

# UNIT 8

A scenic view of a waterfall cascading down a rocky cliff in a forest. The water is white and frothy as it falls over several tiers of rocks. The surrounding area is lush with green trees and vegetation. The overall scene is bright and natural.

## Chapter 15 The Biosphere

# UNIT 5: ECOLOGY

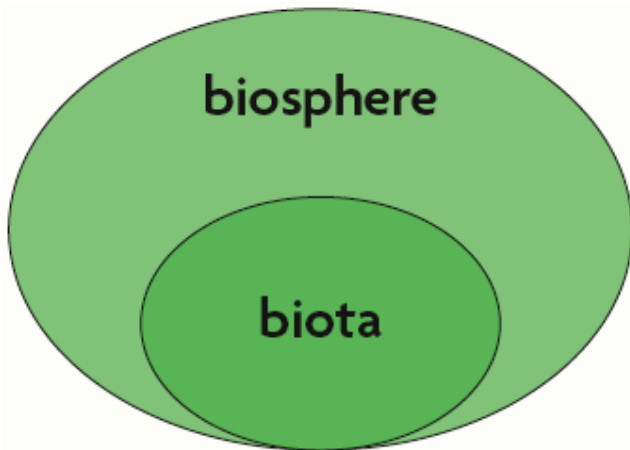
## Chapter 15: The Biosphere

### I. Life in the Earth System (15.1)

A. The biosphere is the portion of the Earth that is inhabited by life

1. **Biosphere**- part of Earth where life exists

a. Includes all living and non-living things in a particular section of just Earth's biosphere



## 2. Earth has 4 major connected systems

### a. **Biosphere**



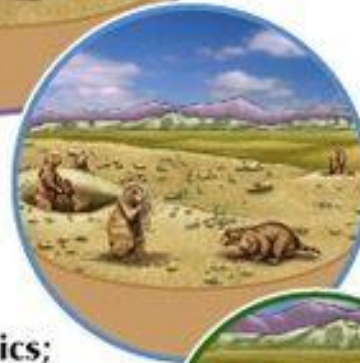
**Biosphere:**  
Global processes



**Ecosystem:**  
Energy flux and cycling  
of nutrients



**Community:**  
Interactions among  
populations



**Population:**  
Population dynamics;  
the unit of evolution



**Organism:**  
Survival and reproduction;  
the unit of natural selection

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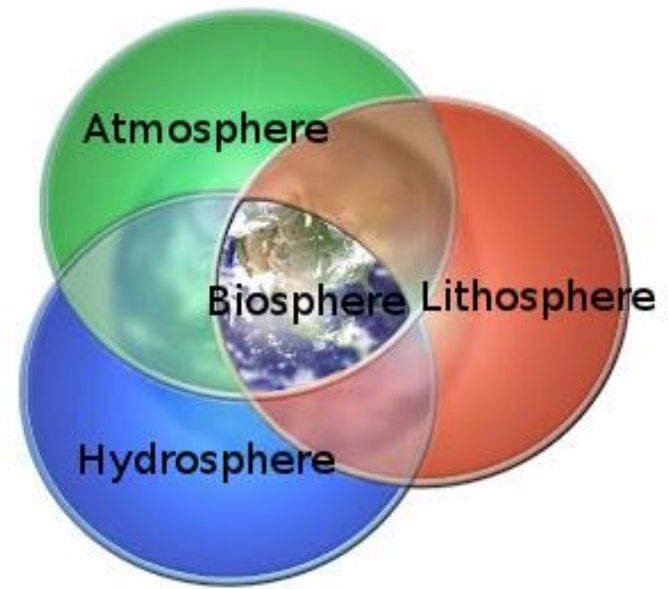
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## B. Biotic and Abiotic factors interact in the biosphere

1. All four of Earth's systems are **connected** to another

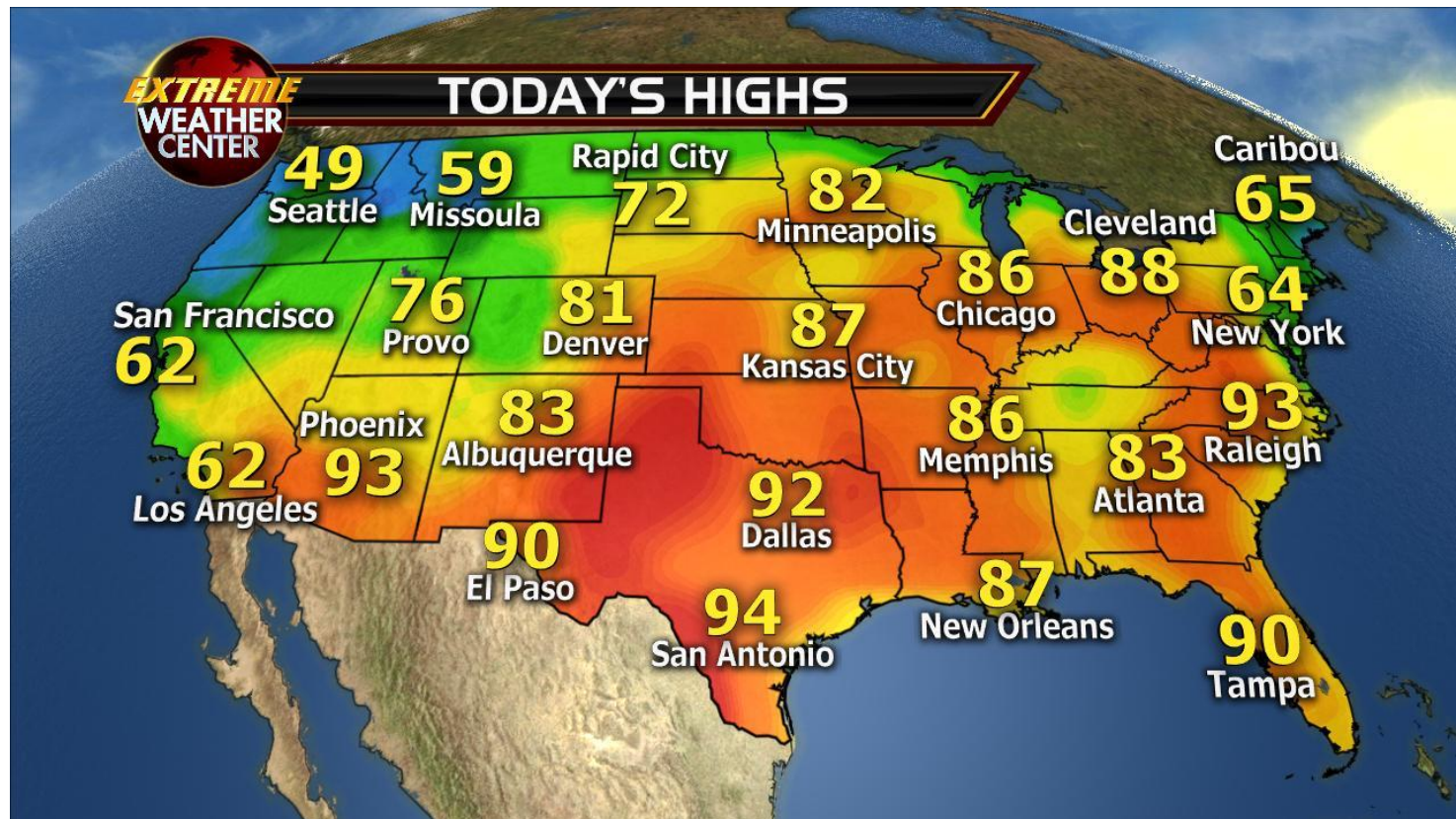
Earth itself is kind of a



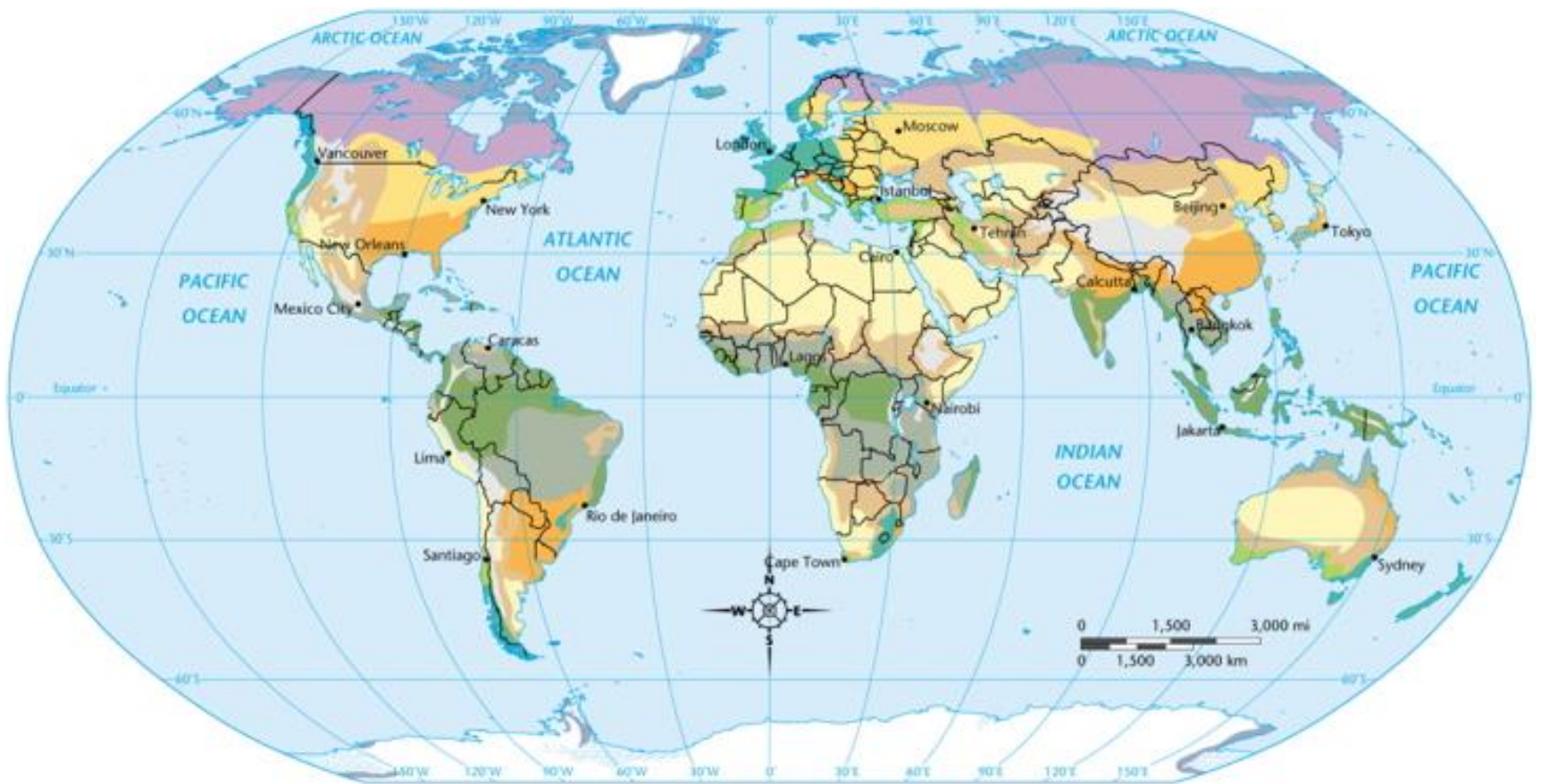
## II. Climate (15.2)

