

Endeavour Hydrothermal Vents: Canada's First Marine Protected Area

Activity II

Special Places

Timeline - 45 minutes to 1 hour.

Grade Levels 4-8

Materials and resources

Backgrounder pages

Chemosynthesis vs. Photosynthesis page

Glossary

Diversity document (optional)

Sticky notes (optional)

Overview – What makes a special place? To humans, a special place may be due to pleasant memories, good feelings or many other things, and to other living things it may be a place that provides the necessities of life. Sometimes there are unique adaptations that allow organisms to survive in their special places, such as heat and cold tolerance in intertidal organisms.

Pressures are often placed on special places that can threaten their very existence, creating the need for protection.

Curriculum Connections

Grade 4 – Science -Communication, Creative thinking, Critical thinking

- all life is interdependent on its environment
- energy comes in a variety of forms that can be transferred from one object to another.
- the way organisms in ecosystems sense and respond to their environment.
- energy has various forms and is conserved
- features of biomes

Grade 5- Science - Communication, Creative and Critical thinking, Social Responsibility

- humans use earth materials a natural resources.
- multicellular organisms have organ systems that enable them to survive and interact within their environment.
- sustainable practices
- local types of earth materials
- the nature of sustainable practices around BC's living and non-living resources.

Grade 6 –Science - Critical thinking

- multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment.
- force of gravity

English Language Arts

- elements of non-fiction texts

Grade 7 – Science - communication, creative thinking, critical thinking, social responsibility.

- the theory of evolution by natural selection provides an explanation for the diversity and survival of living things.
- natural selection, survival needs and interactions between organisms

English Language Arts

- elements of non-fiction texts
- access information and ideas for diverse purposes and from a variety of sources and evaluate their relevance, accuracy, and reliability.

Grade 8 – Science – Communication, creative and critical thinking.

- characteristics of life
- the theory of plate tectonics is the unifying theory that explains Earth's geological processes.
- plate tectonic movement
- layers in earth
- the relationship of micro-organisms with living things
- photosynthesis (vs. chemosynthesis)

English Language Arts

- Create and communicate – presentation techniques

Special Places – the Activity

Read Backgrounder sections on:

(There are short answers for grades 4 and 5, optional)

1)What is a Marine Protected Area ?

2)Canada's Network of MPA's

3)Endeavour - Becoming an MPA and why?

Introduction

All living things have basic requirements to survive. Adaptations to the features of their environment enable organisms to live in their “special place”. An example of a unique adaptation is chemosynthesis, a process to produce nourishment in a dark environment. Due to a complete lack of light, creatures of the abyssal zone use this process. Photosynthesis and chemosynthesis are both processes by which organisms produce food; photosynthesis is powered by sunlight while chemosynthesis runs on chemical energy. (see chemo vs. photosynthesis page)

Our knowledge of chemosynthetic communities is relatively new, brought to light by ocean exploration. The thriving communities associated with hydrothermal vents shocked the scientific world when humans first observed a vent on the deep ocean floor in 1977.

The discovery of hydrothermal vents and cold-water methane seeps gave us a new vision of primary production in the deep sea. The irony is that once scientists knew what to look for, they went to other well-known ecosystems that were rich in hydrogen sulfides, such as salt marshes, and found the same mutualistic association of chemosynthetic bacteria and animals that had stunned them in the deep vents.

No one had ever thought to look for them, but these communities were there all along.

Marine Protected Areas have been created to protect such “special places”, which are chosen for their uniqueness and vulnerability to human intervention.

Activity

Students brainstorm what a special place is to each of them, what makes it special, and then discuss their individual special places. (concept from Get Outdoors, Wild BC)

Examples of what makes a special place - Feeling safe, warm, comfortable, happy, content, loved. Scents, sounds, and aesthetics also can make a place special.

Have students close their eyes and imagine their special place. Ask them to observe what things make this a special place to them. Ask them to keep these thoughts as they will be asked to discuss.

Students get together in groups of 3-4 and share their special places and characteristics. (these can be jotted down on sticky notes) The groups then find the key items that are common in the groups and present to rest of class.

Discussion – What things were in common to some of the groups? Were there any unique items?

What things make the Hydrothermal vents a ‘Special Place’ for it’s residents? There are species that are endemic to the Endeavour hydrothermal vents (meaning they only exist there). Why wouldn’t you find these same species in other areas of hydrothermal vents in the world?

Evaluation

Why do we try and protect special places?

What makes a special place for you?

If this place is the only environment that you could survive in, would that make you unique? (Endemism) Would it make you vulnerable?

What is a Marine Protected Area and why does Canada have them?

How does the MPA designation protect the Endeavour Hydrothermal Vents area?

Extension: (optional)

Read Diversity document to class and discuss how diversity plays a role in survival.

References

Chemosynthesis - <http://oceanexplorer.noaa.gov/facts/photochemo.html>

Get Outdoors, Wild BC publication - <http://hctfeducation.ca/product-category/books-and-guides/>