

DIVERSITY & SUSTAINABILITY IN OCEAN SCIENCE

MARGINALIZED GROUPS IN OCEAN SCIENCE

Like most STEM fields, ocean science has an imbalance in demographic representation from entry level to leadership positions. Although some progress has been made, barriers persist that mean some people do not have equal opportunities to be involved.

CURRICULUM CONNECTIONS

Social Studies; people and groups; stereotypes and societal norms

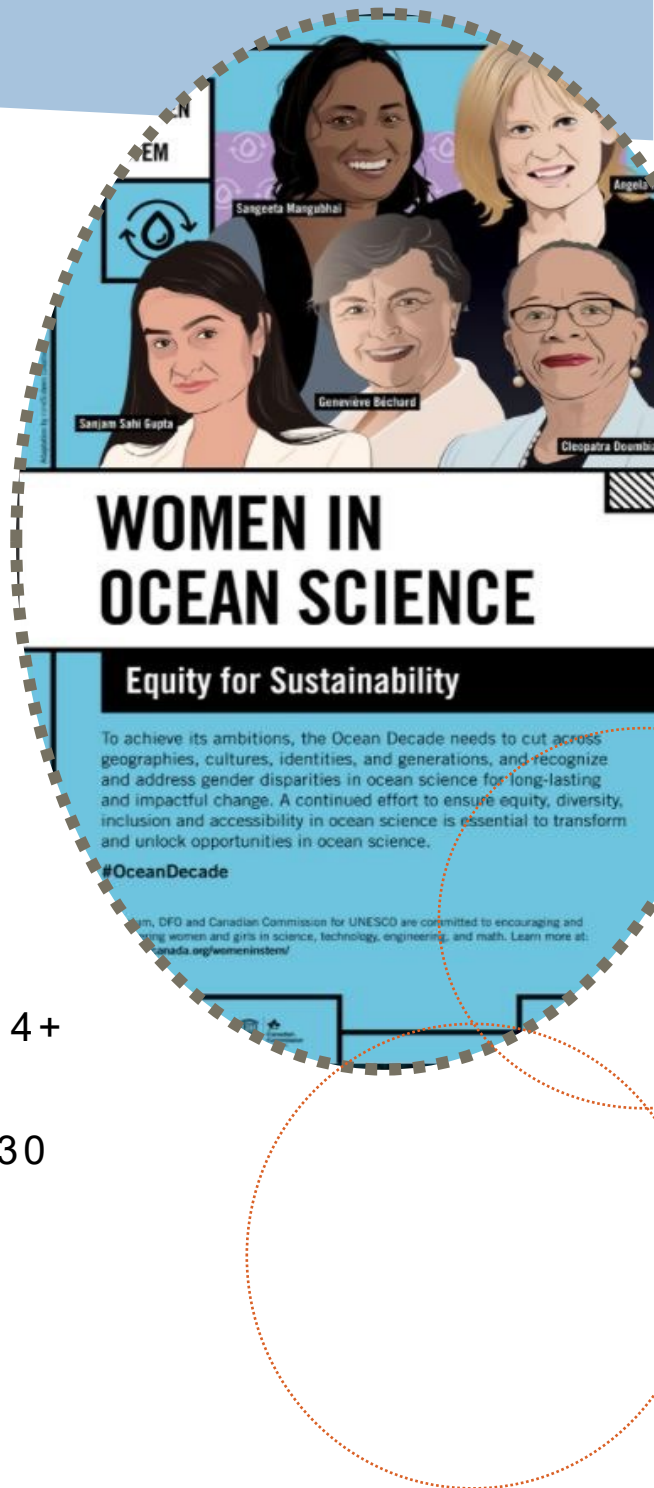
LEARNING OUTCOMES

- **Explain** and **identify** barriers to equity
- **Evaluate** sample cases and empathize with the situation
- **Analyze** and **propose solutions**
- **Discuss** and **engage** with others to share ideas

**SUGGESTED AUDIENCE: GRADES 4+
(AGES 10 YEARS AND UP)**

SUGGESTED GROUP SIZE: 10 TO 30

SUGGESTED TIME: 90 MINUTES



Ingenium, Fisheries and Oceans Canada and the Canadian Commission for UNESCO are committed to encouraging gender equity in ocean sciences.