A. **Climate** is the prevailing weather of a region

1. **Weather**- day to day conditions



## 2. **Climate**- long term pattern of weather conditions



### **Tropical**

- Tropical wet
- Tropical wet and dry

### **Dry**

- Semiarid
- Arid

### **Moderate**

- Mediterranean
- Humid subtropical
- Marine west coast

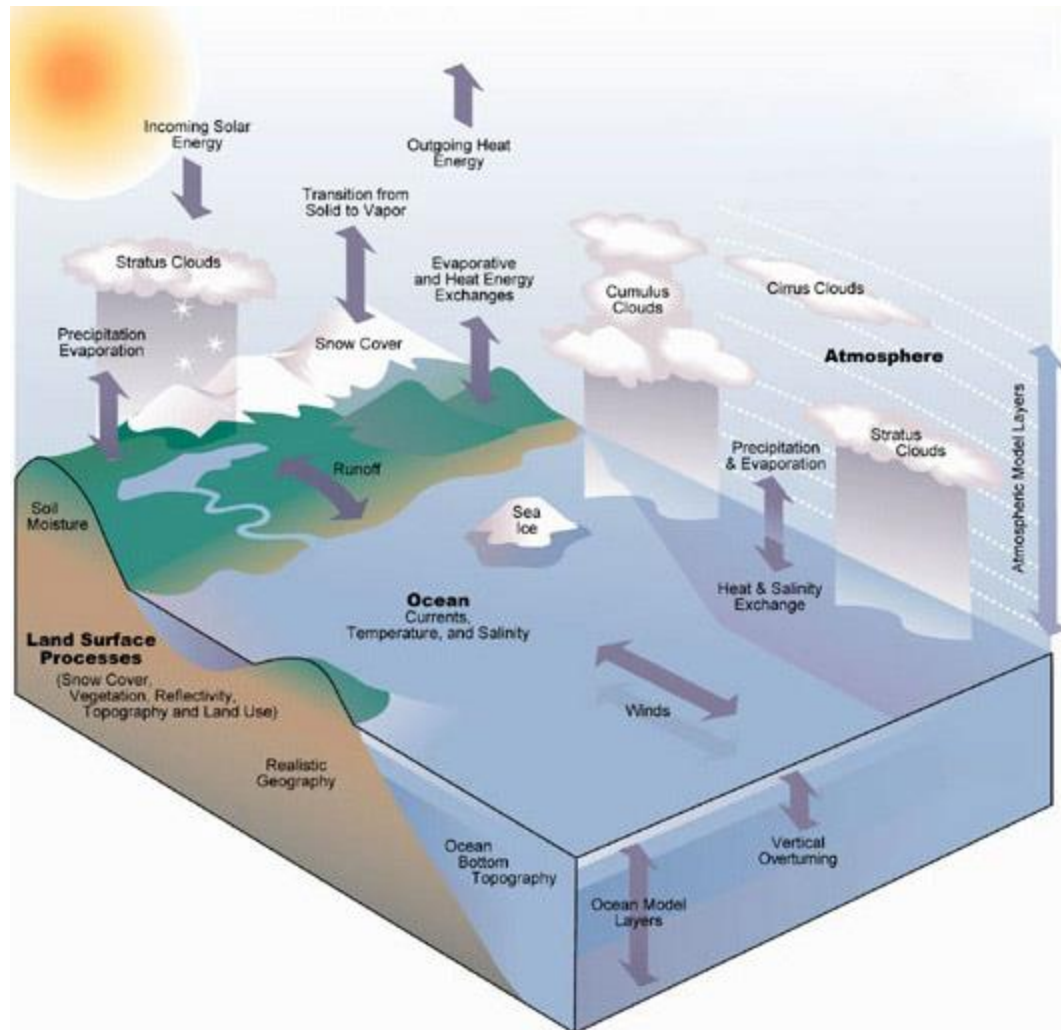
### **Continental**

- Humid continental
- Subarctic

### **Polar**

- Tundra
- Ice cap
- Highlands
- Non-permanent ice

## B. Four key factors that shape an area's **climate**



1. **temperature-** key factor

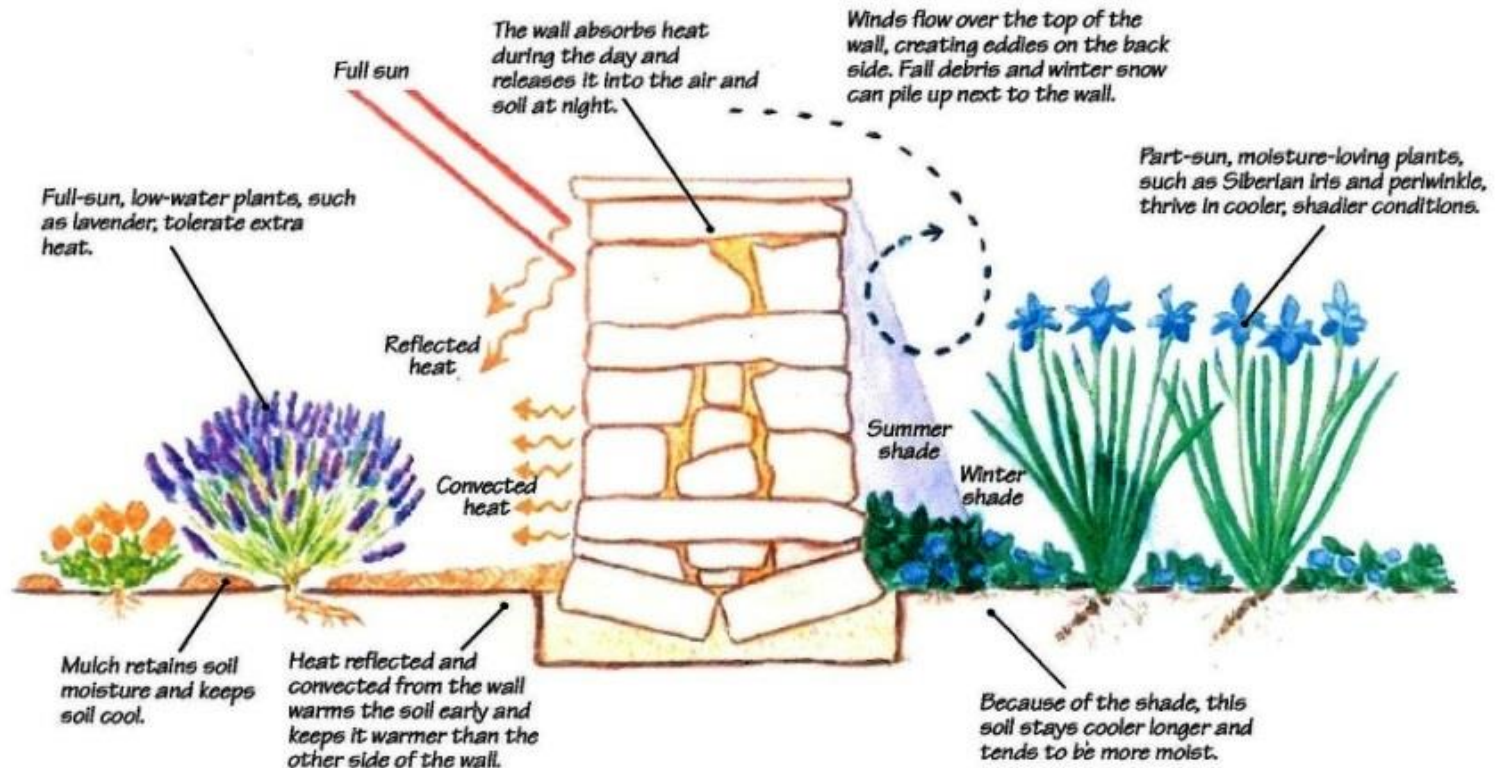
2. **sunlight**

3. **water (moisture)-** key factor

4. **wind**

C. **Microclimate**- climate of a small specific place within larger area.

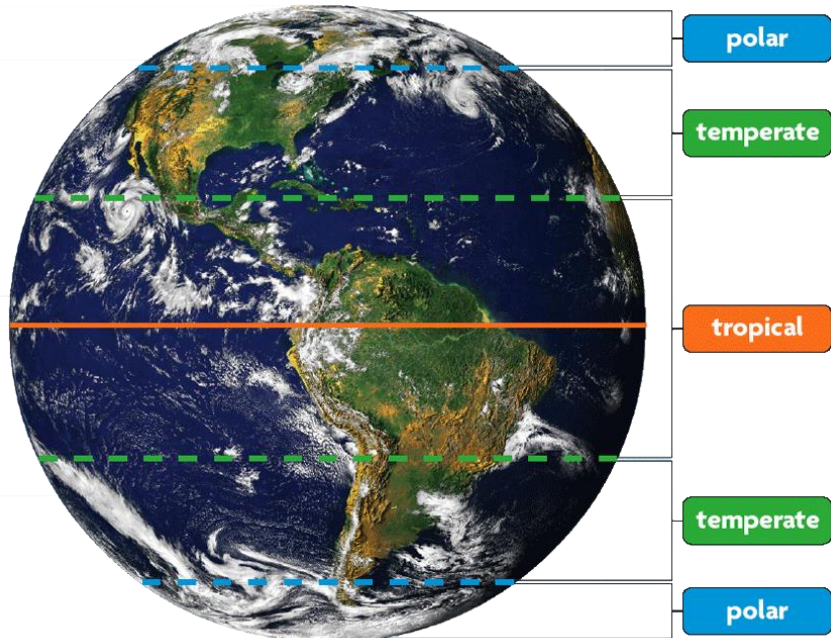
1. Can be very important to living things
2. Can be very small or large area





D. Earth has three main **climate zones**

1. Use average **temperature** and **precipitation** to categorize



a. **Polar zone** -in far northern and southern regions

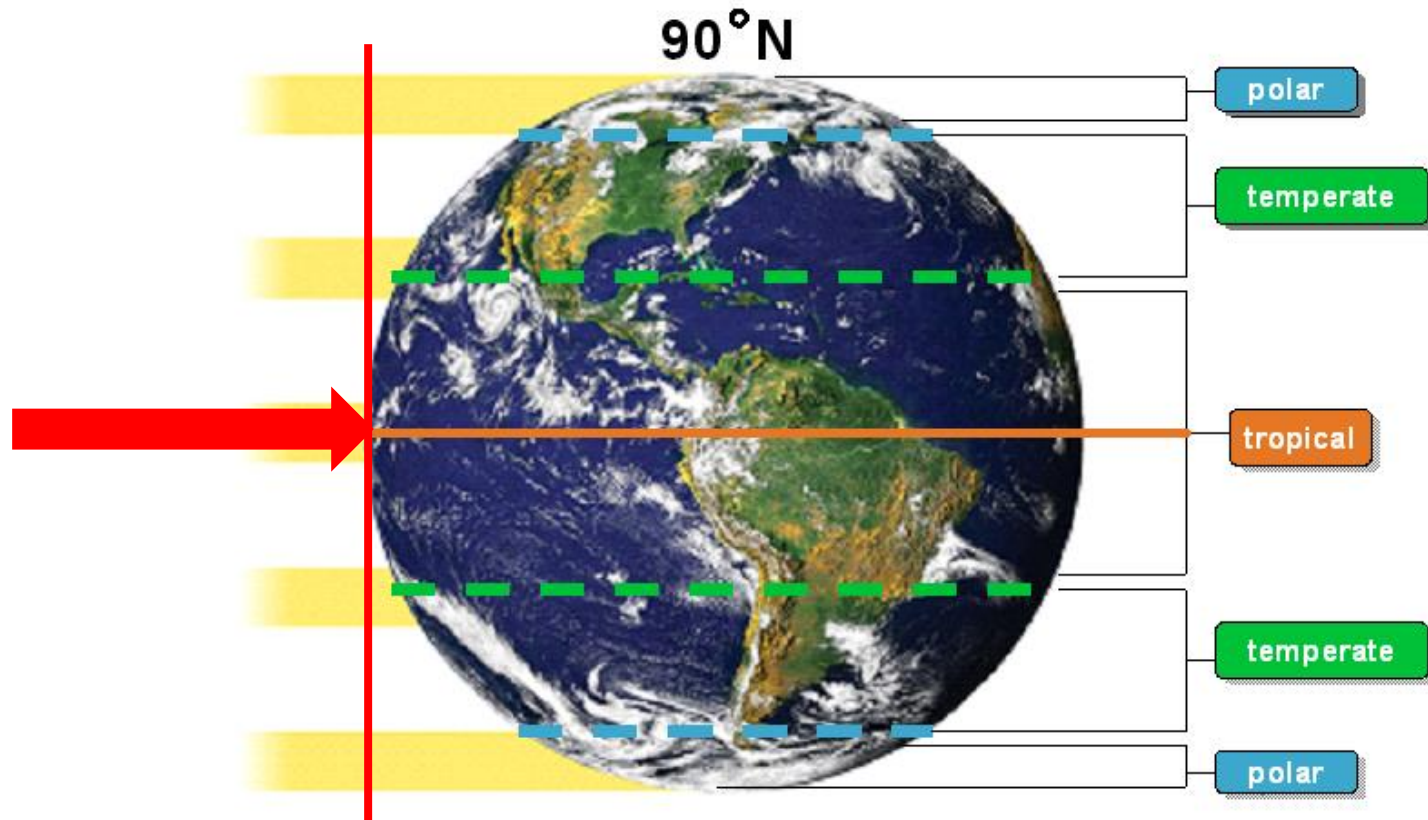
b. **Tropical zone**- surrounds the equator

c. **Temperate zone**- wide area between polar and tropical zones

## 2. Influence of sunlight

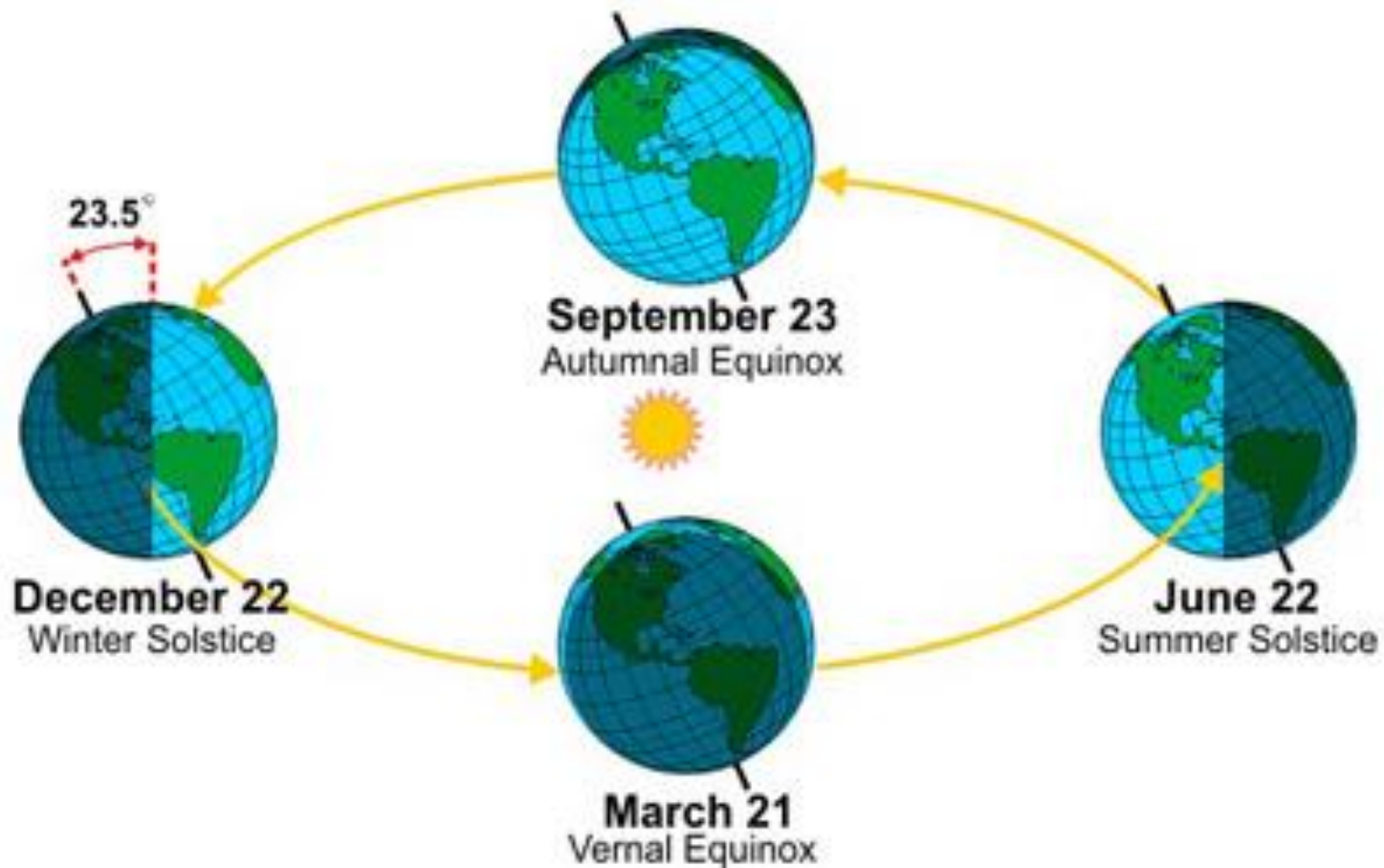
### a. Earth's surface **heated** unevenly

