

# DIVERSITY & SUSTAINABILITY IN OCEAN SCIENCE

## TIMELINE – SHOWCASING UNDERREPRESENTED GROUPS IN OCEAN SCIENCES

While fewer in numbers, scientists from underrepresented groups have made significant contributions to the ocean sciences throughout the years. In this activity you and your class will use a timeline to explore and discuss these contributions. This activity can be easily adapted to other STEM fields.

### CURRICULUM CONNECTIONS

- Social Studies or History; people and groups; stereotypes and societal norms

### LEARNING OUTCOMES

- **Research** and comprehend the history of ocean scientists from underrepresented groups
- **Discuss** and engage with others to share ideas
- **Compare** the situation of ocean scientists from underrepresented group to those from well represented groups
- **Analyze** and propose solutions

SUGGESTED GROUP SIZE: 10 TO 30

SUGGESTED AGE GROUP: GRADES 7 - 9

SUGGESTED TIME: 60 - 120 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/](https://WomenInSTEM.IngeniumCanada.org/ocean-decade/)



**Ingenium**  
Canada's Museums of Science and Innovation



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada



United Nations  
Educational, Scientific and  
Cultural Organization  
**Canadian  
Commission  
for UNESCO**

**Canada**



## INTRODUCTION AND BACKGROUND INFORMATION

Throughout the years, many STEM fields have had an issue of underrepresentation from marginalized groups. This is important because while these individuals are just as able to contribute as other scientists, their underrepresentation can limit their opportunities to do so. Furthermore, this can lead to fewer individuals from marginalized groups in leadership roles, leading to a lack of strategies to consider their needs and make the overall environment less inclusive. To provide some context to this issue, this activity will allow your students to explore the history of underrepresented groups in the ocean sciences and to compare their situation with individuals from groups that are well represented.

**Note:** For this activity, underrepresented groups are being defined from a Canadian perspective. Some examples include women, non-binary individuals, and racial and cultural minorities (such as people of colour or with certain religious beliefs).

## MATERIALS

- Blank wall in your classroom, hallway or even a digital platform
- You may wish to provide a template to your students, such as this example:
- Depending on your approach you may need paper, markers, tape, or pushpins



## HOW TO DO THE ACTIVITY

Timelines are a great way for your class to learn about a topic and how it has evolved through time. Before creating a timeline choose the **period of time** that you wish to study. You may also wish to focus on a **theme** before

**Be creative!** Timelines are flexible so you can choose to construct yours in a number of ways (i.e. use a wall in your classroom or hallway, or create a digital version). You can seed you timeline with major events or discoveries to help set the wider context or highlight major discoveries.

In this resource we focus on the history of ocean scientists from underrepresented groups.



### STEP 1 – PREPARE

- Discuss representation with your class and how certain groups can be underrepresented in various sectors in our society, including among ocean scientists. Some discussion question ideas can be found in the “Guiding Questions” section.
- Introduce the concept of a timeline to you class (if needed).

### STEP 2 – SET UP

- Choose your time period: this will help focus your students and set up your space (wall, digital platform).

