Eight Ways to Support Women in Science

Attracting and retaining women in the sciences require action on all fronts: stopping outright harassment, changing institutional cultures, and ensuring that women are included, recognized, and heard.

Attracting and retaining women in science careers require the concerted efforts of everyone involved, like these students pushing the SSV *Corwith Cramer* from a dock in Woods Hole, Mass. Credit: Stewart Jamieson

By Henri Drake 7 June 2019

To succeed in science, women must overcome subtle biases that favor men as well as a culture of overt sexual harassment. These barriers to success result in the underrepresentation of

women in science: In the United States, women receive 50% of geoscience Ph.D.'s but represent only 20% of geoscience faculty positions. The systemic underrepresentation of women in science fosters a culture of sexual harassment, which in turn discourages women from careers in science and perpetuates underrepresentation.

For people who claim more than one marginalized identity, the multiplicative effects of these barriers can be especially severe.

Although calls have been made for senior scientists (https://eos.org/opinions/senior-scientists-must-engage-in-the-fight-against-harassment) to address sexual harassment and break the cycle, a broader cultural shift is required to reach gender equity in science. Ultimately, the majority group (i.e., men, specifically, white men) must step up and share the burden (https://eos.org/editors-vox/women-in-science-a-qa-with-an-editor) of diversity, equity, and inclusion efforts if we are to succeed in making science diverse, equitable, and inclusive.

We focus on binary gender here, but other underrepresented groups in the geosciences face barriers (https://doi.org/10.1029/2017EO071093) on the basis of their ethnicity, nonbinary gender, sexual orientation, economic status, disability, geography, or religion, among other factors. For people who claim more than one marginalized identity, the multiplicative effects of these barriers can be especially severe (https://doi.org/10.1002/2017JE005256). Many of the strategies outlined here can be generalized to improve the diversity, equity, and inclusion of all underrepresented groups in science.

Here we present an eight-point subset of the many available resources and concrete strategies for effecting a cultural transformation. The AGU Ethics and Equity Center (https://ethicsandequitycenter.org/), which launched earlier this year, provides further resources to educate; to promote and ensure responsible scientific conduct; and to establish tools, practices, and data for organizations to foster a positive work climate in science.

1. Stop Harassing Women

Most women in science experience sexual harassment at some point during their career, most of it perpetrated by men (https://doi.org/10.1177/0361684316644838). In the geosciences, field research environments, which can isolate victims from reporting systems and support networks, amplify the frequency and severity (https://doi.org/10.1029/2016EO044859) of sexual harassment. One reason for the prevalence of sexual harassment in science may be the harasser's ignorance of which behaviors are merely inappropriate and which ones constitute

sexual harassment, as defined by a recent report (https://doi.org/10.17226/24994) on sexual harassment of women by the National Academies of Sciences, Engineering, and Medicine (NASEM).

It is widely recognized that sexual harassment includes unwanted sexual touching (unwelcome physical sexual advances, which can include assault) and sexual coercion (favorable professional or educational treatment that is conditioned on sexual activity). However, the vast majority of sexual harassment (https://eos.org/articles/does-your-institution-foster-a-culture-of-sexual-harassment) consists of verbal, unwanted sexual attention or gender harassment (verbal and nonverbal behaviors that convey hostility, objectification, exclusion, or second-class status toward women).

All forms of sexual harassment have quantifiable negative consequences (https://doi.org/10.1023/A:1014387429057) for victims. These consequences include eroding their sense of security in the workplace, slowing their productivity, and causing them to skip professional meetings where they do not feel safe. Men in the scientific community must confront the reality that many of us have sexually harassed women and that the harassment must stop.

2. Listen to Women

Effective listening requires paying attention to, understanding, not interrupting, believing, responding to, and remembering what is being said.
Listening to the scientific and personal experiences (https://blogs.scientificamerican.com/voices/how-men-can-help-women-in-stem-shut-up-sit-back-and-listen/) of women in science is paramount to achieving gender diversity and equity in science. Effective listening requires paying attention (https://doi.org/10.1177/0261927X14533197) to, understanding, not interrupting (https://www.nytimes.com/2017/06/14/business/women-sexism-work-huffington-kamala-harris.html), believing, responding to, and remembering what is being said.

The simple act of listening to women's science promotes their work, while acknowledging the barriers they face validates their experiences and improves the institutional climate.

3. Be an Active Bystander

In addition to not harassing women, it is our responsibility to be active bystanders (https://eos.org/agu-news/nsf-grant-agu-and-partners-aim-at-gender-issues-in-geosciences). When active bystanders suspect or witness potential or ongoing sexual harassment, they step in to diffuse the situation and

support the targeted party. Active bystanders always prioritize the safety of the targeted party over punishing the harasser.

Active bystanders should know the resources relevant to victims of sexual harassment. For example, they should have the number 1-800-656-HOPE (4673), the National Sexual Assault Telephone Hotline, in their phones. They should also be able to provide information to their institution's ombuds' office, which is an independent and confidential party that helps victims of harassment resolve disputes within their institution.

Leaders of scientific institutions should require face-to-face active bystander training because online sexual harassment trainings have been shown to backfire (https://doi.org/10.1002/jcop.10078) and may actually lead to increased workplace harassment. Men should participate in these active bystander trainings when offered, such as at the recent AGU Fall Meeting 2018 (https://agu.confex.com/agu/fm18/prelim.cgi/Session/64044).

How might an active bystander respond to an incident at a scientific meeting? Here are two hypothetical examples:

A male conference attendee aggressively questions a woman speaker and repeatedly dismisses her answers. An active bystander on the session panel might interrupt the questioner and suggest moving on to questions from other attendees.