#OceanDecade

WomenInSTEM.IngeniumCanada.org/ocean-decade/



INTRODUCTION AND BACKGROUND INFORMATION

Although women and non-binary persons have always made contributions to STEM fields, their contributions are often unrecognized, and their underrepresentation further limits their opportunities to contribute. With lower levels of participation, the amount of marginalized groups in leadership roles is even lower, and strategies to consider their needs are overlooked, making these environments less inclusive.

Using ocean sciences as a case study, your students will identify and discuss barriers for women and non-binary persons in STEM. These lessons can be extrapolated to other STEM fields and marginalized groups.



RESOURCES

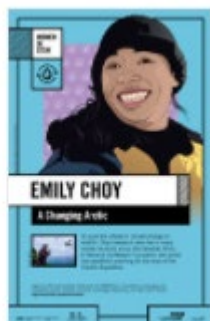
- Gender Equity in Ocean Science video (<https://womeninstem.ingeniumcanada.org/ocean-decade/>)
- List of terms included in this resource
- Definition Cards – cards that define terms
- Scenario Cards – cards that present scenarios where barriers are present
- Modifier Cards – cards that help counter barriers presented on the Scenario cards
- Posters (see list below – free downloads at <https://womeninstem.ingeniumcanada.org/posters/>)



POSTERS

- Amanda Vincent
- Anya Waite

- Emily Choy
- Women in Ocean Science



RECOMMENDED PROCESS

1. Provide the students with a space in which they can listen and share ideas comfortably as a group.
2. A few days before, use resources, such as those suggested above, together with the additional information provided, to learn about women working in ocean science. Are there examples of them overcoming barriers?
3. Introduce concepts based on the United Nations Sustainable Development Goals (SDGs) as they relate to the work of women and marginalized groups in ocean science: Gender Equality (SDG5), Clean Water and Sanitation (SDG6), Reduced Inequalities (SDG10), and Life Below Water (SDG14). Explain the impact that these can have on those working in the field, and the outcomes of their work. For more information on the SDGs, visit sdgs.un.org.





4. Women and non-binary persons have always made contributions to ocean science, and their representation in the field has increased over time. However, there are still barriers to overcome:
 - Although women's rates of participation were higher in ocean science than other fields of science, men still make up more than 60% of the research force.
 - Women's rates of participation decrease with increasing rank, resulting in fewer opportunities to have influence and make decisions.
 - Because of various factors, there are far fewer women graduates in STEM fields.
 - More diverse perspectives in STEM fields results in more ideas, different approaches, and ensures that more voices are heard.
 - By celebrating the contributions women make in ocean science, and empowering them in their careers, we can try and correct the gender imbalance.
5. Review some of the key terms found in the **Definition Cards**. Explain and compare the various barriers, as defined on the **Definition Cards**, so that the students are comfortable with the terms. Explore the different terms used when discussing barriers. You may find it helpful to explore the definitions by comparing related terms: What is the difference between tokenism and representation? What are different "-isms"?
6. Present the **Scenario Cards**, one at a time, and have the students analyze them:
 - a. What is the problem/issue arising?
 - b. What term would you use to describe the barrier being faced? Why?
 - c. Which **Modifier Cards** address the barrier(s) presented in the **Scenario Card**? Do they reduce or eliminate the impact of this barrier?
7. How can we help to reduce these barriers? What can we do as individuals, or as a community? How can you help even if a barrier doesn't affect you?

GUIDING QUESTIONS

1. In this scenario what barrier do you think is present? Why do you think that? The **Definition Cards** can help remind students of the appropriate terms.
2. How do you think this might inhibit or otherwise negatively impact the person's ability to have equal participation in their field? The **Modifier Cards** can elaborate on this question.
3. What solutions could help overcome this barrier in the short term? Are there different long-term solutions or strategies?
4. How can these changes help people affected by barriers?
5. How would they impact the work that people do in ocean science?