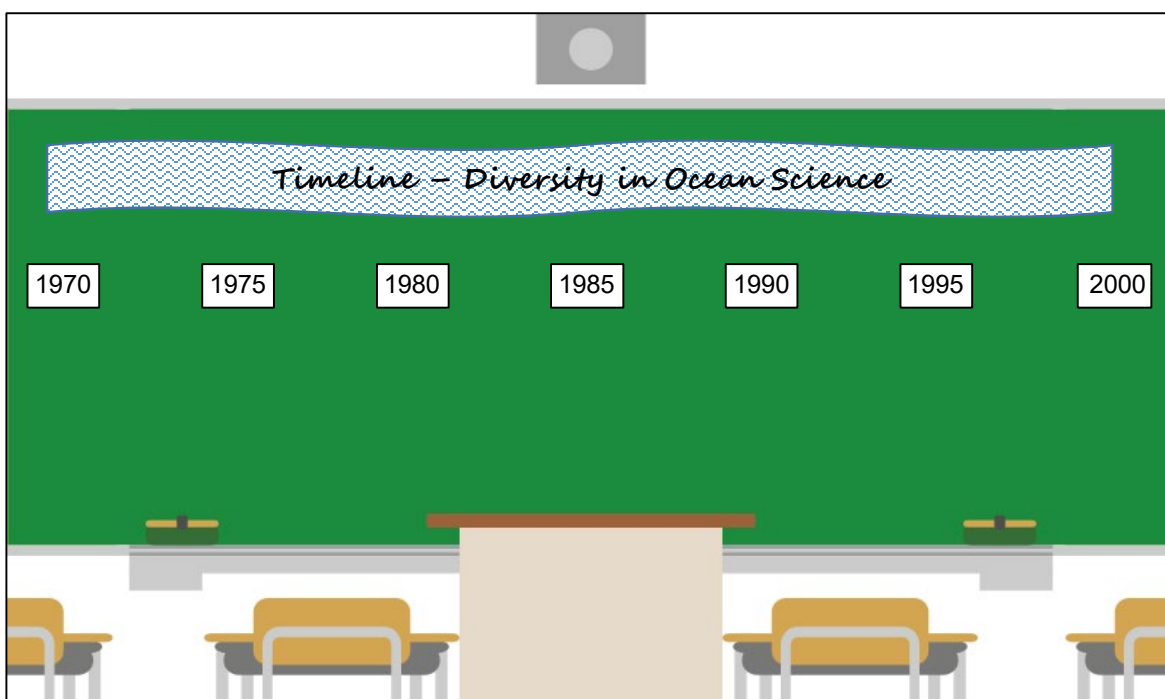


Image modified from: oksmith. (2018) Classroom [Clip art]. Openclipart. <https://openclipart.org/detail/297309/classroom>

### STEP 3 – BUILD

- Task your students (in groups or individually) to find ocean scientists that fit your time period and theme. For each scientist, you may want to capture:
  - ✓ Name
  - ✓ Country/countries in which they worked
  - ✓ Approximate year that they began working as a scientist
  - ✓ If they are from an underrepresented group
  - ✓ One fact about the work that they did.
- Then, create entries for the timeline using this information. You can use the example provided above for inspiration.
- Add each entry on the timeline as a class.
- Place the entries that the students have created onto the timeline (see below). Depending on the size of your class, you can have students share a bit of information about the scientists on the entry as it is being placed on the timeline.