1). Hottest portion where sun strikes directly



2). **Curved** shape causes uneven heating

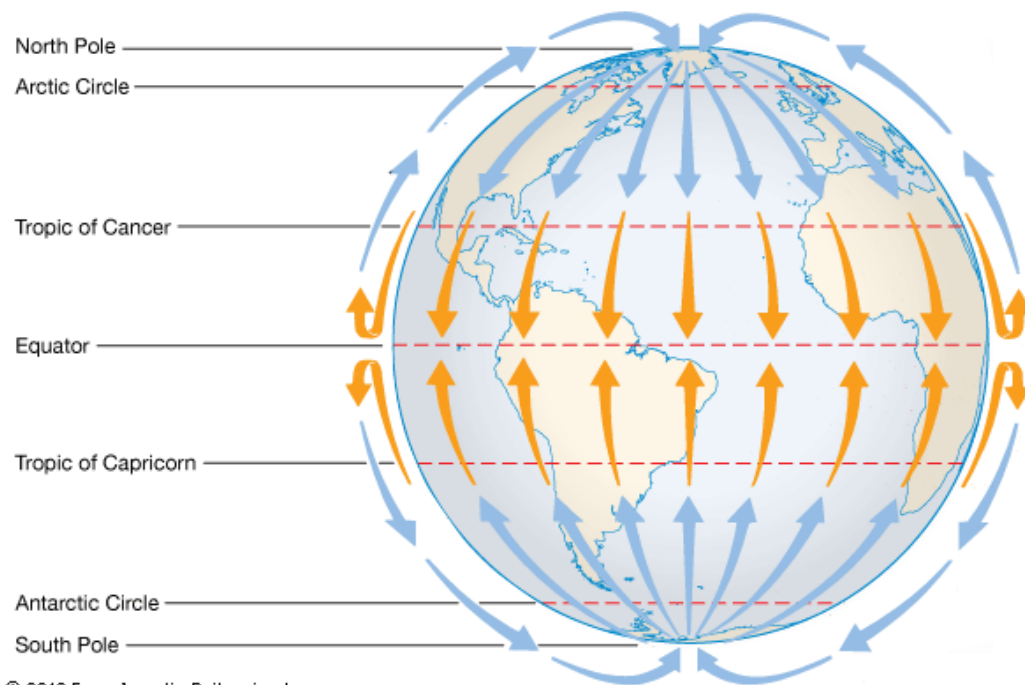
3). Earth **tilts** on its axis and this also plays a role in seasonal changes



### 3. Air and Water Movement

a. Sun also warms **water** and **air**

b. Uneven heating causes wind and water **currents**



c. Warm air (and water) rises and cold air (and water) sinks

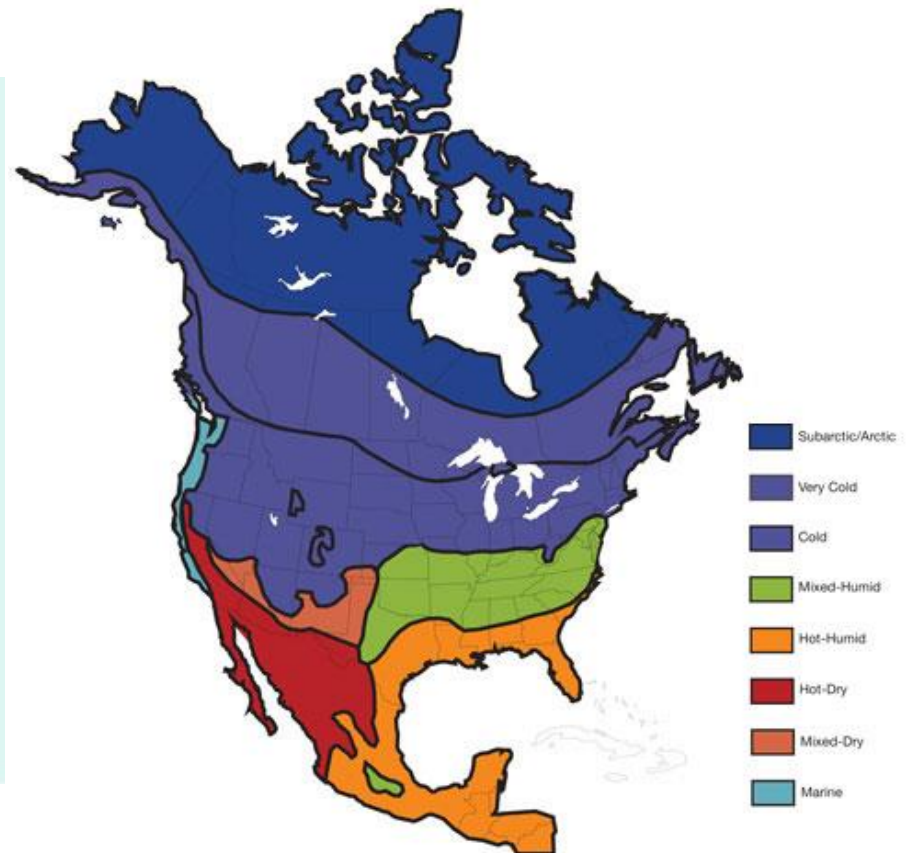
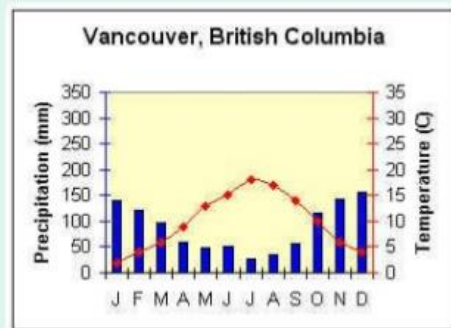
d. Also affects amount of **precipitation** (warm air holds more water than cold air)

## 4. Landmasses- also shape climate

a. **Coastal** areas tend to have smaller changes in temperature (moderated by oceans)

### Marine west coast

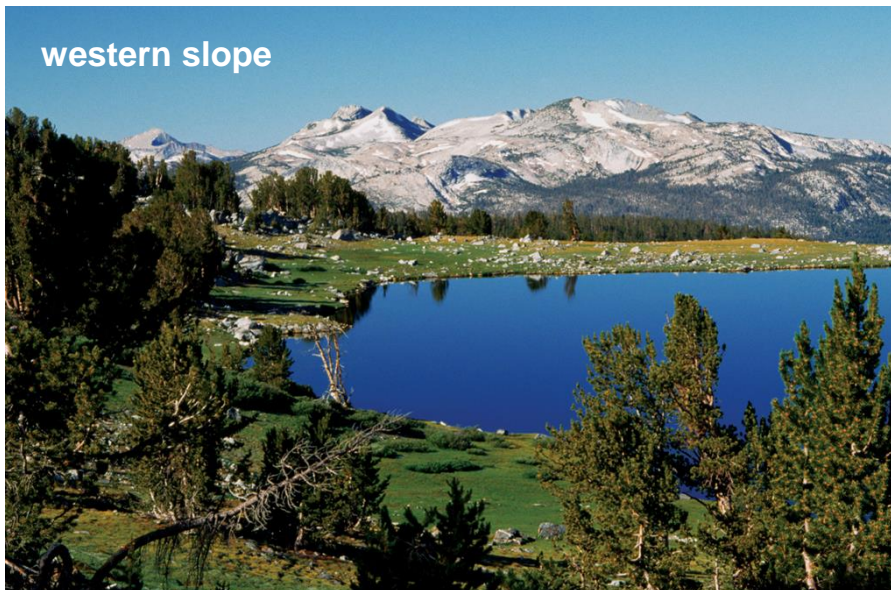
- **Characteristics**
- Mild winters, mild summers.
- Low annual temperature range.
- Heavy cloud cover; high humidity.



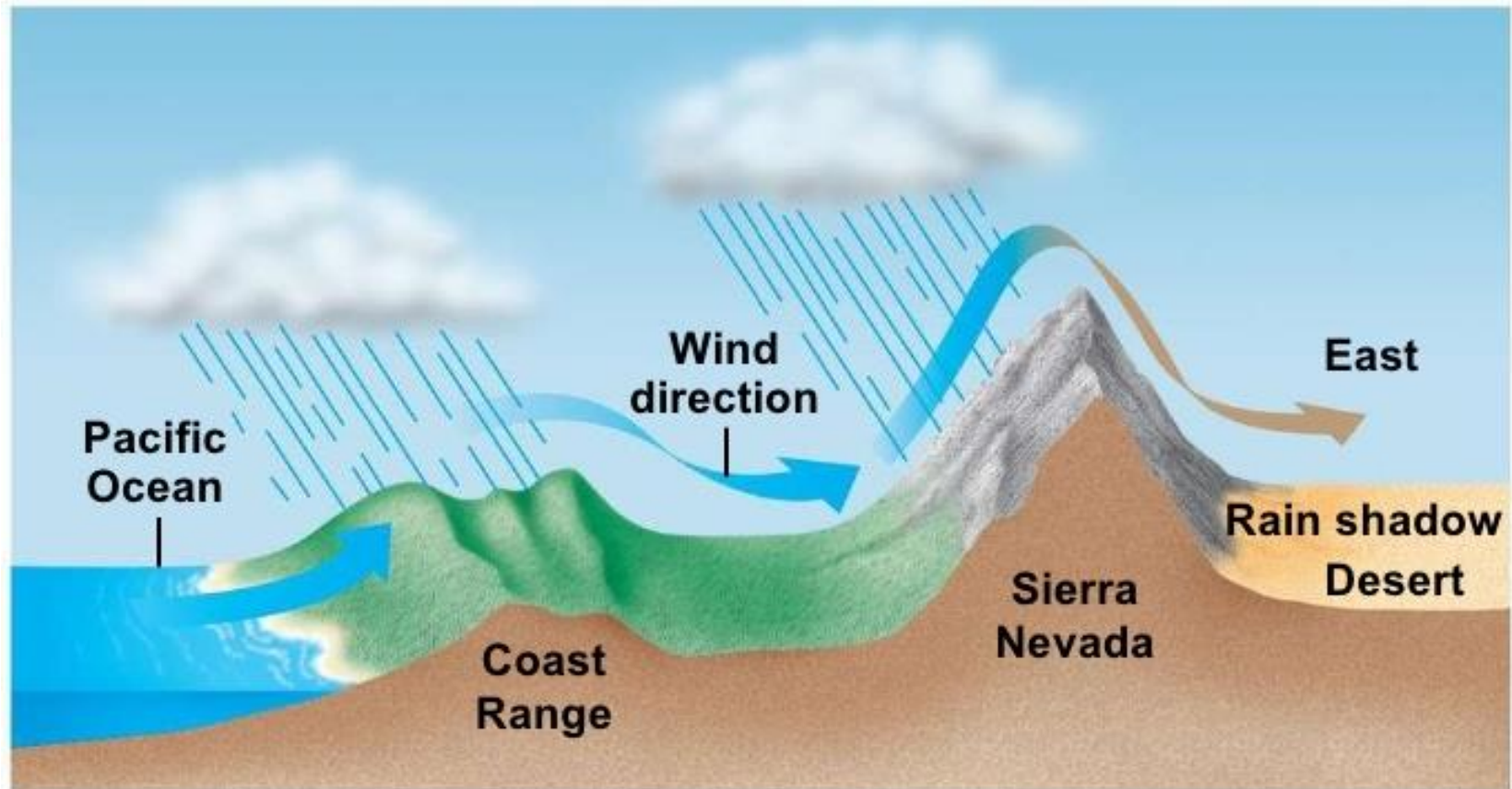
## 4. Landmasses- also shape climate

a. **Coastal** areas tend to have smaller changes in temperature (moderated by oceans)

b. **Mountains** have large effect on climate- causes precipitation



c. **Orographic Effect** (Rain Shadow effect)- a dry area on the leeward side of a mountainous area (away from the wind). The mountains block the passage of rain-producing weather systems and cast a "shadow" of dryness behind them.