ADAPTING FOR DIFFERENT GRADE LEVELS

For grades 4-6, focus on presenting 2-3 related terms at a time in separate lessons, and use the scenario cards that are specific to those terms. Ask them what has led them to their conclusions. The focus should be on knowing what barriers exist and what they look like.

For grades 7-9, you can present a wider variety of terms in fewer lessons, covering multiple scenarios, and use more challenging scenarios. Ask them to propose how one could overcome a barrier.

For grades 10-12, all terms can be explored simultaneously. With each scenario, they should propose solutions. They should also explore how these barriers can be removed or reduced so these scenarios wouldn't arise. You could focus on short-term, mid-term and long-term solutions.



DEFINITIONS

The terms in this table can be found on the **Definitions Cards** provided in Appendix. These cards can serve to remind the students of the definition of the barriers presented in the **Scenario Cards**, as well as terms that can be used to describe the outcomes of the scenarios.

It may be helpful to compare terms that are similar so we've provided some suggestions for these comparisons in the third column. Doing this can help younger students understand the subtle differences between some terms.

Terms	Definitions	Compare with...
Ableism	Prejudice or discrimination based on a person's abilities.	Ageism, Racism, Sexism
Acculturation	Incorporating the language, values, beliefs and behaviours that make a distinct culture.	Assimilation
Ageism	Prejudice or discrimination based on a person's age.	Ableism, Racism, Sexism
Assimilation	Giving up a language, values, beliefs or behaviours to blend in to a culture.	Acculturation
Bias	Prejudiced attitudes or actions against a person or group because of their demographic variables.	Stereotypes
Discrimination	Prejudiced attitudes, actions, or treatment based on a person's demographic variables.	Diversity
Diversity	The inclusion of different social groups, including different genders, races, ethnicities, religions, sexual orientations and identities, or socio-economic statuses etc.	Discrimination
Empathy	The ability to think about and understand the perspective and feelings of another person.	
Equity	The quality of being fair or impartial; freedom from bias or favouritism. People get what they require to meet their needs.	Equality
Equality	The quality or state of being equal or the same. People receive equal treatment, regardless of their needs.	Equity
Explicit attitudes	A person's outward attitudes that they hold consciously.	Implicit attitudes
Gender	The set of behavioral, cultural, or psychological traits typically associated with one sex (e.g., men, women, trans, non-binary).	Sex
Inclusive	That which is broad in scope and includes all people, regardless of demographic or other factors.	Representation, Tokenism
Implicit attitudes	A person's attitudes that exist beyond their conscious awareness.	Explicit attitudes



Terms	Definitions	Compare with...
Intersectionality	<p>The intertwined and additive way in which multiple forms of discrimination (e.g., racism, sexism) combine or intersect to create complex experiences, especially of underrepresented groups.</p> <p>Note. In Canada, there are four designated groups identified under the Employment Equity Act: Women, people with disabilities, Aboriginal peoples, and visible minorities.</p>	Social Location
Racism	Prejudice or discrimination based on a person's race.	Ageism, Ableism, Sexism
Representation	Engaging people of different backgrounds, and valuing their opinions and perspectives	Inclusive, Tokenism
Sex	The biologically-determined categories based on reproductive organs and structures (e.g., male, female, intersex).	Gender
Sexism	Prejudice or discrimination based on a person's sex or gender.	Ageism, Ableism, Racism
Social Location	Where a person 'comes from' in society; the social identities or groups with which they might identify (e.g., gender, ethnicity, nationality).	Intersectionality
Stereotypes	Overgeneralizations of a group of people that are often associated with negative qualities.	Bias
Tokenism	The practice of acting only to prevent criticism and create the appearance of equity (e.g., hiring or promoting a person who belongs to a minority group to make it seem like the environment is diverse or fair).	Inclusive, Representation

DEFINITION

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DEFINITION

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Diversity

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Overgeneralizations of a group of people that are often associated with negative qualities.

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Tokenism

The practice of acting only to prevent criticism and create the appearance of equity (e.g., hiring or promoting a person who belongs to a minority group to make it seem like the environment is diverse or fair).

