



A Community Effort Toward the Retention of Women in Physical Oceanography

BY M. SUSAN LOZIER

Efforts over the past several decades to increase the number of women entering science and engineering fields have largely been successful, with undergraduate and graduate school enrollments averaging between 30 and 50 percent women (Nelson, 2002). Ph.D. attainments show similar progress; however, the percentage of women occupying tenure-track university positions has not risen commensurably. Across the board, women in science and engineering fill on average only 15 to 25 percent of academic positions (Nelson, 2002). Because the number of women in graduate school has been sufficiently large for at least a decade, it is difficult to ascribe the lower percentage of women in faculty positions to a small pool of potential candidates. As reported in the December 3, 2004 issue of *The Chronicle of Higher Education* in the article “Where the Elite Teach, It’s Still a Man’s World,” the disparity between the number of women trained in a field and the number of women occupying positions in that field is instead attributed by some to subtle biases that keep women out of research or academic positions, while others argue that women are consciously choosing alternate careers (to

read the full text, go to <http://chronicle.com/free/v51/i15/15a00801.htm>). The focus of this article and the community effort it describes is on the latter attribution, namely that women are opting out of the “pipeline” in the early years of their scientific careers. Thus, while recruitment efforts on their own should be lauded, we need to also turn our attention to the retention of women already trained in the field if we are to capitalize on the investment that funding agencies and universities have made on the education of women students, and, importantly, if we are to create a scientific workforce whose diversity matches that of the student population and, in a broader sense, that of the US population as a whole.

... we need to also turn our attention to the retention of women already trained in the field if we are to capitalize on the investment that funding agencies and universities have made on the education of women students...

surably. Across the board, women in science and engineering fill on average only 15 to 25 percent of academic positions (Nelson, 2002). Because the number of women in graduate school has been sufficiently large for at least a decade, it is difficult to ascribe the lower percentage of women in faculty positions to a small pool of potential candidates. As reported in the December 3, 2004 issue of *The Chronicle of Higher Education* in the article “Where the Elite Teach, It’s Still a Man’s World,” the disparity between the number of women trained in a field and the number of women occupying positions in that field is instead attributed by some to subtle biases that keep women out of research or academic positions, while others argue that women are consciously choosing alternate careers (to

M. Susan Lozier (s.lozier@duke.edu) is Professor and Director of Undergraduate Studies, Division of Earth and Ocean Science, Nicholas School of the Environment and Earth Sciences, Duke University, Durham, NC, USA.

This article has been published in *Oceanography*, Volume 18, Number 1, a quarterly journal of The Oceanography Society. Copyright 2005 by The Oceanography Society. All rights reserved. Reproduction of any portion of this article by photocopy machine, reposting, or other means without prior authorization of The Oceanography Society is strictly prohibited. Send all correspondence to: info@tos.org or The Oceanography Society, PO Box 1931, Rockville, MD 20849-1931, USA.

Ocean sciences prove no exception to these trends. For example, the number of women receiving their Ph.D.s in physical oceanography has approached 50 percent at most major oceanographic institutions; however, the number of women with a faculty position or a position with principal investigator status remains fairly low. Many factors contribute to the loss of women scientists, such as compe-

Many factors contribute to the loss of women scientists, such as competition between family building and career building, competition between career goals of spouse/partner, lack of female role models, and lack of adequate mentoring.

tion between family building and career building, competition between career goals of spouse/partner, lack of female role models, and lack of adequate mentoring. While some of these problems are best met with institutional changes, the latter problem in particular is one the physical oceanographic community can address. Toward this end, a small group of women physical oceanographers met in the spring of 2004 and decided to plan and implement a mentoring program for junior women in the field of physical oceanography in order to help remove barriers, real or perceived, in their career development. Having secured funding from the National Science Foundation and the Office of Naval Research, our goal is to develop a pilot program within physical oceanography that, if successful, could be expanded to include women in

all areas of ocean sciences. Although the specific challenges may differ, we believe our efforts toward retaining women will also be transferable to the retention of minorities, a goal we heartily endorse.

