

Women ⁱⁿ Oceanography

20 Years of Progress, Change, and Challenge

In the mid-1980s, when I first arrived at Oregon State University as a new postdoctoral scientist, an incident demonstrated to me both the newness of women in science and how all of us can prejudge women. Another woman and I were in the copy room when the machine malfunctioned. There was this rather long, awkward pause while both of us looked to the other to fix the copy machine. We had both presumed the other was a secretary. Dr. Jane Huyer and I had a good laugh over this. It also taught us both a good lesson—we all have preconceived expectations of the female gender!

—Joan Oltman-Shay, President and Senior Research Scientist,
NorthWest Research Associates, Inc.

Though there is still more work to do, the attitudes and ideals of my young women and men colleagues are having a positive impact on the culture of oceanography. As a young oceanographer, my attitude was, largely, to try to fit in, without making many changes. Today, doing things solely on the terms set by earlier male colleagues is no longer the only way to be an oceanographer.

—Rana Fine, Professor, University of Miami

Introduction: An Appreciation for Women in Ocean Science

By Larry Clark, Retired, National Science Foundation (hlclark@attglobal.net)

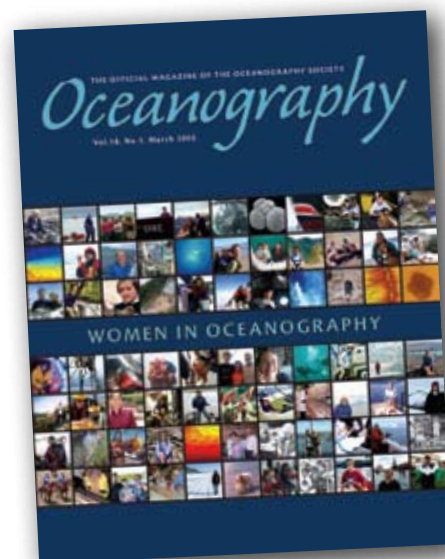
I MAY HAVE a slightly casual view on the changing role of women in ocean sciences. When I went to work at the National Science Foundation (NSF) in 1979, my first two supervisors were women. And when I retired from NSF 27 years later, I answered to a female director of the Division of Ocean Sciences. Along the way, I worked with many very dedicated, talented, and intelligent women who were making a positive contribution to our knowledge of the ocean. For several years, the Director of NSF and the Assistant Director for Geosciences, both women, were ocean scientists. So, I seldom, if ever, thought it strange, different, or extraordinary that the scientist with whom I was working happened to be a woman.

But having said this, I also appreciated the extra effort expended and the pioneering adventures and challenges faced by many women ocean scientists. Numerous stories shared by women described how they had to overcome physical and social barriers on research vessels and while conducting fieldwork, which showed an incredible commitment to career and scientific advancement. This dedication becomes evident in a different way as well. Program managers at NSF and at most federal agencies are reminded, if not directed, to ensure that the composition of review panels, advisory committees, and other

groups are representative of the community. This guidance puts an extra level of pressure on the proportionately small number of women scientists who are called all too often to serve on panels and committees.

A special issue of *Oceanography* (Vol. 18, No. 1, March 2005) celebrates contributions of women to ocean science. Its articles cover a range of subjects and are presented in several formats. Autobiographical profiles describe women in a variety of jobs and careers. But, one thing in common among nearly all the stories about women scientists in this article and in the 2005 special issue is the presence of mentors who provided guidance at critical times in their careers. It is important that we, as individuals and as a professional society, recognize the significance of this collaborative support and seek to mentor those who are a disproportionately small part of our community.

The Oceanography Society (TOS) was established to facilitate such collaborative relationships. Its mission is to disseminate knowledge of oceanography and its application through research and education, to promote communication among oceanographers, and to provide a constituency for consensus building across all the disciplines of the field. TOS has and will continue to encourage student involvement at all its meetings to provide a broad forum for contact with mentors and role models. Many TOS



The autobiographical sketch section of the *Oceanography* special issue on women in oceanography is consistently one of the top three downloads from the *Oceanography* Web site.

members are in positions to be diversity advocates and mentors. TOS recognizes and reports on the disciplinary diversity of oceanography—from biology, to physics, to geology, to resource management. It follows, then, that being advocates for gender and other forms of diversity strengthens oceanography intellectually and better prepares us to respond to diverse social and economic needs.

