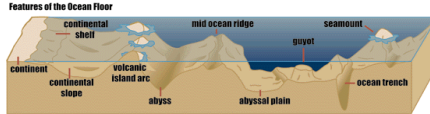


## OCEAN BASIN & DRAINAGE

The Earth is in a constant state of change. The **Theory of Plate Tectonics** explains how the lithosphere (crust of the Earth) is in pieces and these pieces are moving because of convection currents in the magma. Some of these plates are moving toward other plates, some are moving away and some are moving in opposite directions beside each other.



The changing lithosphere affects the drainage patterns of the continents. The Continental Divide marks the division whereby the rivers drain west and east from the divide. Continental drainage systems were also created and are affected by the movement of ice.

## GLACIERS

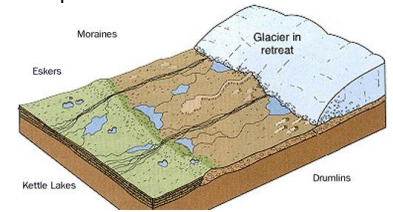
Large bodies of moving ice are called **glaciers**. Those covering large areas of land are called **continental glaciers** or **icecaps**. Continental glaciers cover Antarctica and Greenland. Glaciers also form high in the mountains and move through valleys between mountain peaks. These are called **valley glaciers**. As glaciers move, pieces of rock – embedded in the ice help to shape the landscape by gouging out chunks of the land as the glacier moves.

Glacial movement depends on the climate. In colder climates, little melting occurs and the glacier continues to grow or move forward (this is called an **advancing glacier**).

If the climate is warmer, the glacier melts faster than it grows and leaves the rocks, soil and large boulders it once contained. These glaciers are called **retreating glaciers**.

## GLACIAL LANDFORMS

As glaciers advance or retreat, they create specific **glacial features** across the landscape.



Another glacial feature, an **erratic** - a large boulder (piece of the mountain carried by the glacier to the valley floor). Many are found where retreating glaciers have left them, like the world's largest near Okotoks, AB, CA



## CLIMATE

Climate is the average weather measured over a long period of time. Large bodies of water, like the oceans and the Great Lakes, influence the weather and the climate in their regions. Water holds the heat longer than most substances and so cities that are close to large bodies of water have warmer climates.

The main effect that water has on climate is that **extreme temperatures are less likely to occur in cities near large bodies of water**, because water heats up and cools down very slowly – whereas in places where there is not very much water, the land heats up quickly and cools down quickly – and that is where the extremes are felt.

The **rain shadow** created by the Rockies makes the climate very dry on the East side of the Continental Divide.

## OCEAN CURRENTS

Ocean currents can also affect climate. Currents are streams of water that move within a larger body of water. They can be caused by: wind, temperature differences in the water, salinity differences in the water and Earth's rotation.

Currents cause water to move from place to place. Surface currents are caused by steady winds. The currents that affect Labrador and Scotland are surface currents. If they start near the equator (like the **North Atlantic Current** does), they are warm. If they start near the North Pole, they carry very cold water (like the **Labrador Current** does). When the current flow to their respective shores, they can influence the climate of the land. The temperature of the ocean current not only affects the **air temperature**, but they also affect the **amount of precipitation** that an area receives. Warm air (warm currents) hold more moisture than cold air (cold currents).

## DIVERSITY

Diversity refers to the variety of different kinds of organism species (both plant and animal) living in a particular ecosystem or environment. A rich variety of organisms living and interacting within a water ecosystem indicates a healthy ecosystem. The more species you find, the more likely you will also find more oxygen, and less pollutants.

Large bodies of water like oceans and lakes have layers or **zones**. Some organisms live in only one or two zones, while other organisms can live in all three. In Canada lakes are affected by extreme changes in temperature. Organisms living in the freshwater ecosystem of a lake or pond must be able to adapt to these changes in order to survive.

### LAKE ZONES

#### Upper Zone

– is the area of a lake from the shore down to where the aquatic plants stop growing

#### Middle Zone

– is the open water area that still has light penetration.

#### Lowest/Deep Zone

– is where no light penetrates, so no plants grow there. Food for organisms living in this zone comes from the zones above, in the form of waste.

### SPECIES

Plants – bulrushes, water lilies  
Animals – small fish, clams, insects, snails, worms, leeches, and frogs

**Phytoplankton** are food for fish that live here. Some of the fish that live in this zone also travel to the deeper zone.

Deep water fish (large size species)

### OCEAN ZONES

#### Estuary

– is where fresh and saltwater mix forming **brackish** water.

#### Intertidal Zone

– is the shoreline of an ocean.

#### Continental Shelf

– is warmer water than out in the deep ocean and this area has full light penetration.

**Oceanic Zone** – is where very little light penetrates, so no plants grow there. Food comes from the zones above,

### SPECIES

- Marshes provide habitat for many kinds of plants, insects and other animals that can tolerate the brackish water.

Plants and animals withstand the pounding of the waves and the rise and fall of tides.

Many plants and animals because of the rich nutrients available. **Phytoplankton** are food for fish that live here.

Deep water fish (large size species)

## AQUATIC ADAPTATIONS

An **adaptation** is a **physical characteristic** or **behaviour** of a species that increases that species' chances of survival in a particular environment. All living things are adapted to live in particular environments. As changes occur within their environment, those organisms that can adapt to the changes have a better chance of surviving than those organisms that cannot adapt to the changes.

There are **five factors** that have led to the development of adaptations by aquatic species, including: **temperature, light, pressure, salinity and water movement**.

### POPULATIONS

### WATER QUALITY

### WATER USE

### IMPACT ASSESSMENT