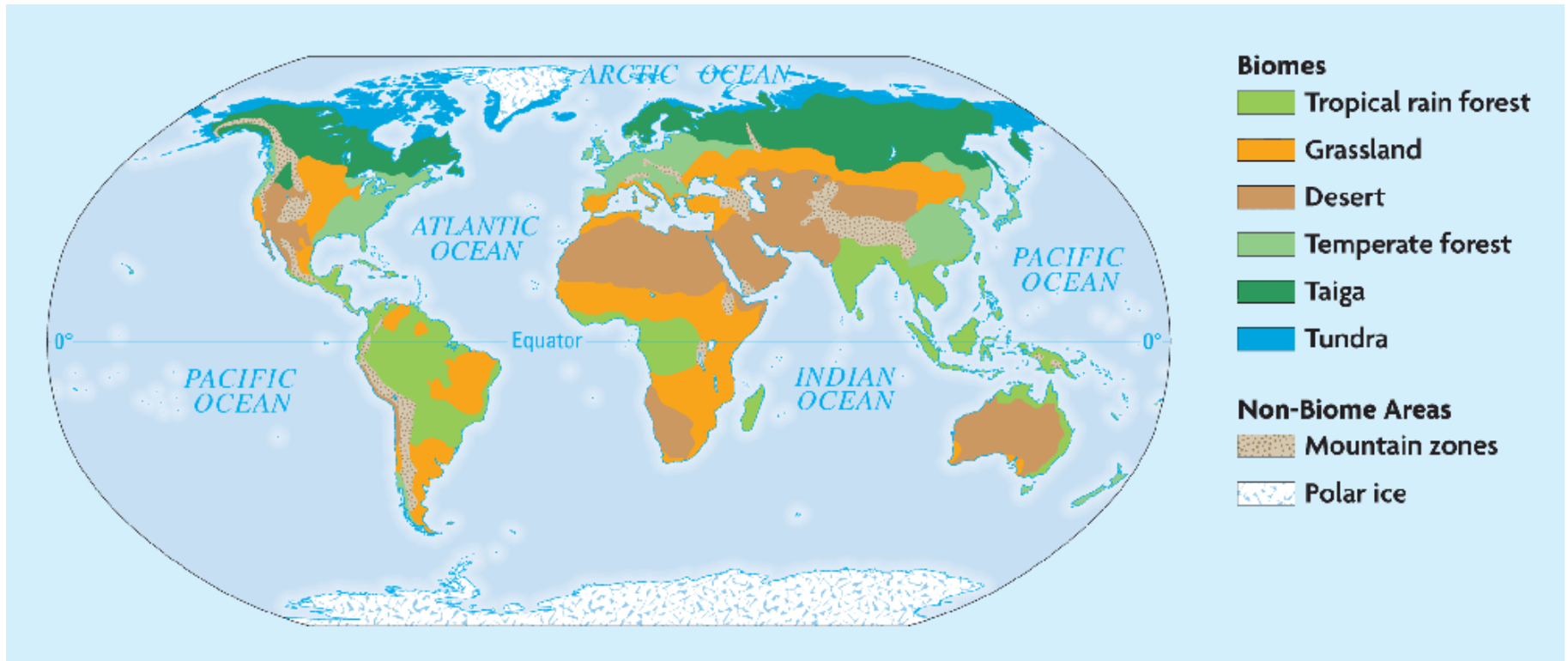
5. Adaptation to Climate- Many organisms **adapted** to survive in specific climate



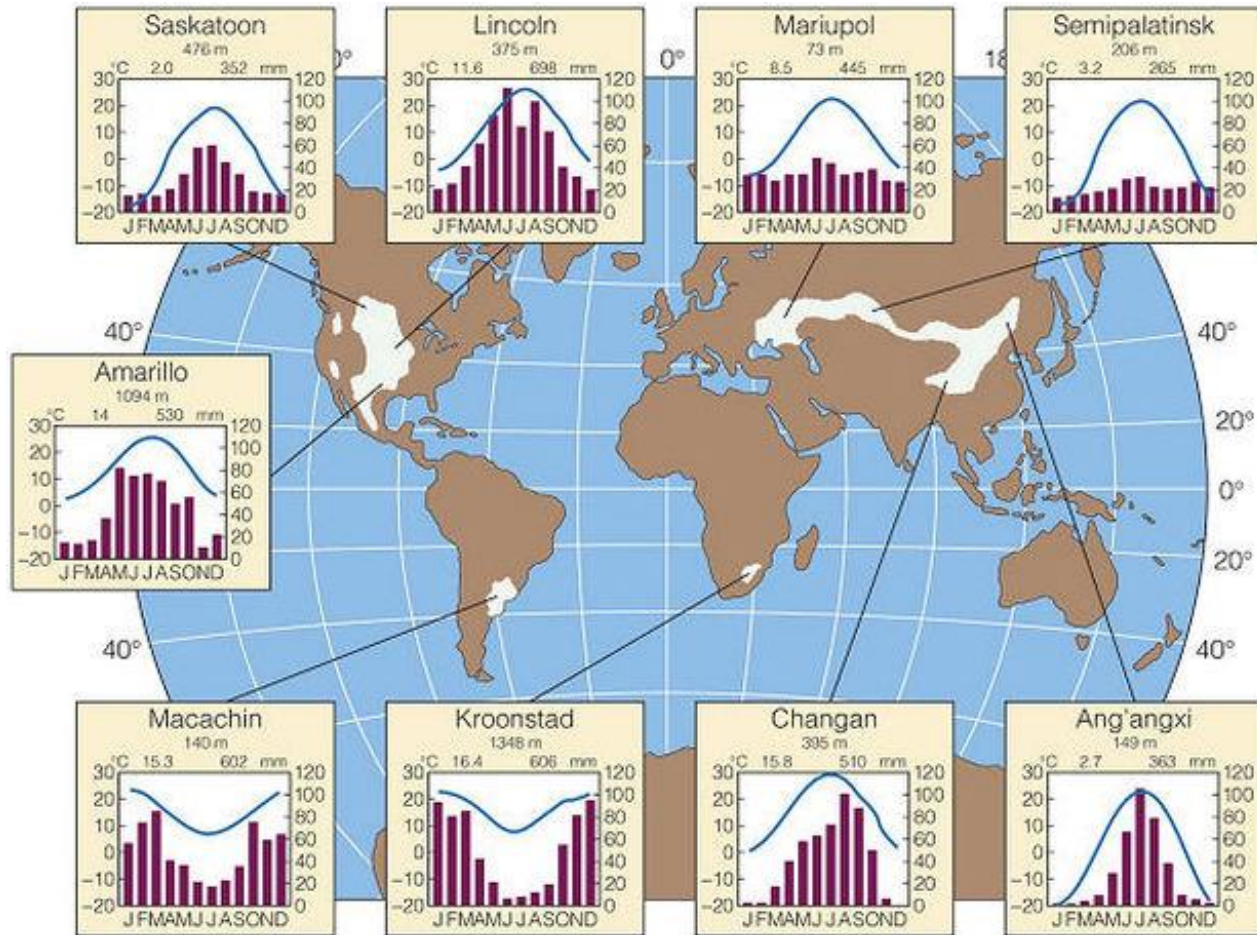


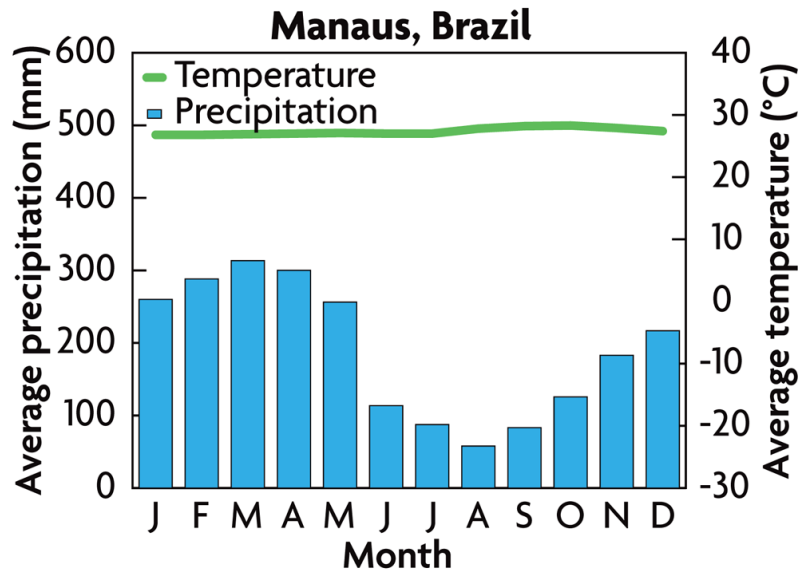
### III. Biomes (15.3)

A. Earth has **6** major biomes- Each biome characterized by certain set of **abiotic factors, ecosystems**



A **climatogram** is a bar graph with a double-Y axis that plots temperate and rainfall amounts over time. The climatogram provides a fast and simple method for comparing climates based on the two most influential factors: rainfall and temperature.

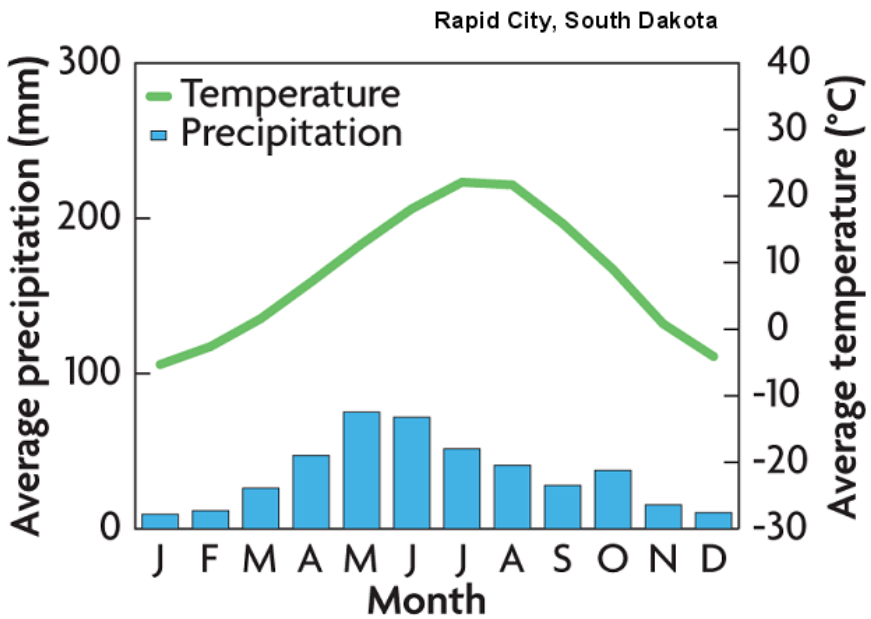




Source: World Meteorological Organization

**1. Tropical Rain Forest Biome**- warm temperatures, abundant precipitation all year, lush forests

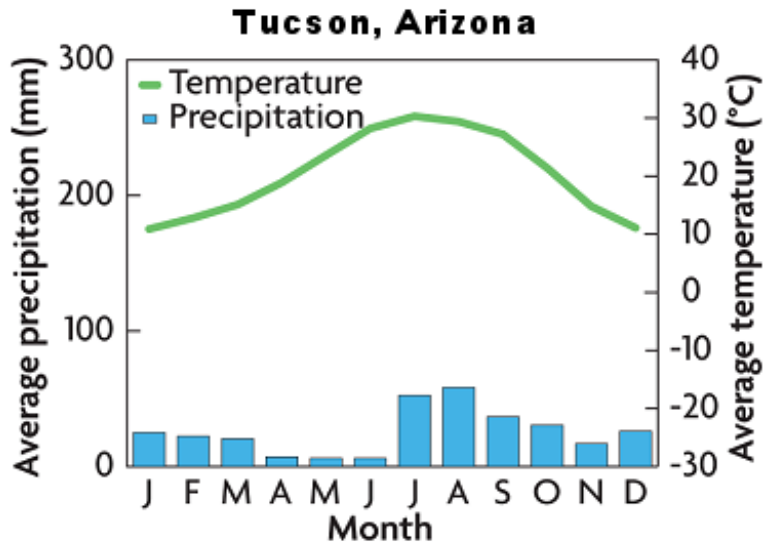




Source: National Oceanic Atmospheric Administration

2. **Grassland Biome**-  
 primary plant life is  
grass. Occurs in variety  
 of climates

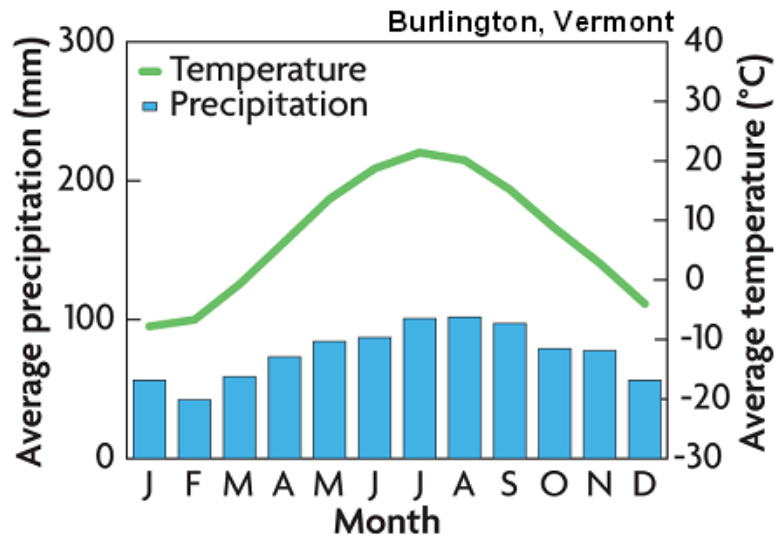




Source: National Oceanic Atmospheric Administration

3. **Desert Biome**- arid environment, little precipitation, four types: hot, semi-arid, coastal, and cold