For this special issue of *Oceanography* celebrating the twentieth anniversary of TOS, our guest editor Mel Briscoe invited several people who have been in the field since the inception of TOS to reflect on how the culture for and roles of women in oceanography have changed over the past 20 years. The following stories and quotes are among the responses we received. ☐

Progress and Challenges for Women in Ocean Science

By Jim Yoder, Vice President for Academic Programs and Dean, Woods Hole Oceanographic Institution (jyoder@whoi.edu)

ALTHOUGH I do not feel comfortable making general comments on the culture for women in oceanography, I can give some specific examples from the Woods Hole Oceanographic Institution (WHOI) that indicate changes have occurred. First, the percentage of women graduate students in the Joint Program has been roughly 50% for more than 10 years, rising from near 0% in the late 1960s and early 1970s, although not all of our five joint programs have a 50:50 male/female ratio. Second, WHOI has five departments, and two of the current chairs are women. Our new director, Susan Avery, is the first woman director of WHOI. Although only about 40% of the applications to our well-known postdoctoral scholar program are from women, there is only a slight down-select for offers. For example, in our most recent competition, 36% of those offered positions

were women, compared to about 38% women applicants.

My experience is that women scientists and administrators have a somewhat different perspective or emphasis than male counterparts, resulting in positive changes to the culture of oceanography. My impression is that women tend to have more interest in interdisciplinary topics, in research that is relevant to societal needs, and in participating in “broader impact” activities (particularly those focused on K–12 education), and they push harder for family benefits in the workplace, for example, on-site day-care. There is less of a gender difference in the attitudes of younger scientists than at more senior levels.

There are still “issues” for women in ocean science. There is the so-called “leaky pipeline” in that women make up a higher percentage of our graduates than of our applications for postdoctoral and junior faculty/scientist positions. Drop out from

faculty ranks is also a problem. These observations, however, beg the question as to why the academic pipeline leaks. Are we advertently or inadvertently forcing women out, or are they making different career choices than men for good reasons? And, if so, what are those reasons? Broad studies of the climate in US academic science show that starting salaries and start-up funds are lower for women scientists than for men, and it seems fair to assume this discrepancy holds for ocean science as well. Finally, sexual harassment at sea, particularly for young women, including graduate students, is still a problem, although the institutions are aggressively seeking to eliminate it.

In the future, I expect to see more women in high positions in ocean science, and the imbalance in salary and other benefits between men and women eliminated. It is difficult to predict how much faster we will see progress in terms of the percentage of women in academic/research positions versus the percentage obtaining higher degrees in ocean science. This is a complicated issue that needs ongoing attention. ☐

There have been so many changes in science in general, and in oceanography in particular, over the past 20 years, I don't know how one separates the influence of the increased presence of women from everything else. Physical oceanography went from a primarily ship-based observational science to one increasingly dependent upon satellites and autonomous vehicles of various sorts. Models finally came of age. So, the whole social structure changed along with the arrival of women.

Working spouses generally have greatly increased the problem of mobility and hiring. That may be the biggest impact on science in general.

—Carl Wunsch, Professor, Massachusetts Institute of Technology

Some (Ocean) Leaders are Born Women

By Marcia McNutt, Director, Monterey Bay Aquarium Research Institute (mcnutt@mbari.org)

IN AT LEAST one very visible and noteworthy way, women have made remarkable progress in the 20 years since the inaugural publication of *Oceanography*: leadership. Of the handful of leading oceanographic institutions in the United States, three of them are now led by their first women directors ever (see photo), a sign of the changing times. The head of the Division of Ocean Sciences at the National Science Foundation, Julie Morris, is also a woman, as was her boss, Margaret Leinen, who served as the Assistant Director for Geosciences until she moved on to other opportunities. The pages of the history books are yet to be written on what the legacy of these women leaders will be—on the culture of their institutions, on the community relations within oceanography, on the visibility of oceanography outside of our narrow field, and on the advancement of women within our discipline. But, these leaders are proof positive that there the glass ceiling has been breached, and that women in leadership positions are not isolated anomalies.

