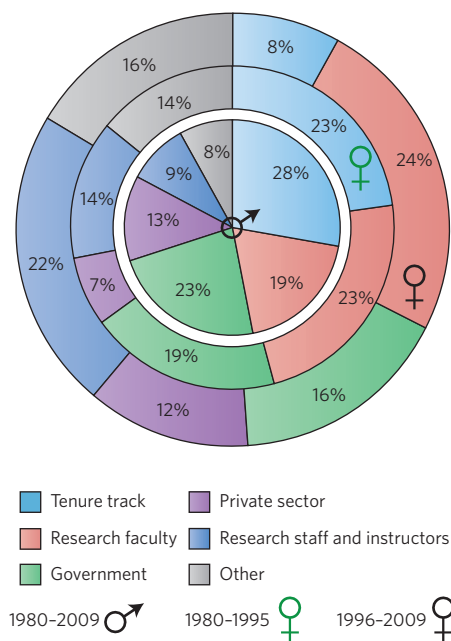


Figure 1 | The gender gap in physical oceanography. Whereas 28% of the men in our sample who earned their PhD between 1980 and 2009 (inner circle) obtained tenured or tenure-track positions, the fraction of women holding these positions dropped sharply from 23% (middle circle) to 8% (outer circle). At the same time, more women were employed as research staff, instructors or research faculty.

position, academic research staff/lecturer and finally those that could not be found or

were not employed in science. We excluded graduates holding postdoctoral positions as of 2009.

We found substantial gender differences, particularly for the second period (1996–2009): whereas about a quarter of all men entered the tenure track consistently throughout time, the fraction of women securing such a position dropped dramatically, from 23% in the earlier period to a mere 8% more recently (Fig. 1, see also Fig. S1).

We suggest two possible interpretations for our results. First, family relationships affect women's academic careers more than men's. Academic women typically have a spouse employed full time¹, and women with children are less likely to enter the tenure track than men². It is possible that more women are choosing to have children and to marry than in previous decades. Alternatively, institutions could have changed hiring practices, putting less effort into balancing the gender distribution of those considered for tenure-track positions to reflect the broader applicant pool. The critical mass for minorities to achieve adequate representation in employment groups is 15% (ref. 3). In our sample, women obtained 20% of the tenure-track faculty positions before 1996, suggesting a critical mass of women in faculty ranks during this time interval. Women awarded PhDs after 1996 obtained only 11% of the tenure-track faculty positions.

We also found that women in physical oceanography were more likely to populate

the research faculty (see Table S1), where positions are fixed-term and funded primarily from research grants. The disproportionate absolute number of men at the full professor rank is probably related to the later arrival of women to the field. However, it is harder to explain the gender distribution of the research and tenure tracks.

In conclusion, although female PhDs are reaching parity with male PhDs in physical oceanography, women are not transitioning to tenure-track faculty positions at the same rate as men — despite compelling reasons for departments to achieve gender equality⁴.



References

1. National Science Foundation *Women, Minorities, and Persons with Disabilities in Science and Engineering: 1996* (NSF, 1996).
2. Mason, M. A. & Goulden, M. *Academe* **88**, 21–27 (2002).
3. Etzkowitz, H., Kemelgor, C., Neuschatz, M., Uzzi, B. & Alonzo, J. *Science* **266**, 51–54 (1994).
4. Holmes, M. A., O'Connell, S., Frey, C. & Ongley, L. *Nature Geosci.* **1**, 79–82 (2008).

Acknowledgements

The authors thank L. Gerber and L. Sindlinger for help with data collection and S. Lozier for discussions that improved the manuscript. The Office of Naval Research provided some of the funding for this work.

Additional information

Supplementary information accompanies this paper on www.nature.com/naturegeoscience.

LuAnne Thompson^{1*}, Renellys C. Perez² and Amelia E. Shevenell³

¹School of Oceanography, University of Washington, Seattle, Washington 98195, USA, ²University of Miami, Cooperative Institute for Marine and Atmospheric Studies and National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratory, Miami, Florida 33149, USA,

³Departments of Geography and Earth Science, University College London, Gower Street, London WC1E 6BT, UK.

*e-mail: luanne@u.washington.edu

Published online: 20 March 2011