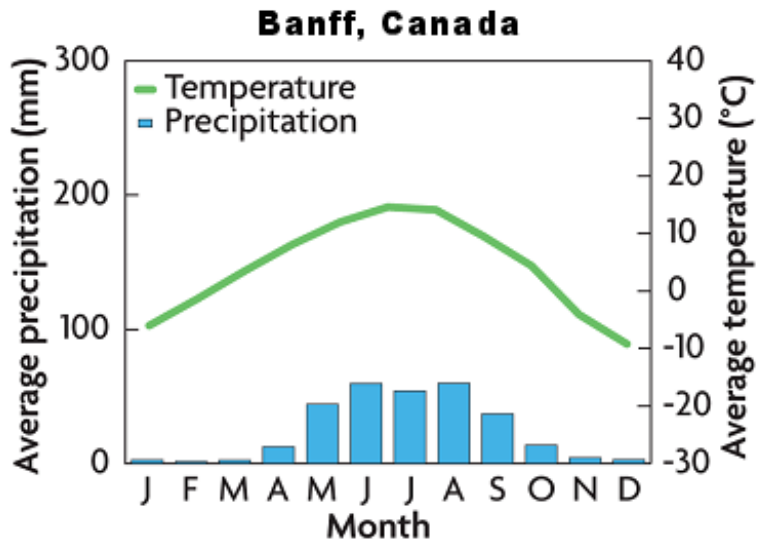




Source: National Oceanic Atmospheric Administration

4. **Temperate Forests**-  
Include deciduous forests  
and rain forests. Temperate  
deciduous forests have hot  
summers and cold winters.  
Deciduous trees are the  
dominant plant species



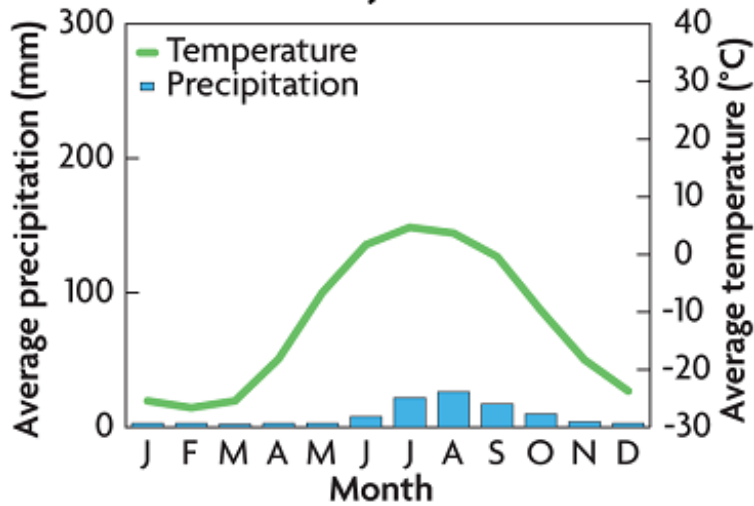


Source: Environment Canada

5. **Taiga**- Found in cool northern climates. Long winters, short summers. Small amount of precipitation



## Barrow, Alaska



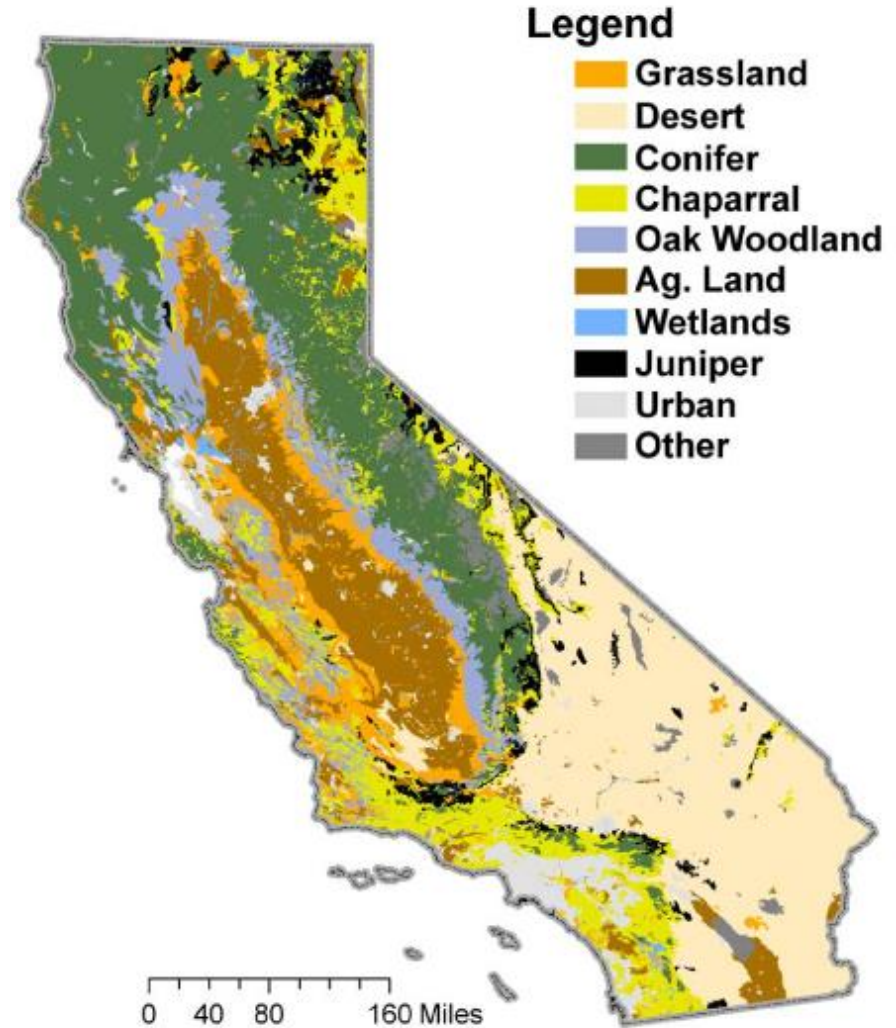
Source: National Oceanic Atmospheric Administration

6. **Tundra**- Far northern latitudes with long winters (10 months) limited precipitation, permafrost





7. Minor biomes-  
example: **chaparral**- hot,  
dry summers and cool,  
moist winters



B. Polar ice caps and mountains are not considered biomes

1. **Polar ice caps**- have no soil and do not have specific plant community



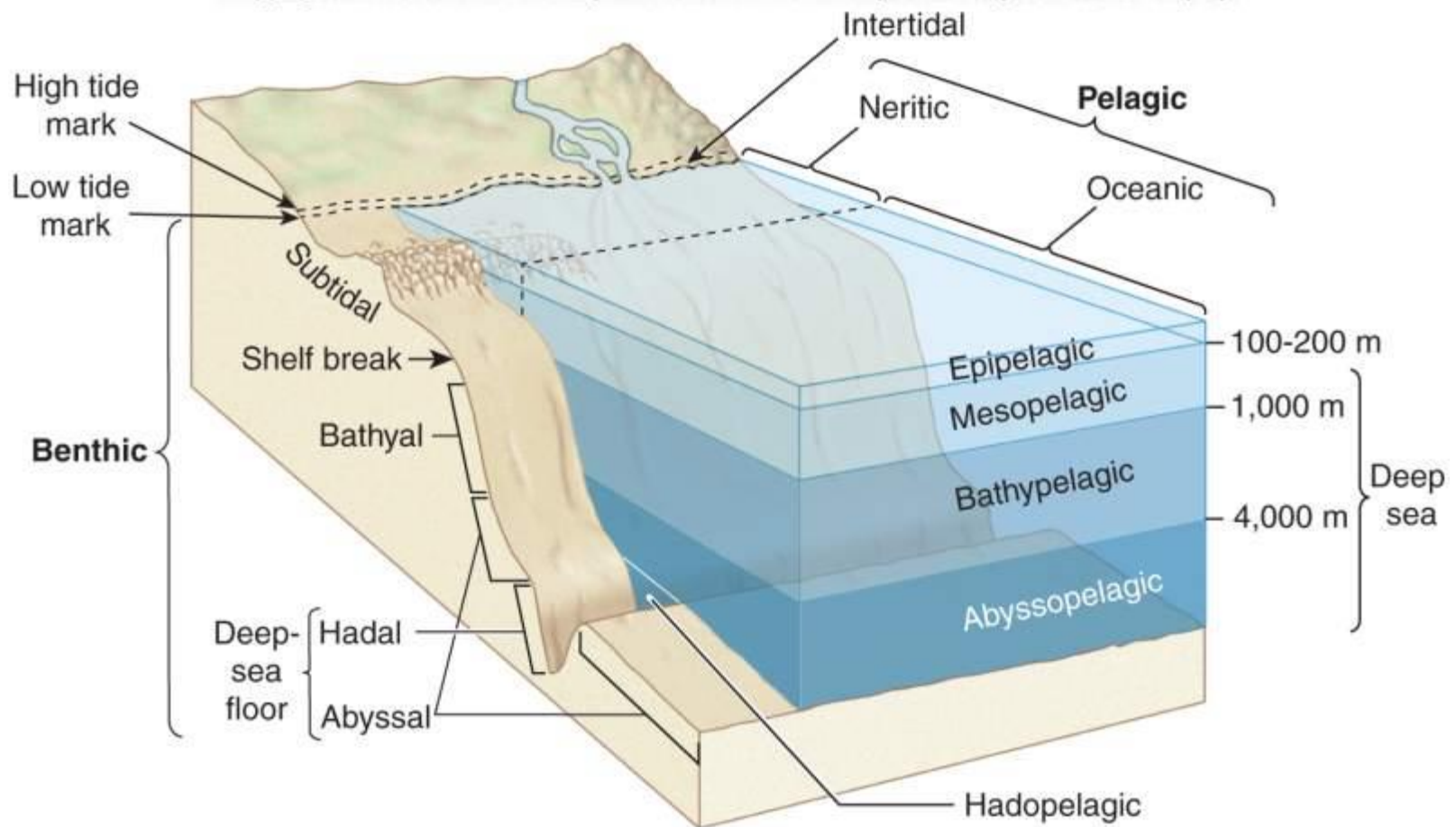
a. Found at poles  
(north and south)

b. Most animals  
depend on sea for food

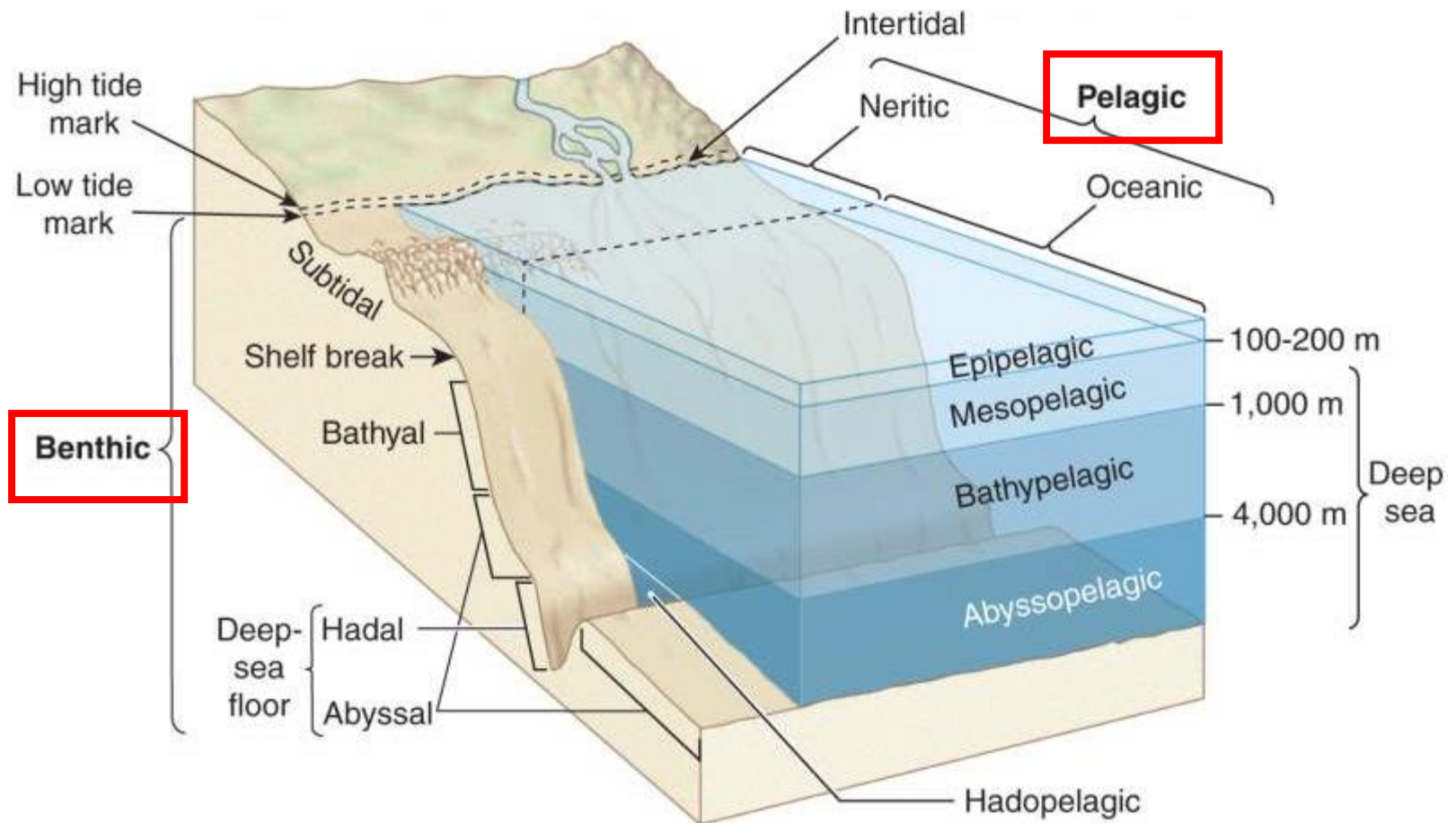
# IV. Marine Ecosystems (15.4)