DEFINITION

SCENARIO CARDS

The text on the **Scenario Cards** (in bold) is followed by an explanation of the barrier being presented (in italics). You can use this as a reference to help guide your discussions.

SCENARIO CARD #1

Issue: sexism

Situation:

Citing safety and productivity, the organizer of a research expedition implements a dress code, listing what crew members must wear: pants and long-sleeved shirts without buttons.

Barrier and possible solution:

The one-size-fits-all dress code doesn't seem to fit a diverse crowd. A list of prohibited garments, based solely on the safety concerns, would be more inclusive.



SCENARIO CARD #2

Issue: sexism

Situation:

Amy (she), a woman of colour, works in a lab. She finds it odd that when she removes her labcoat in the hallway, she's been approached by unfamiliar staff and informed about custodial issues: a spilled drink, or an overflowing garbage can.

Barrier and possible solution:

When she isn't clearly dressed like a scientist, some people presume she's a custodian, simply because she doesn't look like a "real" scientist. It could be because of her sex (sexism), her race (racism), or both (intersectionality).



SCENARIO CARD #3

Issue: sexism

Situation:

Greg (he) is an older man who loves giving his crew nicknames, like “goofball” or “meathead”. When women began joining his crew, he didn’t want to offend them, but wanted them to feel equal, so he would use nicknames like “sweetie” or “cutie”.

Barrier and possible solution:

This misguided approach at inclusion could be considered harassment, since the nicknames are about the appearance of the women. It is also a double standard to presume that women can’t take the silly nicknames he gives to men. Ideally, Greg could act more professionally and not use any nicknames.



SCENARIO CARD #4

Issue: sexism

Situation:

James (he) is known as the ship’s best option for tying knots – it’s been a hobby of his since he was a child. Most crew members seek his help when they need to ensure their knots are done properly. He occasionally teaches some of his male colleagues the knots, but for his female colleagues, he ties the knots for them, because it’s just faster that way.

Barrier and possible solution:

Whether consciously or unconsciously, James is exhibiting micro aggression – he’s willing to show male colleagues how to tie knots, but not the women. Maybe he thinks he’s being a handyman, or that the women have no interest in doing manual labour with their hands. But his different attitudes displayed for women and men is sexist.



SCENARIO CARD #5

Issue: sexism

Situation:

In an effort to make the expeditions less lonely, the leadership on a vessel decide to give women an extra hour of internet access to speak with their families.

Barrier and possible solution:

This is known as benevolent sexism – although the intent isn't malicious, it's still based on the presumption that a woman's values are centred on her role as a wife or mother. It also presumes that men have less of an obligation or interest in family life than women.



SCENARIO CARD #6

Issue: sexism

Situation:

Cathy (she) always takes a male colleague with her when doing diving expeditions. She has never gone alone, and was always paired with men during her training, and feels most comfortable with a male colleague, who probably has more experience than her.

Barrier and possible solution:

Internalized sexism is when an individual has sexist beliefs about themselves. It is often a consequence of a lifetime of exposure to other forms of sexism, which can reinforce a woman's perception of a job not being "her type of work" due to a lack of representation in the field.



SCENARIO CARD #7

Issue: Stereotypes

Situation:

To make the research more efficient, Dan (he) has divided research tasks based on how physically demanding they are, and assigns men the more physically demanding tasks.

Barrier and possible solution:

Dan is assuming all women on his crew are less efficient at physically demanding tasks. If he wants to address efficiency, he should assign tasks based on the abilities of the individuals, not a stereotype that men are better at doing physical work than women.



SCENARIO CARD #8

Issue: bias

Situation:

In university, Steve (he) noticed that there were far fewer women in his math courses. Since there were more men, he assumes that men would be better qualified to do math. He assigns the women more research, and mainly assigns men to analyze the data, but always recognizes the team effort that leads to the findings.

Barrier and possible solution:

Because of historical barriers, there are fewer women role models in math, girls and young women often don't see themselves in math. This can lead to underrepresentation, but in no way reflects the ability of qualified women to do math. Steve's experiences have created a bias.



