Great Bear Rainforest Activity Plan

How could you catalogue biodiversity in the Great Bear Rainforest?

In this activity, students explore the biodiversity of their own area and make comparisons between it and the Great Bear Rainforest. Students learn how species are catalogued in coastal British Columbia and create their own photo atlas to catalogue biodiversity in their own region.

Learning Objectives

Students will:

- Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world
- Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Experience and interpret the local environment
- Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
- Understand over the course of this activity:
    - taxonomic principles for classifying organisms
    - binomial nomenclature

Preparing for the Activity Plan

Read the background information and preview the videos and websites. If conducting a bioblitz on private property, ensure to get the property owner's permission beforehand.

Materials

- computer and projector
- student computers / tablets / devices
- access to Internet
- bioblitz equipment such as spades, shovels, sieves, and nets (needs will vary with the bioblitz area)
- magnifying devices such as foldscopes, hand lenses, dissecting microscopes, and/or compound microscopes
- digital photography device (cell phone, camera, etc.)
- Blackline Master 1: Biodiversity in British Columbia

Background Information and Resources

The Great Bear Rainforest is known for its rich biodiversity. For background information, refer to the grades 7–9 activity plan What biodiversity exists in the Great Bear Rainforest?. This activity plan can also be used as an introductory activity for students.

As students conduct their bioblitz, consider how their location and equipment may limit the types and numbers of living things they catalogue. For example, larger vertebrates such as birds and mammals may not present themselves during the activity.

Videos

10 Ways to Collect Insects (3:48)
Hakai biologists demonstrate 10 creative ways they catch insects.
https://www.youtube.com/watch?v=ys53gwBmYnA

Fatal Attraction: The Carrion Beetles (2:35)
Carrion beetles are lured into trap using the scent of decaying animals.
https://www.youtube.com/watch?v=Td1fosXnN-M&

Make Some Noise for Bats (0:52)
Researchers use an app to identify bats using the noises they make.
https://www.youtube.com/watch?v=PR2cUUnWSn0

To BOLDly Go (4:36)
This video is an introduction to cataloguing biodiversity.
https://www.youtube.com/watch?v=EI5xj5Sd3xE

Hakai Bioblitz (7:34)
This video introduces the concept of a bioblitz and why a bioblitz is important.
https://youtu.be/ki1TMGCkjVw

Taxonomy: Life's Filing System—Crash Course Biology #19 (12:15)
This video gives an overview of what taxonomy is and its origins, as well as the use of binomial nomenclature.
https://www.youtube.com/watch?v=F38BmgPcZ_I

Informational Websites

Barcode of Life Data System (BOLD)
This website is a cloud-based database and includes related resources developed by Centre for Biodiversity Genomics in Canada, which could be used to identify organisms.
http://www.boldsystems.org/

BOLD Systems—SDP
This is the student data portal of Barcode of Life Data System (BOLD). It provides students with an area to explore public records of species that have already been catalogued, as well as a platform for students to contribute their findings to BOLD.
http://v3.boldsystems.org/index.php/SDP_Home

Biodiversity of the Central Coast
This is a website and app that allows students to search an online field guide of species that have been catalogued along the Central Coast and in the Great Bear Rainforest.
https://www.centralcoastbiodiversity.org/

Great Bear Rainforest
At this website, students can learn about the biodiversity of the Great Bear Rainforest—the information is organized into various categories (e.g., plants, mammals, marine life).
https://greatbearrainforest.gov.bc.ca/categories/biodiversity/

Hakai: Building the Library of Life
This website provides a scrolling story map that gives both information and video footage of the BOLD project working on the coast of British Columbia. It also introduces the concept of biodiversity and the importance of cataloguing it.
https://www.hakai.org/storymap/lifelibrary/index.html

Hinterland Who's Who
This website presents information and photographs of wildlife from various biomes in Canada.
http://www.hww.ca/en/

iNaturalist
Students must sign up for a free account to use this website, on which they can then search species by location or observation.
https://inaturalist.ca/

Delivering the Activity Plan

Access Prior Knowledge

- To get students thinking about biodiversity and the importance of cataloguing it, introduce the website Building the Library of Life. This could be done as an entire class activity, but it would be more powerful to have students scroll through the website in pairs.
- (If students worked in pairs, reconvene the class.) Discuss as a class what students observed. Ask "What is biodiversity? Why is it important to catalogue biodiversity in places likes the Great Bear Rainforest?"
- Show students the video To BOLDly Go, which is a great introduction to eDNA and cataloguing biodiversity. After viewing the video, discuss the techniques that were used. Ask, "Could they do something similar where they are?"