## A. The ocean can be divided into zones

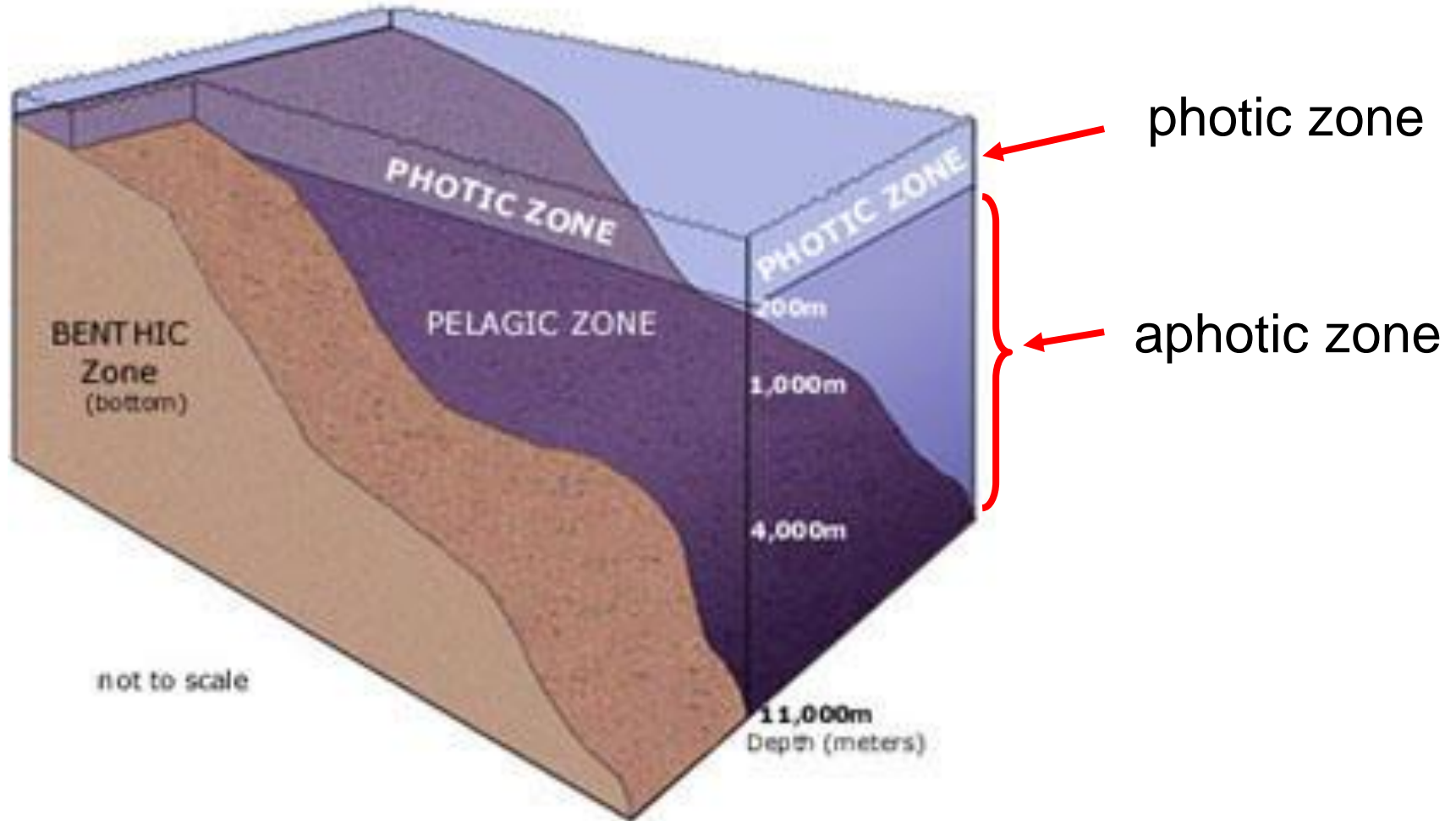
### 1. Ocean Zones



a. Divided into open sea (**pelagic**) and ocean floor (**benthic** zone)

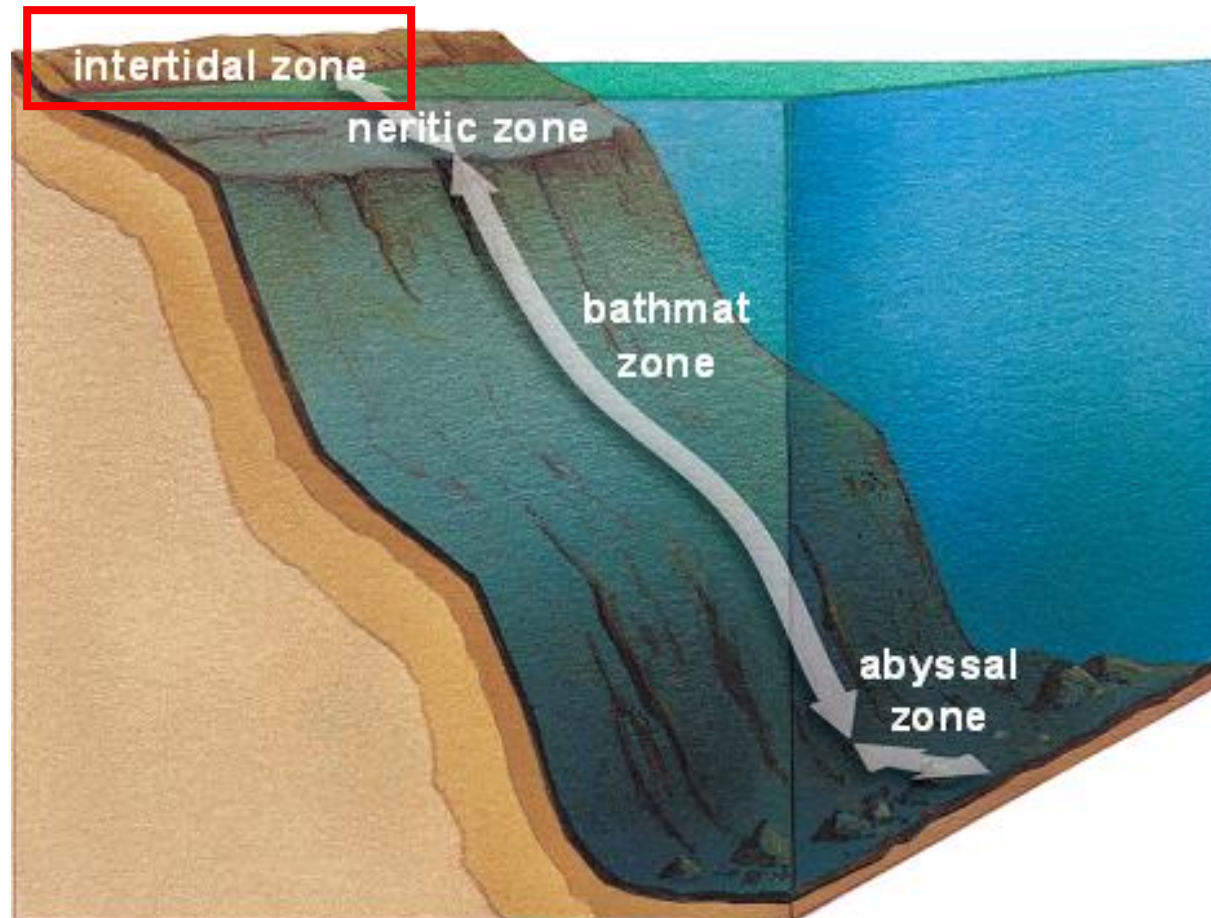


b. Divided between areas that receive light (**photic** zone) and those that do not (**aphotic** zone)



c. Ocean also separated into zones using distance from shoreline and water depth

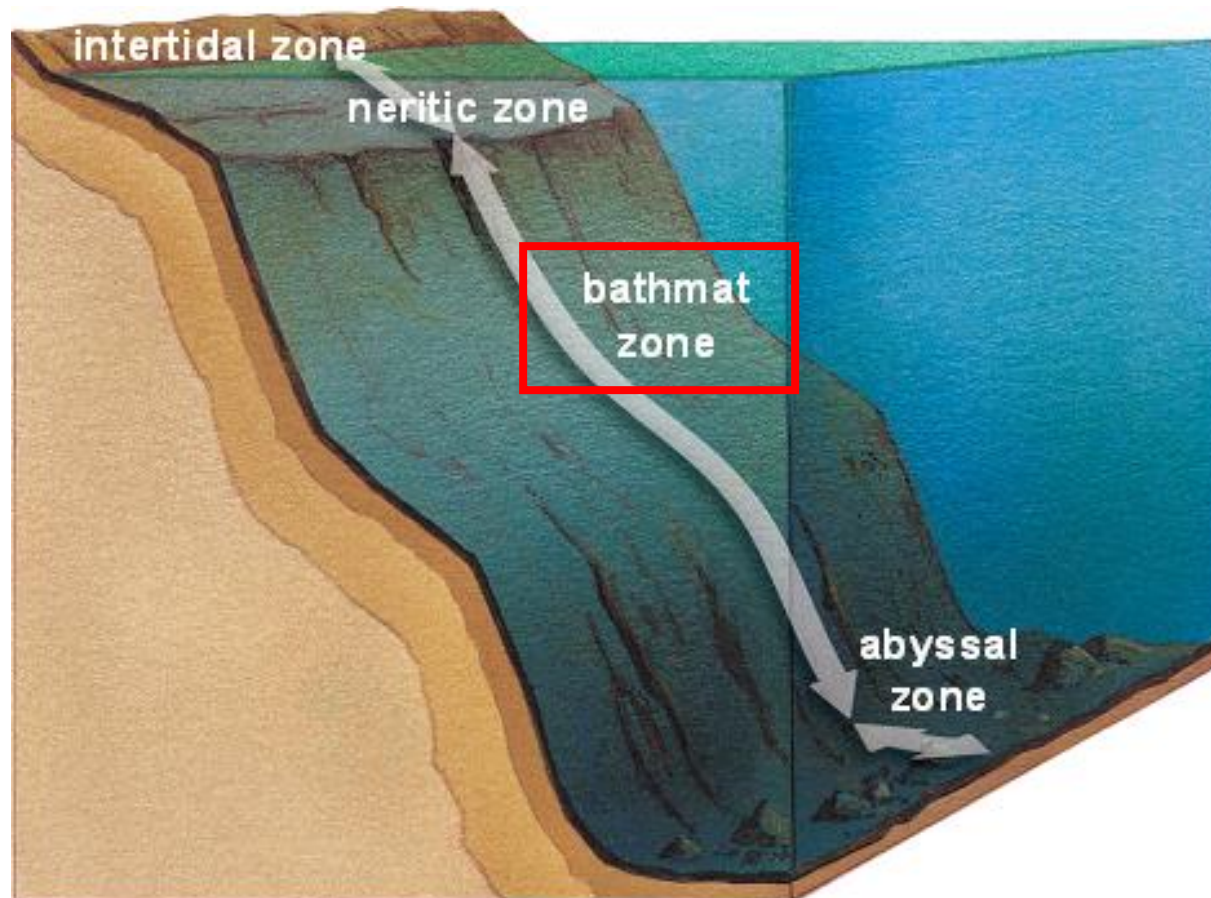
1). **Intertidal zone**- between high and low tide lines