SCENARIO CARD #9

Issue: tokenism

Situation:

The leadership on a vessel has traditionally been male, but in an attempt to be more inclusive, the position of “assistant leader” is created, filled on a rotating basis, at least one day per week by a woman or non-binary person.

Barrier and possible solution:

Creating non-permanent roles that don't have any real mandate won't change the overall decision-making on the vessel. Pointing to the one day per week a woman is placed in the role of assistant leader as diversity, without any opportunity to provide input is tokenism.



SCENARIO CARD #10

Issue: tokenism

Situation:

To encourage inclusivity, a monthly program brings all the women lab workers together to discuss workplace issues and how it can be improved. The recommendations get passed on to leadership.

Barrier and possible solution:

Although getting recommendations from marginalized group is a positive first step, getting a list of suggestions is just the first step towards real representation



SCENARIO CARD #11

Issue: tokenism

Situation:

In an effort to be more inclusive, an organization decides to employ 3 women in a crew of 10.

Barrier and possible solution:

Simply setting up a quota won't help change the work environment. It could also limit qualified women if there are only 3 dedicated spots for women and 7 for men. Quotas can be used for baselines, but not for overall caps.



SCENARIO CARD #12

Issue: intersectionality

Situation:

Samira (she) is a woman and a person of colour, and the only person of colour working in her lab. A team leader gathers suggestions from his staff on a weekly basis to make the working environment more inclusive. Samira notices that her suggestions based on her experiences as a person of colour race are given more consideration than her suggestions dealing with her being a woman, or that the suggestions of the other women are taken more seriously.

Barrier and possible solution:

By only focusing on her perspective as a person of colour, the team's leadership is not recognizing the intersectionality she experiences. People who don't belong to marginalized groups don't always consider that people can belong to more than one marginalized perspective.



SCENARIO CARD #13

Issue: representation

Situation:

Chris (he) prides himself on being open-minded, and considers himself a good ally to marginalized groups. After reading several case studies, he has a pretty good idea on how to develop a more inclusive working environment for women to prevent harassment on board his vessel.

Barrier and possible solution:

Although he means well, by not consulting with women on his vessel, he might not be aware of the issues he should be addressing. This is sometimes called the “saviour narrative”, where someone from a non-marginalized group tries to be helpful, but may not understand what issues are pressing; Chris’ new policies may have no impact because he lacks perspective.



SCENARIO CARD #14

Issue: double standard

Situation:

Cheryl is very proud of her accomplishments in marine research. However, she has the impression that many of her male colleagues working in the same job as her don't seem to have as many achievements as she does.

Barrier and possible solution:

This is not necessarily a perception issue – women often have to more evidence of competence than men to be accepted for the same role.



SCENARIO CARD #15

Issue: representation

Situation:

Carol has been on over a dozen expeditions, only one of which was led by a woman. When she asked the leader of the organization funding the expeditions why there weren't more women in charge, she was told it's because there aren't many women in the field to begin with.

Barrier and possible solution:

Women are underrepresented in STEM fields, And the further up in leadership, the lower the representation for women and other marginalized groups. This is why affirmative action is important, not only for providing more diverse perspectives, but for visibility to encourage others.



SCENARIO CARD #16

Issue: intersectionality

Situation:

In spite of her PhD, Laura's push to have her research pursued is often given less importance, limiting her ability to add to her qualifications. But not all women are marginalized, those much older than her tend to be more successful in their careers.

Barrier and possible solution:

Regardless of the reasoning for her lack of acknowledgement, inequity challenges can make it harder to participate in STEM fields. The lack of opportunities are one of the barriers that can hinder advancement into leadership positions. Her age may be a factor as well.



SCENARIO CARD #17

Issue: sexism

Situation:

After spending five years as a researcher, Linda has not been able to move up in her career. Male colleagues in leadership positions have offered their sympathy, but that hasn't helped improve her chances for advancement.

Barrier and possible solution:

Although she may have sympathetic supervisors, without the experiences that may differ between women and men in STEM fields, they might not be able to offer advice on the barriers she faces and how to overcome them. Having mentors who have faced these challenges before can be helpful to getting pertinent advice.