Inquire

- Ask students if they have ever heard of the term "bioblitz," and have them brainstorm what they think it means.
- After they come up with ideas, explain that a bioblitz is simply a concentrated effort to catalogue living things in a given area in a short time.
- Show the video Hakai Bioblitz to inspire them and reinforce the topic.

Experience

- Let students know they will be conducting their own local bioblitz. Depending on your school's location, students could do the bioblitz by:
    - » exploring areas on their own school grounds,
    - » taking a field trip to a local undeveloped or urban space, or
    - » picking a space in their own neighbourhood.
- **Note:** It is important to have the permission of the property owners before conducting this activity. Natural spaces should be left as undisturbed as possible.
- Section off an outdoor space where students identify and photograph any organisms they observe (including the soil if possible). Microorganisms and small organisms could be explored using foldscopes or traditional microscopes.
- For data collection, small groups of students could be assigned a small space to catalogue, or the entire class could catalogue a larger space.

Explore

- Once students have completed their bioblitz, have them work to organize and catalogue the species they found. Suggest that it would work best if they were to organize their specimens into groups (e.g., insects, worms, flowers, etc.). Depending on the timing of this project, organizing and cataloguing of species could be an opportunity to introduce taxonomy. If students are just learning about the concept, you might show the video Taxonomy: Life's Filing System—Crash Course Biology #19 to start this discussion.
- Have students explore the information sources below as they begin to catalogue and identify their organisms:
    - » On the website Barcode of Life Data system (BOLD). students can explore previously submitted samples in various databases by using a search bar. To use the search bar, students must first go to the "Explore" tab. Students can search by common name, scientific name, or simply keywords.
    - » On the website iNaturalist, students can create a free account to search previously catalogued samples.
    - » Students can ask local experts to help identify samples. Invite experts in yourself or have students reach out.
    - » Students can use traditional ecological knowledge shared by an Indigenous Elder or expert you invite to your school.

Making Connections

Refer to the section on "Involving Local First Nations Communities" in the *Science First Peoples Teacher Resource Guide* (Secondary) for further information on the subject.

This resource is available on the First Nations Education Steering Committee website: http://www.fnesc.ca/learningfirstpeoples/

- Then, have students organize their findings into a photo atlas and conduct additional research to find more information about each species (e.g., classification, scientific and common names, general characteristics, and distribution across British Columbia).

Read and Reflect

- Once students have completed their photo atlases, pose the question: How would their photo atlas compare to a photo atlas of the Great Bear Rainforest? Blackline Master 1: Biodiversity in British Columbia is provided below to guide students reflection on this.
- These websites could be used to research the biodiversity of the Great Bear Rainforest:
  - Biodiversity of the Central Coast
  - The Great Bear Rainforest Education and Awareness Trust website (see the information at the "Gallery" tab)
  - Great Bear Rainforest
  - Hinterland Who's Who

Watch and Listen

- To show students ways biologists collect specimens or observe organisms, consider sharing these videos:
  - 10 Ways to Collect Insects
  - Make Some Noise for Bats
  - Fatal Attraction: The Carrion Beetles

Assess

- As students are conducting the bioblitz, pay attention to the following:
    - Did students make an effort to catalogue many possible organisms in their space?
    - To what extent were students able to make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world?
    - How did students work collaboratively and individually to plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)?
    - Did students use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data?
    - To what extent did students experience and interpret the local environment?
    - Were students able to apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information?
- Photo atlases could be assessed for accuracy and attention to detail, including the following:
    - Did students use taxonomic principles to classifying organisms?
    - Did students use binomial nomenclature to name the organisms they discovered?
- During the reflection, did students thoroughly and thoughtfully compare the biodiversity in their region to the Great Bear Rainforest?

Go Beyond

- In the same way that researchers submit the samples they find after a bioblitz, students can add to the Barcode of Life Data System (BOLD) using the Student Data Portal of BOLD. Teachers must register a course on the site beforehand.
- Students may wish to present their photo atlases. As a class, students could discuss what was similar and different about each catalogue, further share what students found in their comparisons with the Great Bear Rainforest.

Blackline Master 1

Biodiversity in British Columbia

Reflecting

Now that you have conducted a bioblitz, what was successful and what was challenging about conducting this activity? Do you think your catalogue is an accurate representation of the biodiversity in your area? Why or not?

Think about the biodiversity in your area. Would you consider it biodiverse? Why or why not?

How does the biodiversity of your area compare to the biodiversity of the Great Bear Rainforest? Try to explain any observations you are making. Use the Venn diagram below to organize your observations: