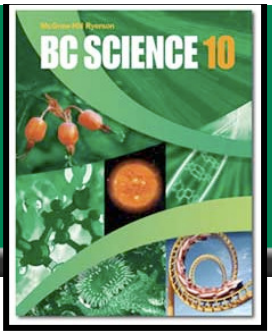
These notes are posted on my site for the following reasons:

- for students to copy in their own hand-writing
  - in order to complete their class notes
  - if student did not have enough time in class
  - if student was away and missed this section
- for assistants and tutors to follow progress of the concepts taught

Photocopied/printed notes can not be used during the Unit Notebook Check in class.

ndupuis@sd61.bc.ca dupuis.shawbiz.ca

3.1 How Changes Occur Naturally in Ecosystems

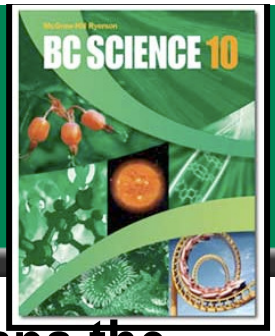


- When an organism is born, it belongs to a species, but it also is born with unique characteristics.
  - Like humans with different coloured eyes and different heights.
  - Sometimes, these unique characteristics give that individual an advantage within their niche. ie, a salmon with a slightly larger tail may be able to swim a little faster or a little farther in a river.
- Natural selection is the process where individuals with advantages are better able to reproduce and pass along their traits.

  - Those with unfavourable characteristics have less chance to reproduce and pass along their traits.
    - A salmon with a smaller tail may never have a chance to spawn because it can't swim to the correct location.

See pages 108 - 109

How Organisms Adapt to Change

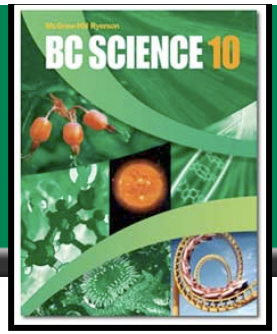


- **The Galapagos Islands, off the coast of Ecuador, are perhaps the most famous example of natural selection.**
  - **Many species on these islands are very similar to each other, and also to species on the South American continent.**
    - **There are thirteen species of finch on the islands.**
    - **Each is descended from a finch species from the mainland.**
    - **Each species has very unique characteristics that allows them to thrive in their own niche, and not compete with other finches for resources.**
- **<u>Adaptive radiation</u> is the term for this type of natural selection.**
  - **Many different species appear from one original species.**

Galapagos finches

See page 110

How Ecosystems Change Over Time: Primary Succession

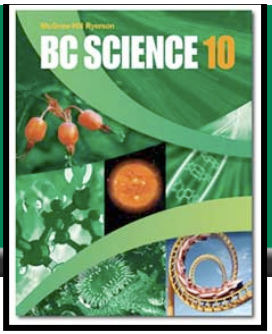


- **Ecological succession refers to the changes in the biotic characteristics in an area over time.**
  - Over time, the life in an area changes
  - There are two types of ecological succession: primary succession and secondary succession.

1. **Primary succession - begins with nothing but bare rock**
   - Where glaciers scrape away dirt, or a volcano erupts
   - Wind carries spores of lichens and organisms that can survive and eventually, combined with the weathering of rock, help form soil.
   - The first organisms to survive and reproduce are pioneer species.
     - Pioneer species alter the abiotic and biotic environment in some way.
     - Soil improves, plants are able to grow, animals begin to appear.
   - Primary succession occurs in this way in all parts of the world.
   - This stage can last for hundreds of years, until a mature community eventually forms.

See pages 111 - 113

How Ecosystems Change Over Time: Secondary Succession

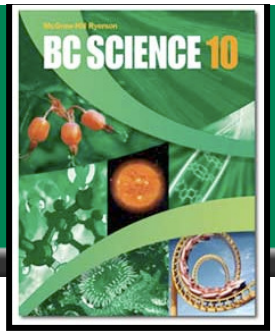


- **Mature communities are very stable, and can appear to be unchanging over long periods of time.**
  - **These are also known as climax communities, but "mature" correctly implies that there are still changes occurring, albeit more slowly.**

2. **Secondary succession - after a major disturbance in an area that already has soil and once had living organisms.**
   - **Forest fires are the most common reason for secondary succession.**
   - **The soil remains for plant growth, and contains seeds, micro-organisms, earthworms and insects.**
   - **Secondary succession is much more rapid than primary succession.**
     - **There is already soil, seeds and insects, so it only lasts decades.**

See page 114

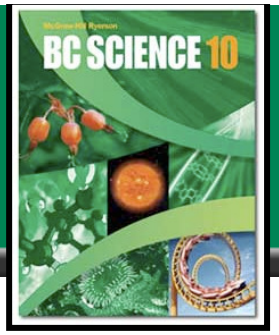
How Natural Events Affect Ecosystems



- Many other disturbances can affect mature communities.
- Flooding
  - Water is not contained within natural or artificial barriers.
  - Generally occurs in locations where water levels can change rapidly.
  - It can result in soil erosion, as well as the spread of pollutants and harmful bacteria associated with wastes.
  - Climate change and global warming may be increasing incidents of flooding.
  - A tsunami occurs when huge waves, from large earthquakes or volcanic eruptions, floods coastal areas.
- Drought
  - Occurs when an area receives a lower than average amount of rainfall over a very long period of time.
  - Prolonged drought can have severe effects on organisms.

See pages 115 - 116

How Natural Events Affect Ecosystems (continued)



- **Insect infestations**
  - Many insects play important roles in their ecosystems.
  - Even insects that appear destructive, such as the mountain pine beetle, actually play a role in the renewal of the forest.

    - The beetles even have a symbiotic relationship with a species of fungus that inhibits the trees' ability to use resin for protection.
  - However, when normal conditions are changed, infestations can occur.
    - Trees can be stressed from overcrowding, drought or animal grazing, and do not resist the insects as effectively.
    - A warmer climate, and lack of forest fires, allows the insects to spread much more effectively than in the past.
  - Not only are the trees affected, but so is the entire forest ecosystem, as well as any human industries relying on the forest.

See page 117

Take the Section 3.1 Quiz