COMMUNITY EFFORT

Several women within the physical oceanography community serve on a steering committee that is directing

this effort toward the establishment of a mentoring program called Mentoring Physical Oceanography Women to Increase Retention (MPOWIR). These women are:

- Amy Bower, Woods Hole Oceanographic Institution
- Victoria Coles, University of Maryland Center for Environmental Science
- Rana Fine, University of Miami
- Susan Lozier, Duke University (chair)
- Julie McClean, Naval Postgraduate School
- Paola Rizzoli, Massachusetts Institute of Technology
- Lynne Talley, Scripps Institution of Oceanography, University of California, San Diego
- LuAnne Thompson, University of Washington

Although the steering committee is cur-

rently comprised of women only, it is important to emphasize that the lack of retention is not a “women’s issue.” Many researchers in our community—women and men alike—routinely express concern about the advancement of their female graduate students, postdocs, and/or junior colleagues. We have all invested in the careers of these young women; that investment is most often considered in the form of time and effort spent educating, interacting, and collaborating with them on various research projects. When we lose that investment, that talent, and that resource, the community as a whole suffers the loss. It is also important to acknowledge that our investment is also emotional as these young women are part of our relatively small community. When one leaves our field, we lose not just a resource, but a colleague as well.

Because we do not envision the lack of retention of junior women in our field as a problem that only affects women in the field nor one that can be fixed by only the women in the field, a broad spectrum of the community, including men, will be invited to participate in the design and execution of the mentoring program.

THE ROLE OF MENTORS

The Council of Graduate Schools cites a useful summary (Nelson, 2003) of a mentor’s multiple roles: “Mentors are advisors, people with career experience willing to share their knowledge; supporters, people who give emotional and moral encouragement; tutors, people who give specific feedback on one’s performance; masters, in the sense of employers to whom one is apprenticed; sponsors, sources of information about

and aid in obtaining opportunities; models, of identity, of the kind of person one should be to be an academic.” Meaningful and sustained guidance from a senior individual, acting as a mentor with these multiple roles, can be a critical element to success in a scientific career. Alternatively, failure to be engaged in a productive advisor/advisee relationship has been identified as a significant contributing factor to the lack of progress in a scientific career (see *Women Scientists in Industry: A Winning Formula for Companies* [1999]). A mentor can be someone with whom one is actively collaborating, but it can also be someone in a related field who has had experiences that can be shared. The advantage to a young woman of working directly with a mentor might include more frequent interaction and the possibility that the mentor would have more familiarity with her work (Rauss, 2001). However, it is not always possible to find a mentor who has extensive knowledge in a certain field of study. Additionally, it might be more useful at times to a young scientist to have career guidance from someone who doesn’t have a vested interest in their research (Rauss, 2001), but who has a wider perspective on career advancement. Because oceanographers are not always in a place where a mentor can be found locally, it may be important to establish mentoring relationships at a distance or with someone in a related field.

A common argument against formal mentoring programs is that the best mentoring is a spontaneous relationship that arises naturally between a junior and senior person. The counterargument can be that while this is the best kind of

mentoring, it occurs less often for women than men, and that we aim to provide at least basic, minimal mentoring where otherwise there might be none.

Overall, our purpose in focusing on the mentoring of junior women is to break a cycle that is perpetuated by the relatively low number of women in the field. As expressed in Nelson (2002), “Women are less likely to enter and remain in science and engineering when they lack mentors and role models.” If we are able to provide some mentoring that creates an incremental gain in retention, we believe such an increment will provide positive feedback for further gains in the number of women in physical oceanography, and, as a consequence, a positive gain for the community as a whole.

There has been a strong focus on the mentoring of women in science and engineering at many levels during the past decade. In designing our own program, we are fortunate to have many

...our purpose in focusing on the mentoring of junior women is to break a cycle that is perpetuated by the relatively low number of women in the field.

resources to draw from. For example, the Computing Research Association Committee on the Status of Women in Computing Research (CRA-W), active since 1991, has developed a number of successful mentoring programs (more information available at <http://www.cra.org/Activities/craw/>). While we plan to draw heavily from the experience of CRA-W and other such groups, we can-

not simply adopt a program that has been developed from another discipline. A career in oceanography is unique in that it often requires sea time; there are few, if any, industry jobs; the number of geographical locations where oceanography jobs are available is limited; the field has a preponderance of soft-money positions; and the field is relatively small (relative to computing sciences, mathematics, and physics). These factors will all come into play when deciding how MPOWIR’s mentoring program should be designed and what facets of mentoring should be emphasized.

