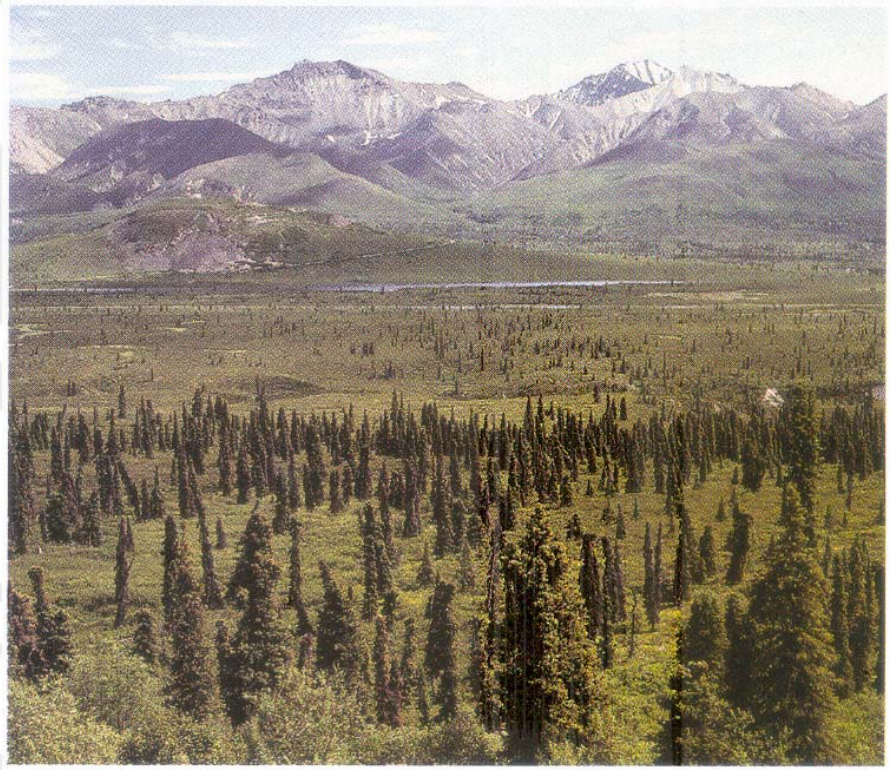
Unit 3 Lecture 5
Various ecosystems

- FOREST ECOSYSTEM
  - Northern coniferous forest
  - Moist temperate coniferous forest
  - Temperate deciduous forest
  - Broad leafed deciduous and evergreen forests
  - Tropical rainforest
- GRASSLAND ECOSYSTEM
- DESERT ECOSYSTEM
- FRESHWATER AQUATIC ECOSYSTEM
  - Lakes
  - Ponds
    - Ox bow pond
    - Temporary pond
    - Farm pond
    - Beaver pond
  - Streams and rivers
- OCEANS
  - Pelagic ecosystem
  - Benthic ecosystem
- ESTUARIES

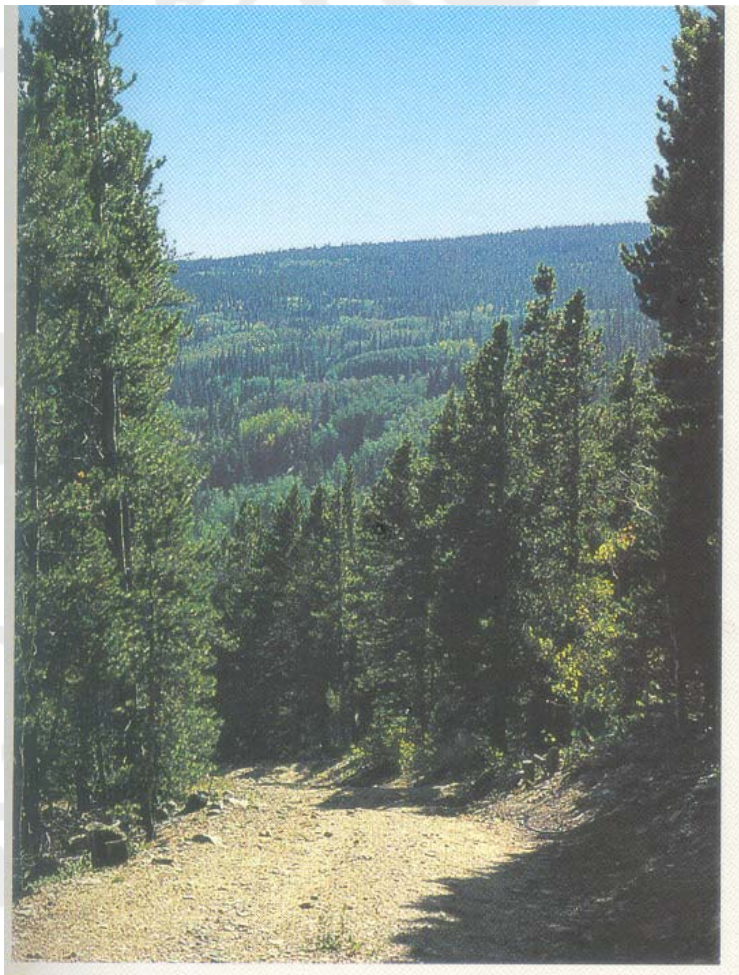
Unit 3 Lecture 5
Various ecosystems-Forest ecosystem