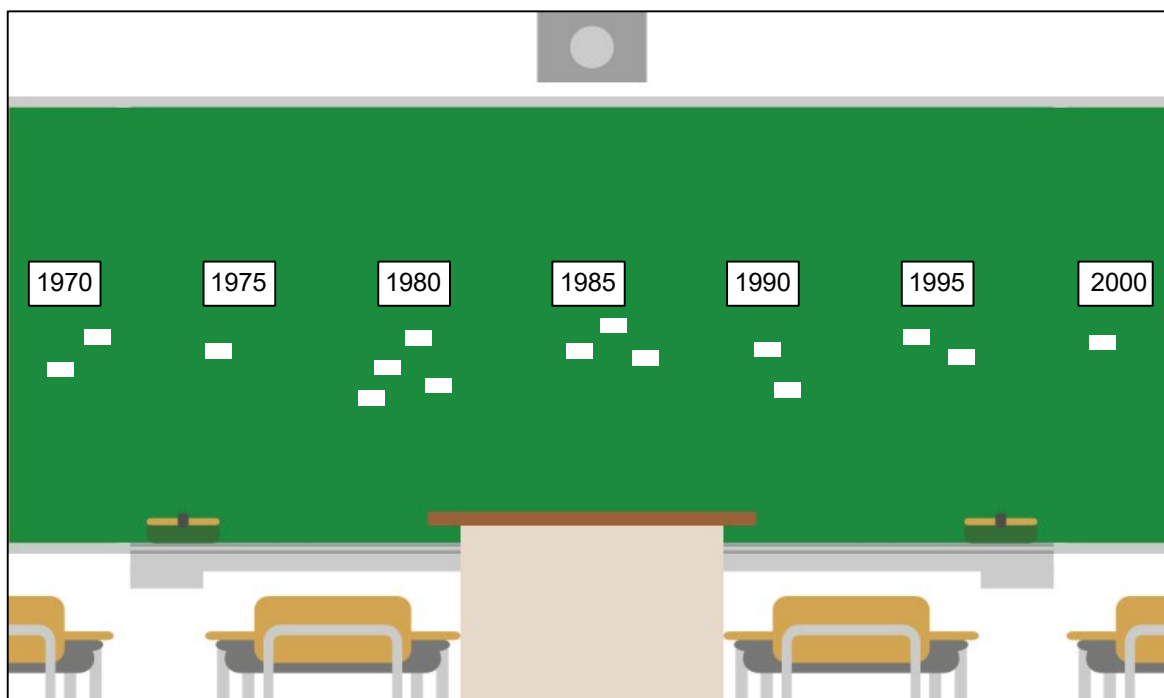


Image modified from: oksmith. (2018) Classroom [Clip art]. Openclipart. <https://openclipart.org/detail/297309/classroom>

- Have an initial discussion with your class about the trends in the timeline as well as anything else that is remarkable. Some trends you could discuss include comparing the number of scientists from underrepresented groups to the rest (there should be less from underrepresented groups), the frequency that certain countries come up and when most of the entries are found.
- For a more in-depth discussion, break your class into small groups (such as groups of 5). Some possible questions that they can discuss can be found in the “Guiding Questions” section. Once they are done discussing, have each group give a short presentation on what they talked about.

**Alternate Idea:** There are many ways in which you can construct a timeline. For example, you can turn your entire classroom into one in which groups of desks represent a time period and the entries are drawings. There are also websites in which you can construct the timeline electronically. Some of these sites are included the “Resources” section.



## GUIDING QUESTIONS

### 1) DISCUSSION QUESTIONS FOR THE BEGINNING OF THE ACTIVITY

- What does representation and underrepresentation mean to you?
- Can you think of any examples of underrepresentation that you've experienced or that you've heard of? How did they make you feel?
- Do you think the underrepresentation of certain groups and privilege is a major issue in Canada? Can you think of any examples? What impact do you think this has on our society?
- Do you think the underrepresentation of certain groups and privilege is an issue among scientists such as ocean scientists? Can you think of any examples? What impact do you think this has on how scientific research is done?

### 2) DISCUSSION QUESTIONS FOR SMALL GROUPS

- Look at some of the timeline trends that you discussed as a class in more detail. What are your thoughts about them? Do you think that these trends are fair? Should fairness matter?
- Based on the trends that you see on the timeline, do you think that underrepresentation of scientists from marginalized groups is a problem? Why or why not? What additional information would you need to make a more informed answer?
- Do you think that the timeline that you created as a class is an accurate representation of the situation? Why or why not?
- How and why do you think that the trends that you see in the timeline became established?
- Look at how the number of scientists from underrepresented groups has changed throughout the years on the timeline. Are these changes what you expected? If yes, discuss why you were expecting these changes. If not, discuss why you didn't see these changes.
- How would the timeline look like if all groups were equally represented? What are the advantages? What are the disadvantages?
- Propose a solution to any issues of underrepresentation that you see in the timeline. What are the advantages and disadvantages of your solution? How easy or difficult would it be to implement your solution?
- Most ocean scientists would agree that representation from all groups is a good thing. Attempts to address this have been made in the past. Yet underrepresentation in the ocean sciences still remains. Why do you think that it is difficult to address this issue?

## ADAPTING TO DIFFERENT GRADE LEVELS

**For Grades 4-6:** Simplify the group discussion questions so that they are mainly focused on identifying the fact that certain groups are underrepresented in the ocean sciences and coming up with solutions.

**For Grades 10+:** Instead of a discussion in small groups, create a research project out of the discussion questions in which your students will need to write a report. Another idea is to create a role playing activity out of the questions in which your students represent different groups of people who are trying to address the issue of underrepresentation and representation.