WORKSHOP TO DESIGN A MENTORING PROGRAM

Our initial objective is to hold a workshop for the express purpose of designing a mentoring program for junior women in physical oceanography. Our goal is to provide all women with access to mentors early in their scientific ca-

reers and to provide information to both potential mentors and mentees about the importance of their involvement in this endeavor. The workshop will be held at the Airlie Center in Warrenton, Virginia, from October 9-12, 2005.

This workshop will involve approximately 25 physical oceanographers. We plan to include junior and senior women in this workshop so that we have input

both from the potential mentors as well as the potential “users.” This effort requires buy-in from the junior women and we believe such buy-in will best result when junior women have been active participants in the design of the program. We also believe it is important to have representation from the spectrum of workplaces for physical oceanography. Thus, we plan to invite women from oceanographic research institutions, universities (both large and small), and government labs. With this coverage, we aim to also include women whose primary job responsibility is directed toward research, teaching, or management. Finally, as mentioned above, we plan to invite men to participate in this workshop. Men will continue to provide the bulk of mentoring in our field for many years and we believe it is important to have their input and expertise, as well as their support of this endeavor.

In designing MPOWIR’s mentoring program, it is important to keep in mind that a young woman’s need for mentor-

women to learn skills beyond those with direct bearing on their science—skills useful for negotiation, presentations, teaching, and management.

Information on this workshop and on the MPOWIR effort in general can be found at <http://www.mpowir.org>. We encourage readers to access this site for information, but also to submit comments on our efforts and to complete an online survey.

SUMMARY

The barriers to success for women in physical oceanography, as in other fields, are varied. These include the demands of combining a family with a career that requires a large amount of effort during prime childbearing years, the competition between the career goals of a spouse or partner, and the lack of adequate mentoring. Recent studies and surveys have consistently shown that one of the indicators of success in science seems to be whether or not an individual has a mentor. The physical oceanographic

search, we plan to develop a community-run mentoring program for the purpose of retaining more women in the field of physical oceanography. If successful this program will aid capitalization on the investment the funding agencies and universities have made in the education of women, and it will help create a more diverse scientific workforce. Finally, this program will aid each of us in the community by retaining our colleagues.

ACKNOWLEDGMENTS

This initiative is funded by the Physical Oceanography Program at the National Science Foundation and at the Office of Naval Research. The author would like to thank Jim Yoder and Eric Itsweire, from NSF, and Mel Briscoe and Terri Paluszkiwicz, from ONR. Their sound advice and keen insights have been instrumental in initiating this effort. ☒

REFERENCES

- Nelson, D.J. 2002. *Nelson Diversity Surveys*. Diversity in Science Association, Norman, OK. [Online] Available at: <http://cheminfo.chem.ou.edu/~djn/diversity/top50.html>.
- Nelson, D. 2003. The standing of women in academia. *Chemical Engineering Progress* 99(8):38S-41S.
- Rauss, K.P. 2001. *Navigating the Tenure Track: A Handbook for Scientific Staff*. Woods Hole Oceanographic Institution, Woods Hole, MA, 30 pp.
- Women Scientists in Industry: A Winning Formula for Companies*, 1999. Catalyst Publications, New York, NY, 60 pp.

Recent studies and surveys have consistently shown that one of the indicators of success in science seems to be whether or not an individual has a mentor.

ing often arises when her personal and professional lives are discordant. Toward this end, we plan to pay particular attention to how we can mentor young women as they navigate issues such as dual careers, childbearing, and childrearing. Additionally, we will discuss the importance of creating opportunities for young

community cannot change the structure of family life nor make major organizational changes to the structure of scientific careers; however, it can begin to make a difference in the mentoring of junior women scientists. Thus, under the joint sponsorship of the National Science Foundation and the Office of Naval Re-