- Throughout the southern half of Canada, parts of northern Europe, and much of Russia, there is a northern **coniferous forest** or boreal forest. In India, along the Himalayas. Among the dominant conifers are pine, hemlock, spruce, cedar, and fir.



Unit 3 Lecture 5
Various ecosystems-Forest ecosystem

- **Moist Temperate Coniferous forest** These occur along the west coast of North America from central California to Alaska. Here the temperatures are higher, seasonal range is relatively small and humidity is very high.



Unit 3 Lecture 5
Various ecosystems-Forest ecosystem

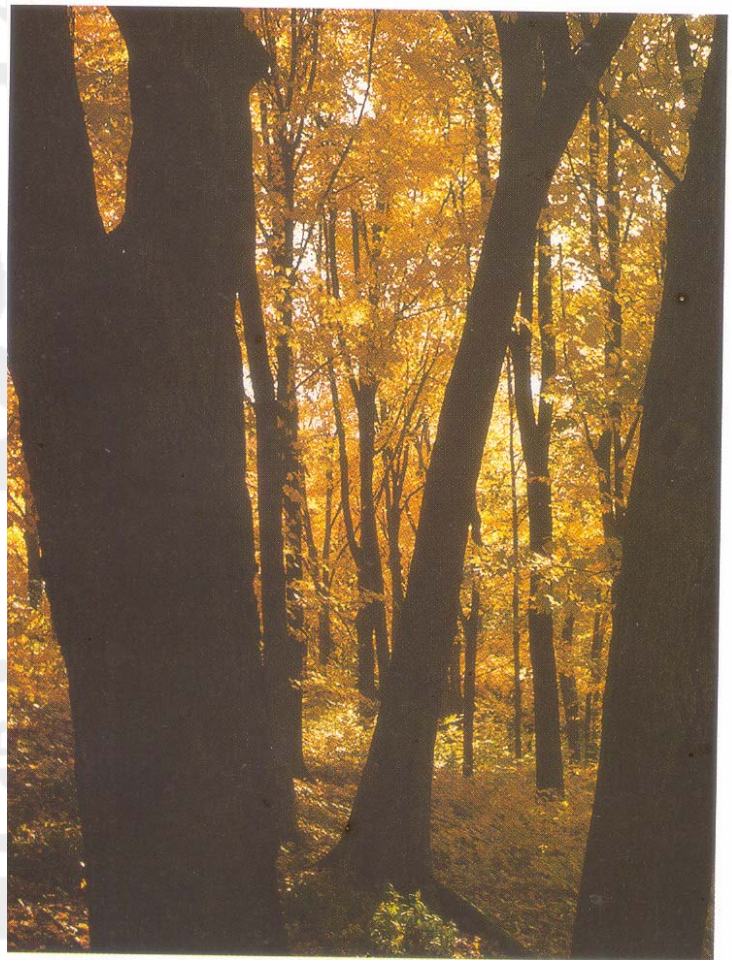
- **Temperate deciduous forest** This kind of forest is called the temperate deciduous forest found in the eastern half of the United States, parts of south central and south eastern Canada, southern Africa and many areas of Europe and Asia.