A conference attendee is holding the arm of a visibly uncomfortable woman who is giving a poster presentation. An active bystander might diffuse the situation by introducing themselves to the poster presenter with a handshake—giving the woman presenting an opportunity to free her arm from the harasser—and standing by to listen to the remainder of her presentation.

4. Implement Policies That Support Victims of Sexual Harassment

The responsibility of implementing policies that support women lies with those who hold most of the power, namely, male institutional leaders (https://muse.jhu.edu/article/168395). Following the recommendations of the NASEM report *Sexual Harassment of Women*, leaders in science should implement the following concrete policies (the report contains a more complete list):

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Leaders of scientific departments, institutions, and organizations must make it clear that sexual harassment (https://www.nsf.gov/od/odi/harassment.jsp) is a form of scientific misconduct

(https://eos.org/agu-news/agu-revises-its-integrity-and-ethics-policy) that carries clear and appropriate negative consequences for proven harassers. When a victim files a harassment claim, the priority of the institution should be to ensure that the victim can safely continue their work.

Institutions need to consider the confidentiality of the target while also directing that person toward systems of support for victims of harassment. Sexual harassment policies should be clear, accessible, and consistent. They should address all forms of sexual harassment, including gender discrimination. Anonymized annual reports should be available to the entire community, detailing statistics of recent and ongoing sexual harassment investigations, including any disciplinary actions taken.

Academic institutions have a poor track record when it comes to punishing sexual harassers, especially when the harassers are faculty members. Disciplinary consequences should be progressive: They should correspond to the frequency and severity of the harassment. For example, disciplinary consequences might escalate from requiring counseling to reductions in pay to dismissal. Progressive consequences have the cobenefits of appropriately punishing harassers and reducing the fear of retaliation for victims. Funding agencies and professional organizations should rescind existing funding and awards from proven harassers.

5. Evaluate Your Personal Biases

Women in science are disenfranchised not only by sexual harassment but also by structural and implicit biases (https://eos.org/features/data-illuminate-mountain-molehills-facing-women-scientists). For example, science faculty (irrespective of gender) view male students as more competent (https://doi.org/10.1073/pnas.1211286109) than equally qualified female students. Similarly, recommendation letters for postdoctoral fellowships in geoscience display significant gender differences (https://doi.org/10.1038/ngeo2819) that favor male applicants.

The first step to eliminating implicit biases is to recognize (https://agu.confex.com/agu/fm18/meetingapp.cgi/Session/50265) and quantify them. Women already count (https://eos.org/opinions/women-count) how well women are represented in conference sessions, panels, papers, and committees. Men should also evaluate the gender balance of their collaborators and departments (http://arementalkingtoomuch.com/) and strive for equal representation. Men should consult existing resources for avoiding bias (https://web.archive.org/web/20180330232154/http://csw.arizona.edu/sites/default/files/avoiding_gender_bias_in_letter_of_reference_writing.pdf).

6. Promote Women Scientists and Their Work

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Combating implicit biases against women in science requires an explicit effort to promote women scientists and their work. When writing papers, cite women. If you can think of only a few women authors to cite, look at those papers and consider the women authors they cite—you may discover relevant papers you overlooked.

When planning invited departmental talks, consider the gender balance of invited speakers and strive for equal representation. If you are struggling to adequately represent women when organizing a panel, searching for a keynote speaker, or covering a recent paper for a media outlet, consider consulting women colleagues or resources such as the Request a Woman Scientist (https://500womenscientists.org/request-a-scientist/) list, compiled by the group 500 Women Scientists. This list contains thousands of women scientists and is sortable by scientific field and level of expertise.

7. Incentivize and Support Inclusion Efforts

Women take on the majority of diversity, equity, and inclusion efforts in science at the expense of teaching and research, often without reward. Institutions should recognize, reward, and incentivize diversity, equity, and inclusion efforts. Such efforts include creating a departmental award for diversity, equity, and inclusion efforts; requiring a diversity statement in faculty applications; and recognizing diversity, equity, and inclusion efforts as positive contributions in promotion packages.

Institutions should encourage men to participate in diversity, equity, and inclusion efforts. Men can be trained as equity advisers (https://inclusion.uci.edu/advance/equity-advisors/) to combat implicit bias and advocate for underrepresented groups, for example. Programs like STEM Equity Achievement (SEA) Change (https://seachange.aaas.org/) provide metrics to evaluate institutional efforts to improve diversity, equity, and inclusion.

8. Hire Women Faculty and Nominate Women for Awards and Leadership Positions

Women are particularly underrepresented in leadership positions in science. They represent disproportionately few geoscience faculty members (https://doi.org/10.1002/9781119067573.ch2);

science, technology, engineering, and mathematics (STEM) department heads (https://muse.jhu.edu/article/168395); and AGU Fellows and awardees (https://doi.org/10.1029/2011EO470002). Institutions should implement policies that encourage the nomination and hiring of women. Such policies include explicit reminders to nominate women for awards; support for existing efforts to nominate scientists (https://doi.org/10.1029/2019EO117855) from underrepresented groups; and hiring clusters (https://www.insidehighered.com/news/2015/05/01/new-report-says-cluster-hiring-can-lead-increased-faculty-diversity) of scientists from underrepresented groups at the same time, a practice that can dramatically improve faculty diversity and institutional climate.

As you can see, promoting diversity in the sciences requires all kinds of efforts, large and small. Individuals can make some of these changes by being observant of their own attitudes and actions and by stepping in to help when they see an opportunity to do so. Other changes require institutional leaders to enact policies and offer training and resources that promote fair treatment. Individuals can influence these larger efforts by advocating for change and by stepping forward to assist with institutional-level efforts.

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7 June 2019: This article has been updated to identify the vessel in the photograph.

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