## RESOURCES

### 1) SOME EXAMPLES OF OCEAN SCIENTISTS FROM MARGINALIZED GROUPS

- Amanda Vincent (featured on an Ingenium poster – see link in next section)
- Anya Waite (featured on an Ingenium poster – see link in next section)
- Emily Choy (featured on an Ingenium poster – see link in next section)
- Eugenie Clark (featured on the Ingenium timeline – see link in next section)
- Farooq Azam
- Helen Irene Battle (featured on an Ingenium poster – see link in next section)
- Robert Kent Trench
- Ruth Gates
- Samuel Milton Nabrit
- Shelly Denny (featured on an Ingenium poster – see link in next section)
- Sylvie Earle

### 2) INGENIUM RESOURCES

- Ingenium - Women in STEM  
<https://womeninstem.ingeniumcanada.org/>
- Ocean Decade – Women in Science, Technology, Engineering and Mathematics  
<https://womeninstem.ingeniumcanada.org/ocean-decade/>
- Ocean Decade – Women in Science, Technology, Engineering and Mathematics Posters  
<https://womeninstem.ingeniumcanada.org/ocean-decade/posters/>
- Timeline – Women in Science, Technology, Engineering and Mathematics  
<https://womeninstem.ingeniumcanada.org/timeline/>

### 3) ONLINE TIMELINE WEBSITES:

- <https://www.adobe.com/express/create/timeline>
- <https://creatly.com/lp/timeline-maker-online/>
- <https://www.timetoast.com/>
- <https://time.graphics/>

### 4) BACKGROUND INFORMATION (EITHER FOR TEACHERS OR STUDENTS)

Black in Marine Science is building a community

<https://penntoday.upenn.edu/news/black-marine-science-building-community>

Profile about individuals trying to increase diversity in the marine sciences

Celebrating women scientists in World Heritage marine sites

<https://whc.unesco.org/en/news/1983>

Highlights some female ocean scientists

Diversifying the Ocean Sciences

[https://tos.org/oceanography/assets/docs/34-2\\_garza.pdf](https://tos.org/oceanography/assets/docs/34-2_garza.pdf)

Thoughts from an ocean scientist about diversifying the ocean sciences



### History of Oceanography

<https://divediscover.whoi.edu/history-of-oceanography/>

Provides a brief history of oceanography (or ocean science) as well as some information about specific topics and scientists

### Making Waves: Notable Women in Ocean Science

<https://oceanservice.noaa.gov/news/womens-history-month/>

Profile of some notable women ocean scientists

### Oceanography

<https://www.nationalgeographic.org/encyclopedia/oceanography/>

Provide a brief introduction to oceanography (or ocean science).

### People known for: Oceanography

<https://www.britannica.com/biographies/sciences/oceanography>

List of significant ocean scientists from both underrepresented groups and groups that are well represented

### Women in Oceanography Still Navigate Rough Seas

<https://eos.org/features/women-in-oceanography-still-navigate-rough-seas>

An article about the difficulties that female ocean scientists face

### Women in Oceanography: Continuing Challenges

[https://www.tos.org/oceanography/assets/docs/27-4\\_supp\\_orcutt.pdf](https://www.tos.org/oceanography/assets/docs/27-4_supp_orcutt.pdf)

An article about the challenges faced by female ocean scientists



## APPENDIX: GLOSSARY OF USEFUL TERMS

<b>Bias</b>	Prejudiced attitudes or actions against a person or group because of their demographic variables.
<b>Discrimination</b>	Prejudiced attitudes, actions, or treatment based on a person's demographic variables.
<b>Diversity</b>	The inclusion of different social groups, including different genders, races, ethnicities, religions, sexual orientations and identities, or socio-economic statuses etc.
<b>Empathy</b>	The ability to think about and understand the perspective and feelings of another person.
<b>Equity</b>	The quality of being fair or impartial; freedom from bias or favouritism. People get what they require to meet their needs.
<b>Equality</b>	The quality or state of being equal or the same. People receive equal treatment, regardless of their needs.
<b>Gender</b>	The set of behavioral, cultural, or psychological traits typically associated with one sex (e.g., men, women, trans, non-binary).
<b>Inclusive</b>	That which is broad in scope and includes all people, regardless of demographic or other factors.
<b>Intersectionality</b>	<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 people and visible minorities.</p>
<b>Racism</b>	Prejudice or discrimination based on a person's race.
<b>Representation</b>	Engaging people of different backgrounds, and valuing their opinions and perspectives
<b>Sex</b>	The biologically-determined categories based on reproductive organs and structures (e.g., male, female, intersex).
<b>Sexism</b>	Prejudice or discrimination based on a person's sex or gender.
<b>Stereotypes</b>	Overgeneralizations of a group of people that are often associated with negative qualities.
<b>Underrepresentation</b>	A state of being represented in numbers that is fewer than expected.