Unit 3 Lecture 5
Various ecosystems-Forest ecosystem

- **Broad-leafed Deciduous and Evergreen Forests**

  These forests occur throughout the world where the rainfall is plentiful. In temperate regions, the climate supports lush summer plant growth when water is plentiful but requires survival adaptation for the frozen season.

  Found in Western Ghats, North East India, and Andaman & Nicobar Islands.



Unit 3 Lecture 5
Various ecosystems-Forest ecosystem

Tropical Rain Forest These are located near the equator in central and south America, Africa, south east Asia, and some islands in the Caribbean sea and Pacific ocean. These forests have a very large number of plant species including balsa, teak wood, and many other ornamental roots. The trees are usually in two or three layers, with some taller trees.

Unit 3 Lecture 5
Various ecosystems- Grassland ecosystem

Grasslands, also known as prairies or steppes, are widely distributed over the world. They generally receive between 25 and 75 cms of precipitation per year. These areas are windy with hot summers and cold to mild winters.

Found in Western India, parts of Central India and Deccan plateau

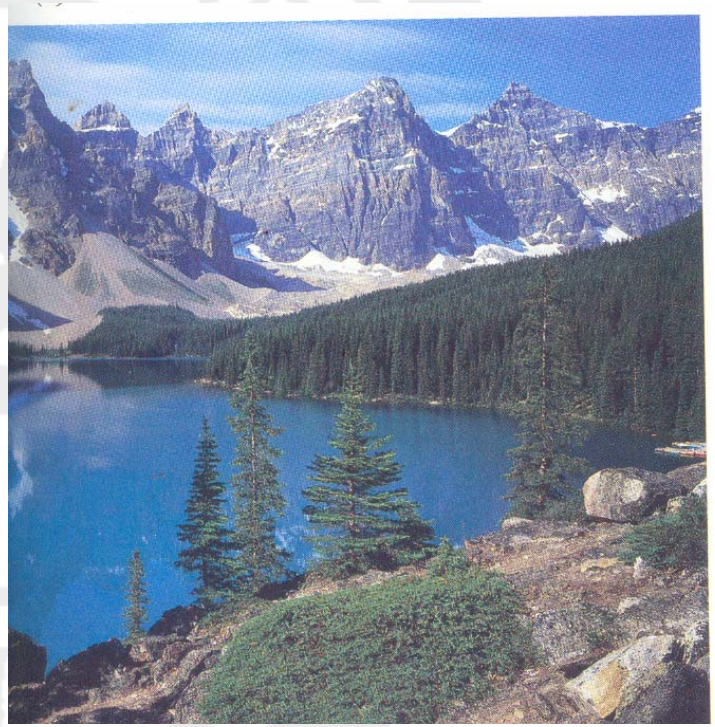
Unit 3 Lecture 5
Various ecosystems- Desert ecosystem

Deserts are areas that generally receive fewer than 25 cm of precipitation per year. Although most deserts, such as the Sahara and the deserts of the south western United States, Mexico and Australia

India-Found in Rajasthan and Gujarat

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

Aquatic ecosystems are shaped by primary determiners. Four such factors are ability of the sun's rays to penetrate the water, the nature of the bottom substrate, the water temperature, and the amount of dissolved materials. Those that have little dissolved salts are called **freshwater ecosystems** and those that have a high salt content are called **marine ecosystems**



Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

Freshwater Ecosystems This can be divided into two categories: those in which the water is relatively stationary, such as lakes and ponds, and those in which the water is running downhill, such as streams and rivers.

The zones that are evident in a lake ecosystem are as follows :

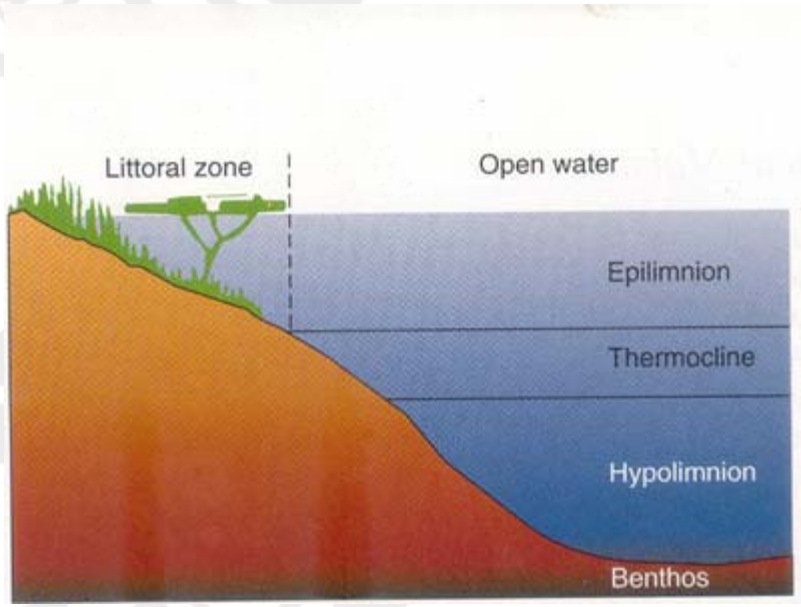
Littoral Shallower water region with light penetration to the bottom; typically occupied by rooted plants