2). **Neritic zone**-extends from intertidal out to edge of continental shelf

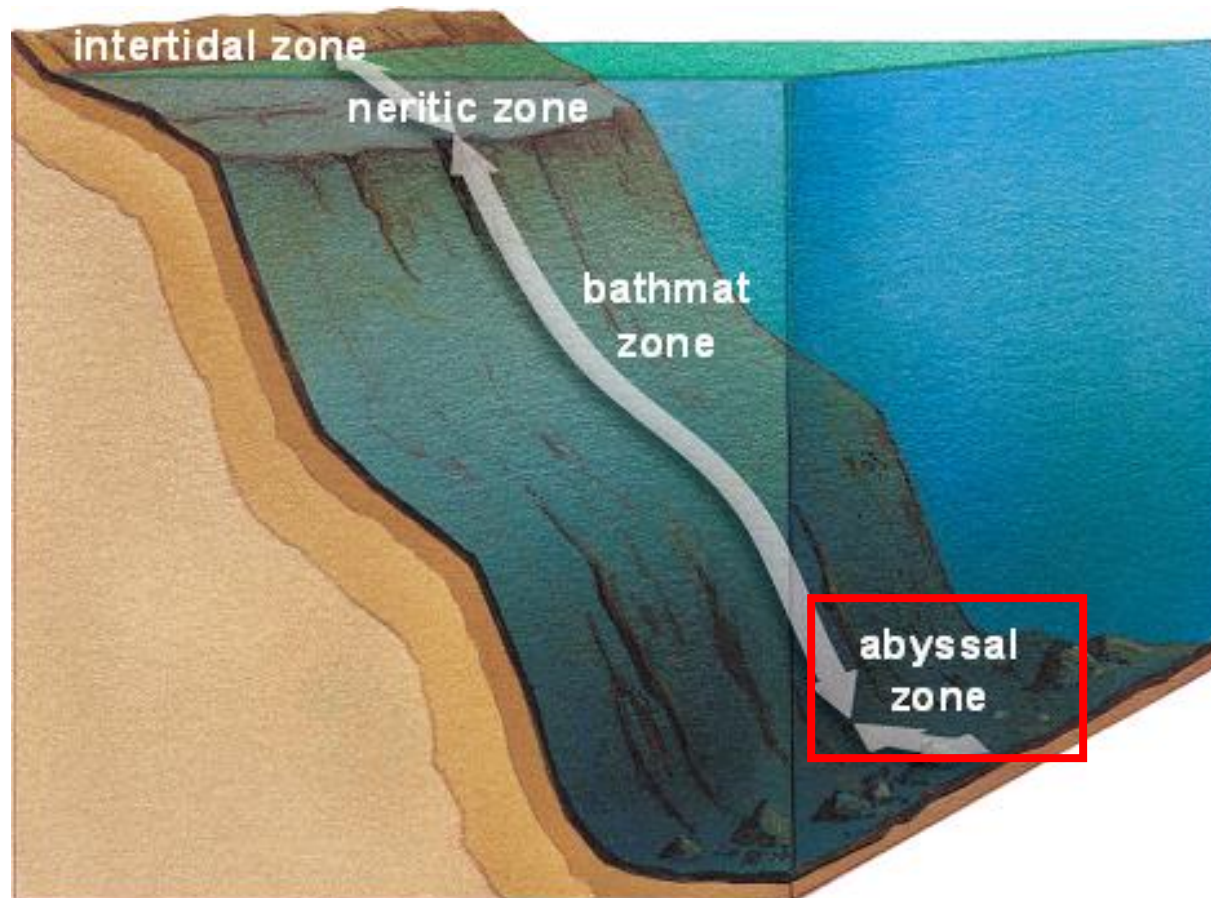


3). **Bathyal zone**- extends from edge of neritic zone to base of continental shelf





4). **Abyssal zone**- lies below 2000 meters and is in complete darkness



d. Life in **Neritic Zone**- only 1/10th of ocean but contains majority of biomass (Most biomass consists of plankton)

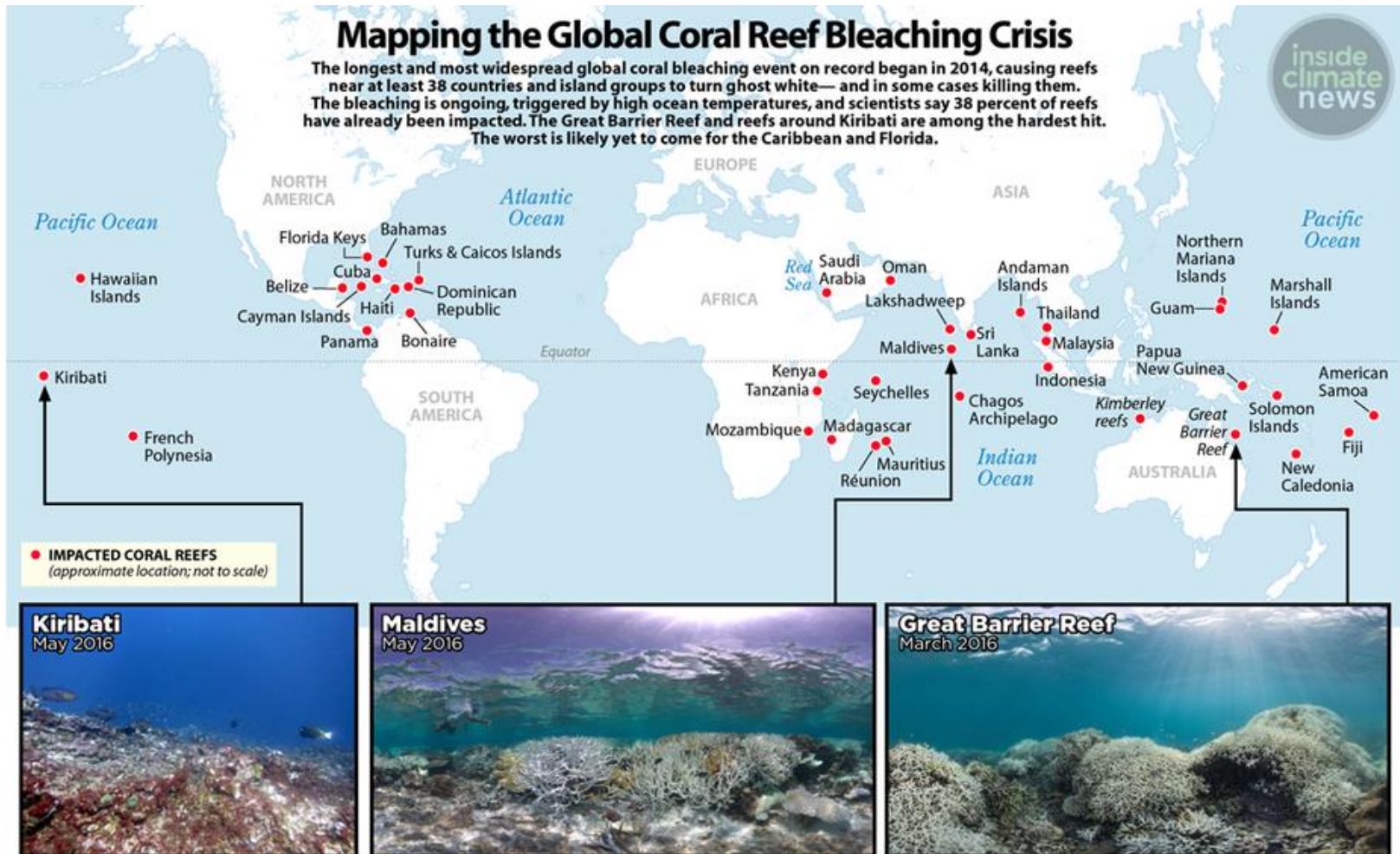


## B. Coastal waters contain unique habitats

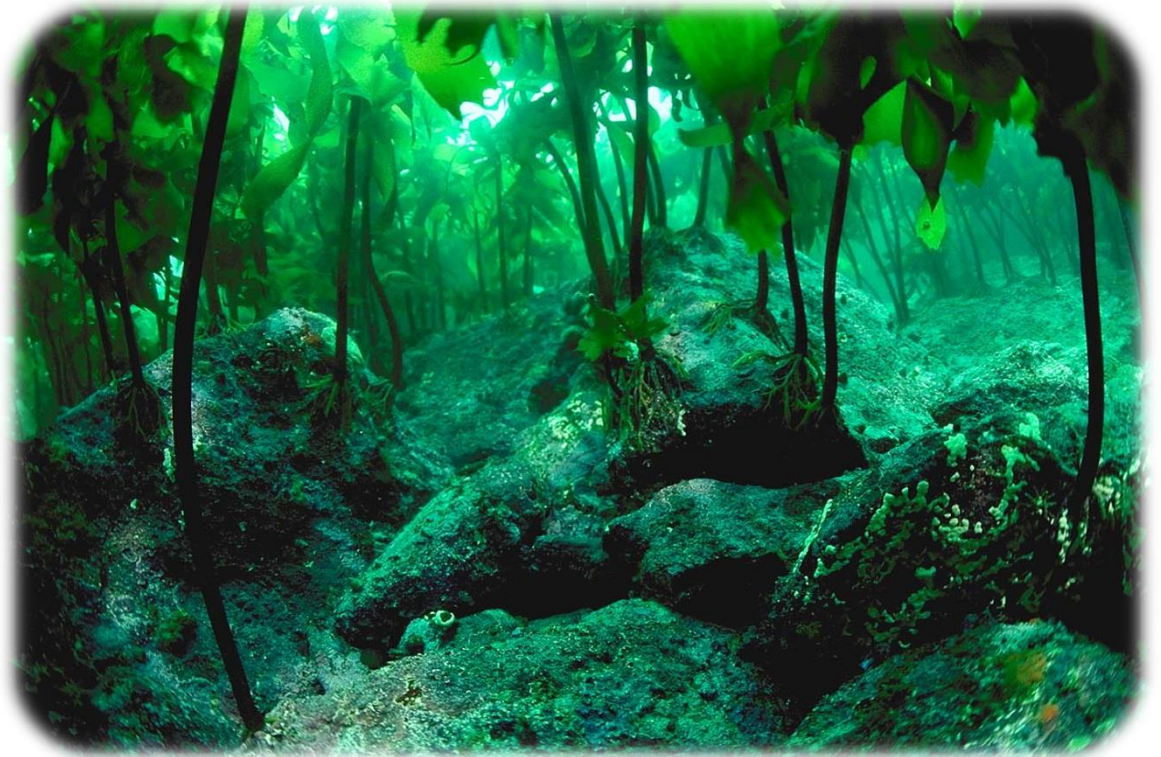
1. **Coral Reefs**- found within tropical zone and contains large diversity



# Ocean acidification from increased CO<sub>2</sub> levels, combined with increased sea temperatures have caused **coral bleaching**



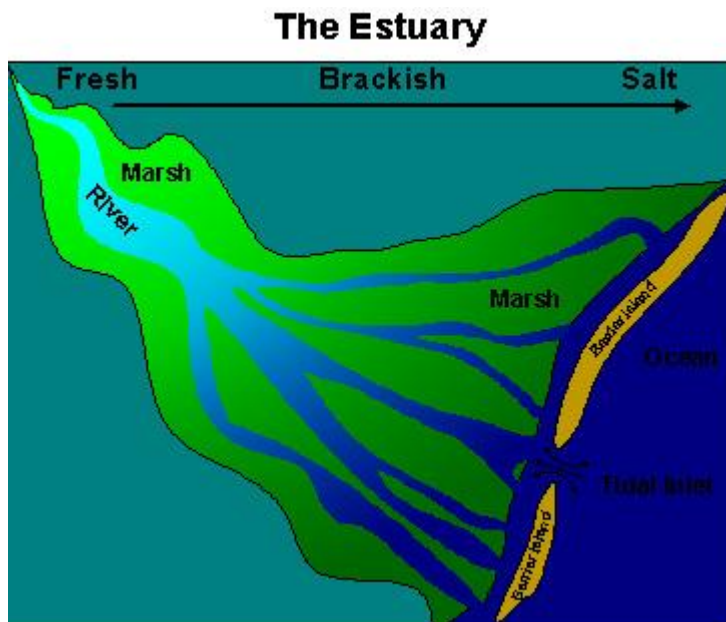
## 2. **Kelp Forests**- found in cold, nutrient rich waters



## V. Estuaries and Freshwater Ecosystems (15.5)

A. Estuaries are dynamic environments where rivers flow into the ocean

1. **Estuary**- partially enclosed body of water formed where a river flows into the ocean



a. Mix of **fresh** and **salt** water

b. River carries lots of **nutrients**

c. Large numbers of species thrive and are highly productive ecosystems

d. Provide refuge for many species and spawning grounds



e. Over **80%** of estuaries have been lost to land development

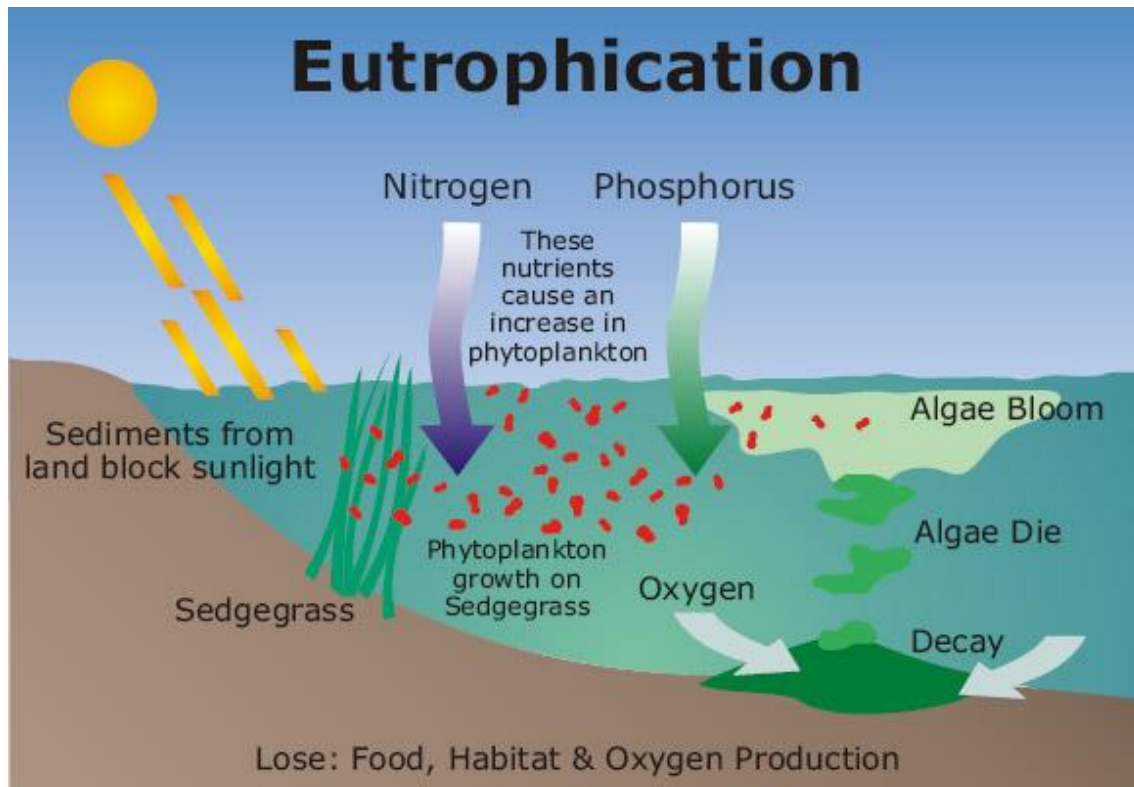
# San Mateo Creek, and Trestles Beach estuary-

One of last free-flowing creeks from it's source in the mountains to the ocean in California.