We continue to be concerned in oceanography, and in all areas of science and engineering, about what has been termed the “leaky pipeline.” This term refers to the fact that girls begin their educational careers on par with (or even ahead of) boys in both interest and aptitude for science and math, but gradually opt out. Even graduate departments that are filling their classes



Susan Avery, Director of Woods Hole Oceanographic Institution, Marcia McNutt, Director of the Monterey Bay Aquarium Research Institute, and Shirley Pomponi, Director of Harbor Branch Oceanographic Institute, gather at a meeting of the Consortium for Ocean Leadership.

with roughly equal numbers of female and male graduate students are having a difficult time achieving gender balance in their faculties, despite the fact that they have been graduating significant numbers of female graduate students for many years. There have been many hypotheses over the years trying to explain this leaky pipeline, but to the extent that at least some of it might be lifestyle decisions made by women who find it difficult to balance dual careers, motherhood, and the demands of an academic career, I am excited about the new flexibility offered in the era of observatory-based oceanography. In the

future, when many scientists will be able to receive high-quality, multidisciplinary oceanographic data over the Internet, the playing field will be far more level for those researchers who must live far from the ocean in order to also find employment for a spouse, or who cannot spend a month at sea on account of the need to tend to a young child. Indeed, there will be challenges associated with this new way of conducting our science, but I feel confident that they can be overcome, and will be worth the effort in terms of the additional creative and talented minds they bring to our field. ☐

Perspectives on Contributions of Women to the Culture of Oceanography

By Marie C. Colton, Technical Director, NOAA National Ocean Service (Marie.Colton@noaa.gov)

The invitation to contemplate how women have changed the culture of oceanography arrived just a few weeks after I had read the “Department of Human Behavior” column by Shankar Vedantam in *The Washington Post*. Published March 24, 2008, it was entitled “Unequal Perspectives on Racial Equality.” Typically, according to the article, whites evaluate equality by comparing the past with the present, a perspective that measures the considerable gains from the past. Nonwhites look forward from the present to an ideal future, a perspective that focuses on gains yet needed for true equality. When asked to use each other’s yardsticks, the difference in perspectives disappears, with agreement that substantial progress has been made but there is much yet to be done.

With this idea of perspectives in mind, I invited a sample of women from multiple age groups and marine science disciplines in the National Ocean Service to reflect on their own experiences for validation of women’s progress, and for fresh perspective on what they hope to see in the future.

Culture is defined as the beliefs and institutions of a population that are passed down from generation to generation, including manners, rituals, and norms of behavior. Modern American pop culture is about rapid-fire information, condensed to the essence, often delivered in a shorthand form as “what’s

in and what’s out.” Women I spoke with recounted a number of personal experiences to illustrate the progress of women and their contributions to the culture of oceanography over the last 20 or 30 years.

Looking forward, the “what’s in” column suggests a shifting value system. Women are dominant in some subdisciplines of oceanography, particularly the life sciences, and the competition for fewer positions is raising the bar on individual scientific accomplishment across the board. Acceptance of women in field campaigns and advanced technologies offer alternative workplace assignments. Interdisciplinary collaboration, information sharing, and interest in social

benefit questions require individuals to develop significant team and communications skills. Practical reality regarding marital or family issues is not just about having family leave available; it is about balancing work, personal, and individual demands on time and commitments. Taken together, a “community” value system emerges that is based on personal excellence, teamwork, shared credit, service, and quality of life.¹

Developing alternative credit systems to reward “community” work in the future as part of what defines a successful marine scientist of either gender or any other classification is a significant cultural challenge. For example, recent