Limnetic Open water zone to the depth of effective light penetration, called the compensation level, which is the depth at which photosynthesis just balances respiration

Profundal The bottom and deep-water area, which is beyond the depth of effective light penetration

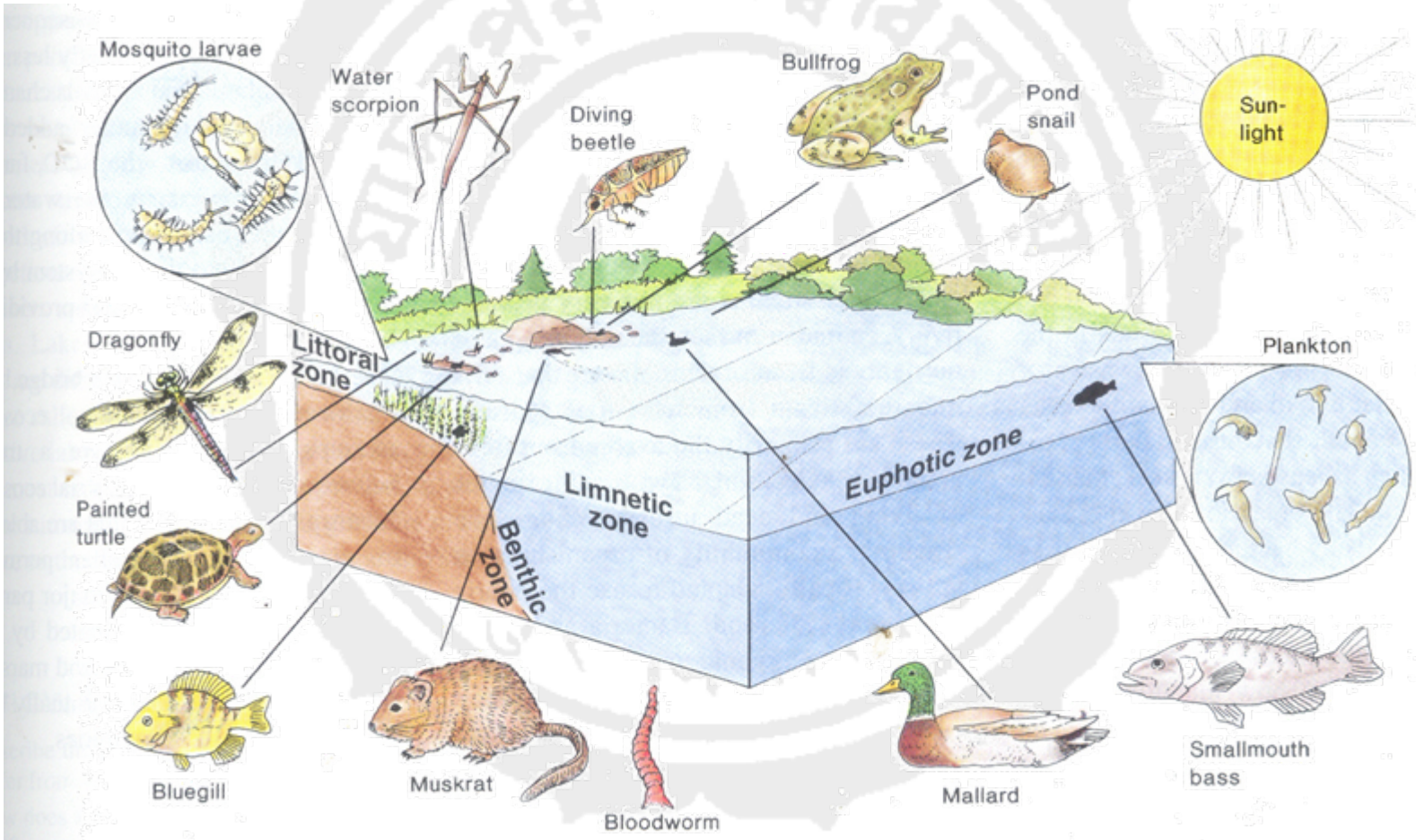
Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