SCENARIO CARD #18

Issue: representation

Situation:

Caroline was excited to get accepted into a PhD program in marine biology. But after a few weeks, she realized that there were far fewer women in her program than there were in her previous university education. Because her voice, and those of her female colleagues, are often drowned out, she has begun to feel that she might have made the wrong decision to pursue a higher level of education.

Barrier and possible solution:

Because of the various barriers that exist against marginalized groups, the further along in the career path one goes, the lower the rate of participation. This is known as the leaky pipe.



SCENARIO CARD #19

Issue: double standard

Situation:

Jessica is constantly praised for everything she does, but notices that her male colleagues seem to only get praise for major accomplishments. She dismisses this as just her perception, but when she asks one of her supervisors, he says it's because since women face many barriers, they want to encourage her as much as possible.

Barrier and possible solution:

Jessica is receiving backhanded compliments. Although the intent is to encourage her, constant praise for minor accomplishments is patronizing, and diminishes the recognition of her major accomplishments.



SCENARIO CARD #20

Issue: sexism

Situation:

Melanie is having trouble advancing in her career as an ocean science researcher, so she decides to try and set up a company that performs ocean mapping. However, she is consistently turned down in her requests for loans, and has difficulty finding business models of women founding their own company in ocean sciences.

Barrier and possible solution:

Women consistently have a more difficult time than men at accessing funding and getting loans for starting their own business, facing more difficult challenges when it comes to starting their own business.



MODIFIER

Representation is everything

Women are consistently underrepresented in science and engineering workplaces. This is especially so in senior management positions, where they face a high attrition rate.

MODIFIER

MODIFIER

Girls don't see themselves as scientists

Women are constantly underrepresented in science and engineering workplaces. This is especially so in senior management positions, where they face a high attrition rate.

MODIFIER

MODIFIER

Mentors are awesome

Women have blazed this trail before you, and many of them want to help others succeed.

MODIFIER

MODIFIER

Diversity makes science better

Evidence has shown that mixed-gender teams produce research articles perceived to be of higher quality than single-gender teams.

MODIFIER

MODIFIER

Sexism delays science

Charles Darwin delays publishing the *Origin of Species* by 20 years in part because mentor Adam Sedgwick writes that evolution is an idea that "could have been written by a woman."

MODIFIER

MODIFIER

The leaky pipeline

Women are half the population but hold only about a quarter of the science and engineering jobs in the US. As well, despite women receiving roughly half the PhDs, they only hold less than a quarter of professorships.

MODIFIER

MODIFIER

Biased family leave

The inclusion of different social groups, including different genders, races, ethnicities, religions, sexual orientations and identities, or socio-economic statuses etc

MODIFIER

MODIFIER

Ways of the Queen Bee

STEM women's careers suffer disproportionately from taking family leave. Many fathers do not take paternal leave even where it is available.

MODIFIER

MODIFIER

Trailblazer

Although there is still much work to be done, things are better than they used to be. For this, we owe a huge thanks to the trailblazing efforts of many women in STEM.

MODIFIER

MODIFIER

Tokenism is not inclusion

The Oxford Dictionary defines this as: The practice of making only a perfunctory or symbolic effort to do a particular thing, especially by recruiting a small number of people from under-represented groups in order to give the appearance of gender or racial equality within a workforce.

MODIFIER

MODIFIER

Backhanded compliment

Unfortunately, this happens a lot. Said Voltaire of Emilie du Chatelet (physicist and mathematician), "She was a great man whose only fault was being a woman."

MODIFIER

MODIFIER

Prove it again and again

Women in STEM, particularly women of colour, often have to provide more evidence of being competent to be treated as equally capable as men.

MODIFIER

DEFINITION

Mistaken for a janitor

Almost half of black and latina women in STEM fields have been mistaken for a janitor or admin staff in their own offices.

DEFINITION

DEFINITION

Good girls play nice

Women in STEM report pressure to fill traditionally feminine roles. Asian-Americans report the most backlash for assertive, self-promoting behaviours.

DEFINITION