What’s In	What’s Out
More women in all marine science disciplines and educational levels	Being the lone female in classes, conferences, departments
“Yes, I teach oceanography”	“No, I teach oceanography, not stenography”
Women at sea are no longer “in the way”	Wearing skirts while taking field measurements
Family leave available for both parents	“Family leave” means leaving your job
Women in higher positions as mentors	No mentors, finding your own way
Safer workplaces for all	Pinups and “it’s just a joke”
Women seeking collaboration, sharing the load, and sharing the credit	“It’s all about me” competition for grants, resources, papers
Women pioneering innovative approaches to ocean literacy and sharing information from “K to gray”	Education and outreach as an afterthought, or only for undergraduate levels and above
Women often drawn to ocean science problems that address a social good	Interest in ocean science problems for the institutional or individual good

¹ Not surprisingly, the real-life experiences of the women in our group, as well as many women in other professions, are translating into the aspirations of our young sons and daughters and their definitions of leadership. In a formal study of nearly 4000 girls and boys ranging in age from 8 to 17, Schoenberg et al. (2008, p. 71) state that, “...girls are signaling that leadership needs to change to fully engage them. [T]he conventional command-and-control model of leadership so prevalent in our culture does not resonate with their desire to make a difference in the world around them.”



From left to right. (1) In the 1940s, professional women were recruited into the ocean service to compute tidal predictions while their male colleagues served in combat. Today, women in NOAA's Ocean Service Center for Operational Oceanographic Products and Services serve in a full spectrum of activities in support of tide and current measurements and analyses such as those shown here: (2) leveling a tidal station; (3) conveying information on water levels directly to resource managers and peers; (4) installing and testing new current meter technology on buoys; and (5) deploying current profilers in ports and harbors to support safe navigation.

National Oceanic and Atmospheric Administration (NOAA) numbers indicate that women are nearly equally represented in critical job categories (e.g., fishery biology, environmental sciences) at entry professional levels, but their numbers decrease steadily up the ladder to only 20% at higher-paid, division-level supervisory categories. Of these positions, many of the higher-ranking women are in deputy rather than director positions.

The women who responded to my inquiries were not certain that greater representation at lower levels was a sufficient condition for more women in leadership positions later. They noted the collaborative community attributes that drew them to environmental professions in the first place are often counter to recognized attributes for leadership positions. Traditional leadership characteristics such as aggressively competing for resources, focusing single-mindedly on work, and self-promotion did not spark the interest that collaboration, community, and quality of life did. Even though family leave is available, many women who had children or other significant

responsibilities at home were reluctant to use these programs fully because they did not want to let anyone down, including themselves. Maintaining this over-achieving equilibrium at work, home, and personally requires so much energy that our best, highly trained women may be taking it upon themselves to opt out of more responsibility at higher levels. The younger women in the group noted how important it was to have senior women mentors to observe how others maintained positive attitudes and balance while also rising in rank and stature. However, these young women also lamented how few senior women exist exactly at a time when the community needs balancing skills to address complicated issues effectively.²

This brief essay describes impressive cultural changes that women have influenced, but it also speaks to the original character traits of the oceanographic community they entered. Open-mindedness, tolerance, high ethical standards, and a technical meritocracy predisposed the initial, mostly male community to include women rather than exclude them. We must draw on

these character strengths again as a more diverse community to assimilate the changes that women and other minorities have influenced. Dedication to closing gender and diversity gaps will require continued effort to recruitment, particularly at higher levels; advocacy for practical assistance with family issues; supportive environments that foster self-confidence and emotional safety; and aspirational definitions of leadership.

Incorporating the complex cultural lessons learned by women as the ocean community moved from competition to global collaboration will surely help all of our colleagues enjoy greater professional and personal satisfaction. We are proud to be part of a community that holds these ideals.

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² Similarly reflected in political representativeness, Lawless and Fox (2008, p. 20) assert that, "A central criterion in evaluating the health of democracy is the degree to which all citizens—men and women—are encouraged and willing to engage the political system and run for public office." This study offers five explanations for women's lack of interest in running for political office that are almost identical to our own small group as well as Girl Scouts: "attitudes about campaigning, levels of encouragement and recruitment, traditional family dynamics, self-perceptions of political viability, and perceptions of the political environment."