Thermal Stratification – During the summer the top waters become warmer than the bottom waters, as a result only the warm top layer circulates and it does not mix with the more viscous colder water, creating a zone with a steep temperature gradient in between called the **thermocline**. The upper warm circulating water is the **epilimnion** while the colder non-circulating water is the **hypolimnion**.



Deep, cold, nutrient-poor lakes are low in productivity and are called **oligotrophic lakes**. Shallow, warm, nutrient-rich lakes are called **eutrophic lakes**.

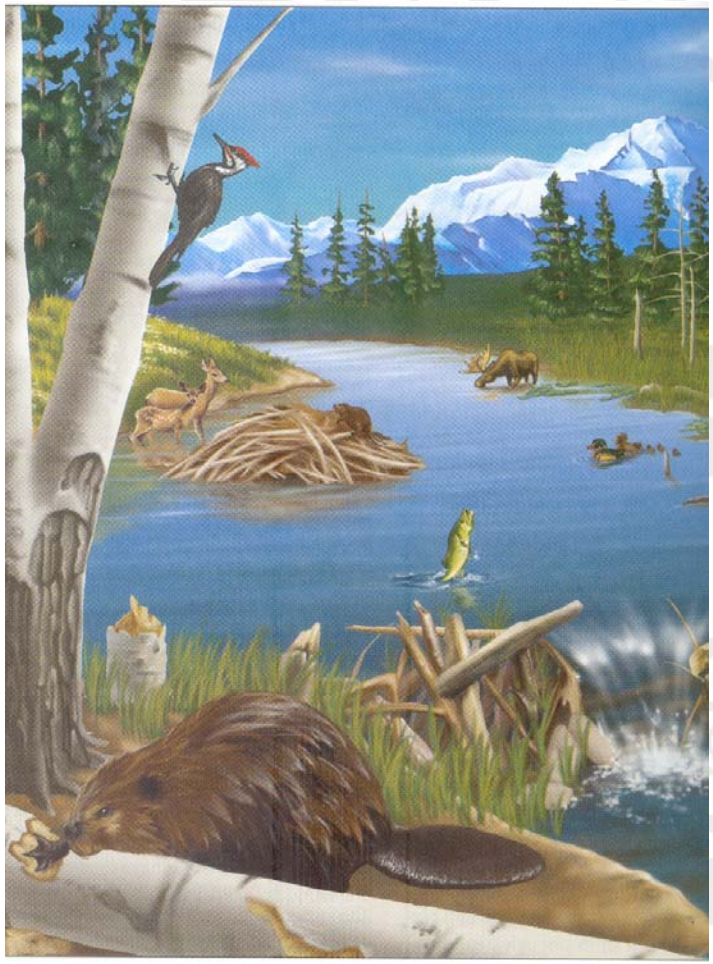
Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem



Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- Ponds are small bodies of water in which the littoral zone is relatively large and the limnetic and the profundal zones are small or absent. Stratification is of minor importance.
- Ox-bow – They are continually being formed, for example, as a stream shifts position, leaving the former bed isolated as a body of standing water or 'ox-bow'
- Temporary pond – they are dry for part of the year and support an unique community
- Farm ponds – these are created artificially by detouring a stream around a pond or the pond is constructed in a basin without a permanent stream