**Anthropogenic**- Caused or influenced by **humans**. Anthropogenic carbon dioxide is that portion of carbon dioxide in the atmosphere that is produced directly by human activities, such as the burning of fossil fuels, rather than by such processes as respiration and decay.



B. Freshwater ecosystems include moving and standing water

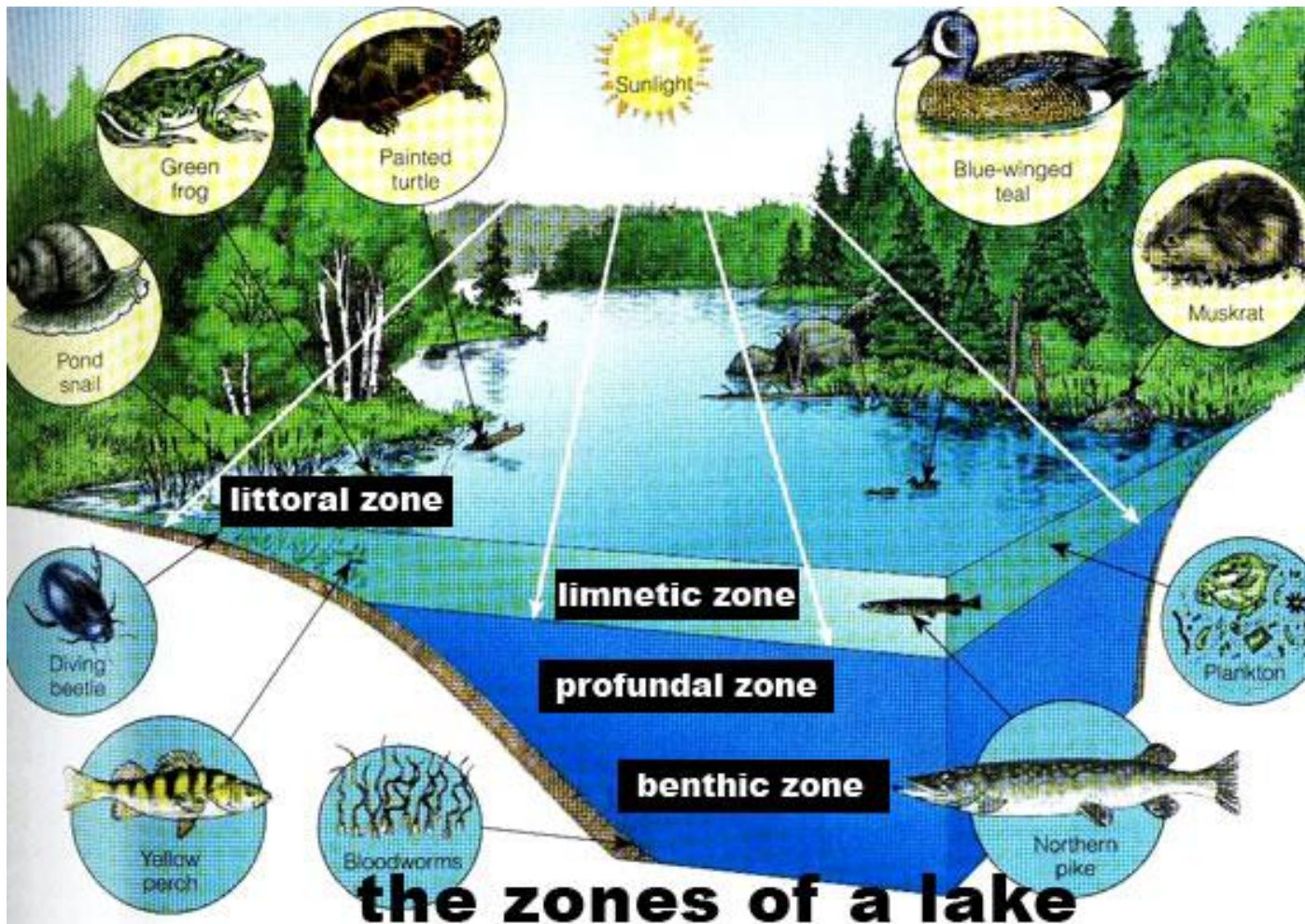
1. **Freshwater ecosystems**- rivers, streams, wetlands



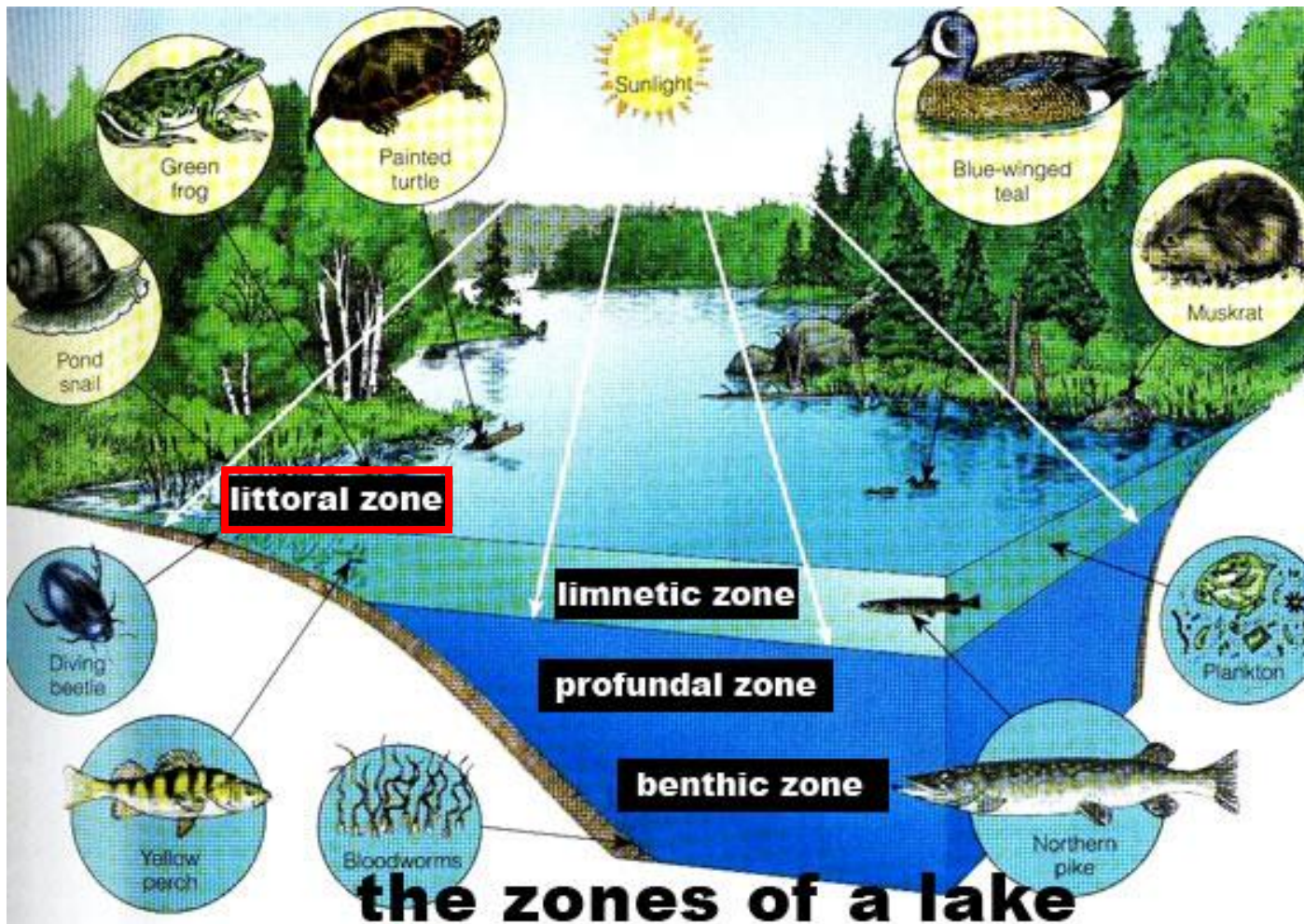
2. among most productive ecosystems on Earth

## C. Ponds and lakes share common features

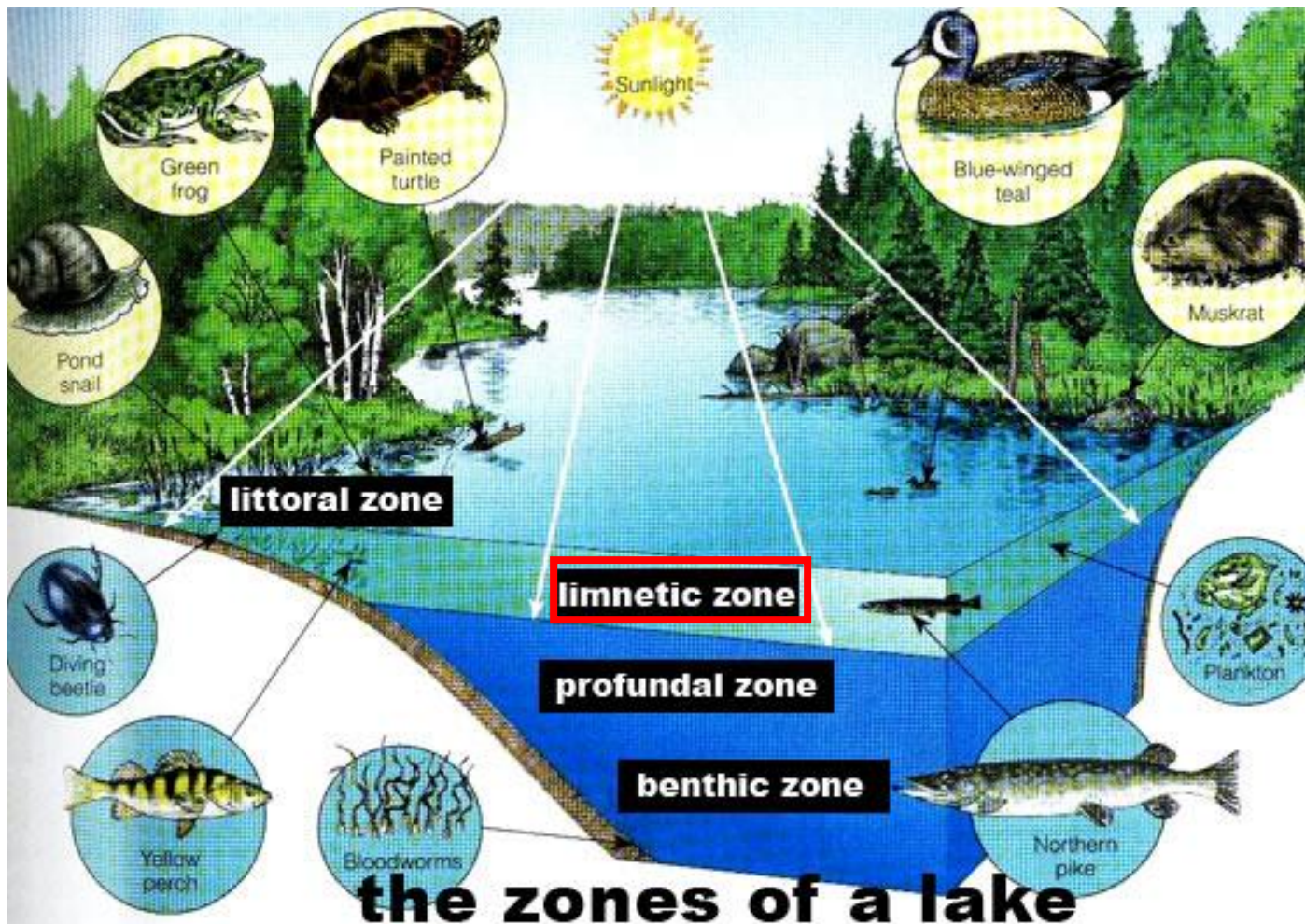
1. Smaller in size than oceans, but also divided into zones



a. **Littoral zone**- between low and high water marks



b. **Limnetic zone**- open water farther out from shore



c. **Benthic zone**- bottom of lake or pond where less sunlight reaches