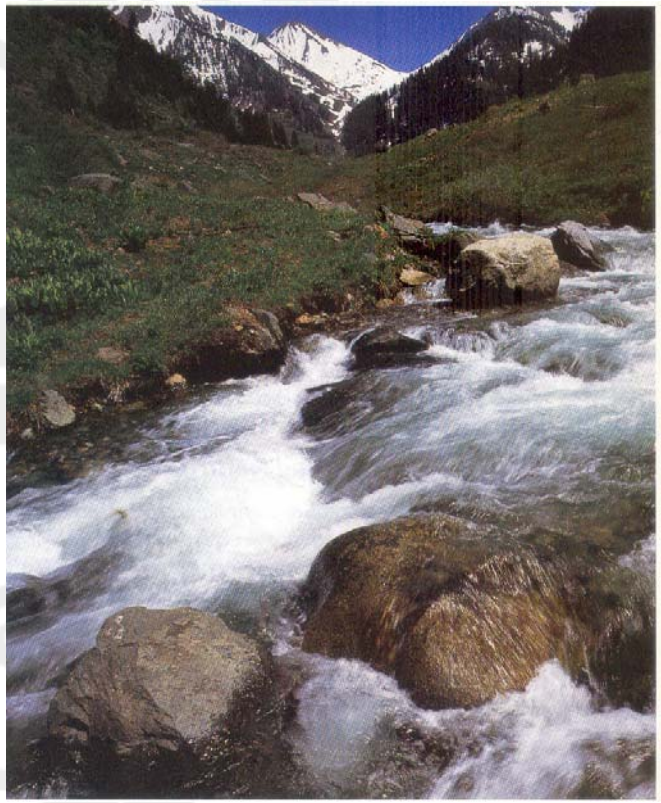
Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem



Beaver pond – these are created by damming of a stream or basin by animals such as beaver

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- **Streams**: Since the water is moving, plankton organisms are less important than are attached organisms. Most algae grow attached to rocks and other objects on the bottom. This collection of algae, animals, and fungi is called **periphyton**
- In streams two major zones are mainly evident
  - **Rapid** : Shallow water where velocity of current is great enough to keep the bottom clear of silt and other loose materials, thus providing a firm substrate
  - **Pool** : Deeper water where velocity of current is reduced and silt and other loose materials tend to settle to the bottom, thus providing the soft bottom, unfavourable for surface benthos but favourable for burrowing forms



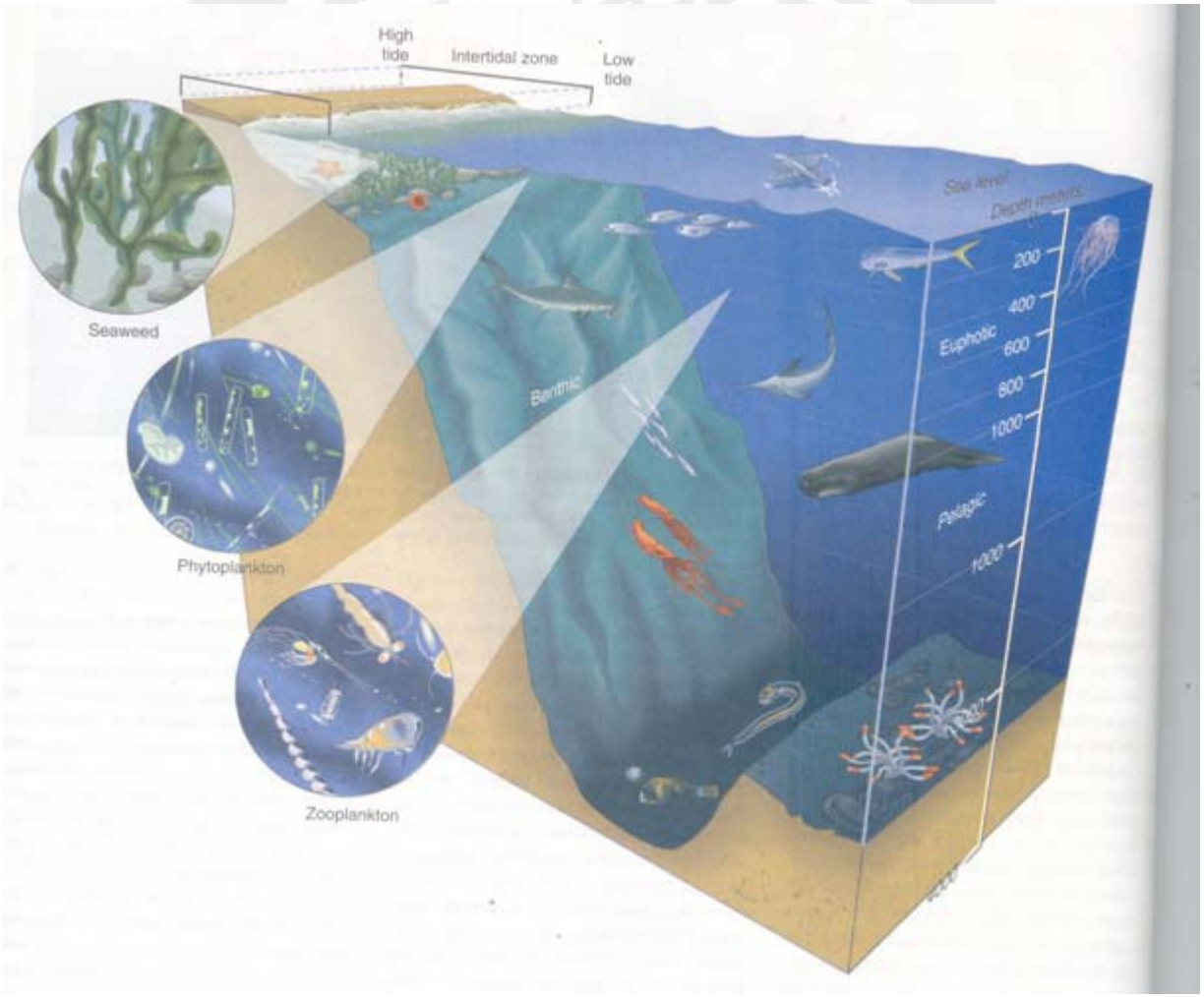
Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- In general differences between streams and ponds revolve around a triad of conditions:
  - Current is much more of a major controlling and limiting factor in streams.
  - Land-water interchange is relatively more extensive in streams, resulting in a more open ecosystem and a heterotrophic type of community metabolism.
  - Oxygen tension is more uniform in streams, and there is little or no thermal or chemical stratification.

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- The oceans cover 70% of earth's surface and play an important role in our global environment. Oceans buffer and modulate climate, reduce the extremes in temperature that would otherwise be experienced on earth
- It is deep and life extends to all its depths
- It is continuous, not separated as land and fresh water habitats
- It is in continuous circulation
- It is dominated by waves of many kinds and by tides
- Ocean is salty
- The concentration of dissolved nutrients is low
- oceans and some groups of organisms that live in it are older than the ocean floor

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem



Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- The ocean consists of two ecosystems: Pelagic Ecosystem and Benthic Ecosystem
- In ocean a majority of the producer organisms are small, microscopic, floating algae called **phytoplankton**. Since sunlight cannot penetrate to great depths in water, these phytoplankton are located in the upper regions. This region where the sun's rays penetrates is known as the **euphotic zone**. Small, weakly swimming animals of many kinds, known as **zooplankton**, feed on the phytoplankton. Organisms that live on the ocean bottom, whether attached or not, are known as benthic organisms, and the kind of ecosystem that consists of these organisms is called a **benthic ecosystem**. At great depths in the ocean is an ecosystem that relies on a continuous rain of organic matter from the euphotic zone. These areas are known as **abyssal areas**, and the ecosystem is known as an **abyssal ecosystem**

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- **Ocean Food Webs** There are many different food webs in the ocean

  Planktonic Food Webs They have small floating algae and photosynthetic blue green bacteria as the primary producers

  Intertidal Food Webs The intertidal region is made up of areas exposed alternately to the air during low tide and to ocean waters during high tide

  Reef Food Webs Coral reefs are structures that appear to be made of rocks but are actually formed of the hard material deposited by living organisms.

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

- ESTUARY It is a special category of marine ecosystem consisting of shallow, partially enclosed areas where freshwater enters the ocean. It is a good example of a coupled system that achieves a good balance between physical and biotic components, and thereby a high rate of biological productivity.

- It consists of several basic subsystems

1. The shallow water production zone
2. The sedimentary subsystem in the deeper channels
3. The plankton and nekton which moves freely between the two fixed subsystems

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

The reasons for high productivity in an estuarine ecosystem can be summarized as follows:

1. It is a nutrient trap that is partly physical and partly biological

2. They benefit from a diversity of producer types programmed for virtually year around photosynthesis

3. Tidal action is important in creating a fluctuating water level ecosystem

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

Rocky Estuary

Unit 3 Lecture 5
Various ecosystems- Aquatic ecosystem

Mangrove Estuary