

Principles of Ecology

BSc. Course 2024 – 2025

Lecture 8

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Aquatic Ecosystems:

- 1. Freshwater Ecosystems**
- 2. Estuarine Ecosystems**
- 3. Marine Ecosystems**

Aquatic Ecosystems

- Almost **three-Quarters** of the Earth's surface is covered with water.
- All water bodies contain a wide variety of communities influenced by biotic and abiotic factors including **light**, **nutrients**, **oxygen**, **depth**, **flow**, **temperature**, **latitude** and chemistry of the overlying water (**dissolved chemicals**).
- **Aquatic ecosystems** are often grouped according to the abiotic factors that affect them.
- The depth of water determines the amount of light that organisms receive.

Freshwater Ecosystems

- Freshwater ecosystems can be divided into two main types:
- **1-** flowing-water ecosystems such as Rivers, streams, creeks, and brooks are freshwater ecosystems that flow over land.
- **2-** Standing-water ecosystems such as Lakes and ponds
- **Freshwater Wetlands**
- A **wetland** is an ecosystem in which water covers the soil or is present at or near the surface of the soil at least part of the year.
- The water in wetlands may be flowing or standing and fresh, salty, or brackish.
- Many wetlands are productive ecosystems that serve as breeding grounds for many types of wildlife.

Freshwater Ecosystems

- Key distinction of water bodies:

SALINITY = salt content of the water

Measured in parts per thousand (ppt)

1 gm of salt in 1000 gms water = 1 ppt

FRESH usually < **0.5** ppt

OCEANS average **35** ppt

0.5 to **17** ppt is called **BRACKISH**

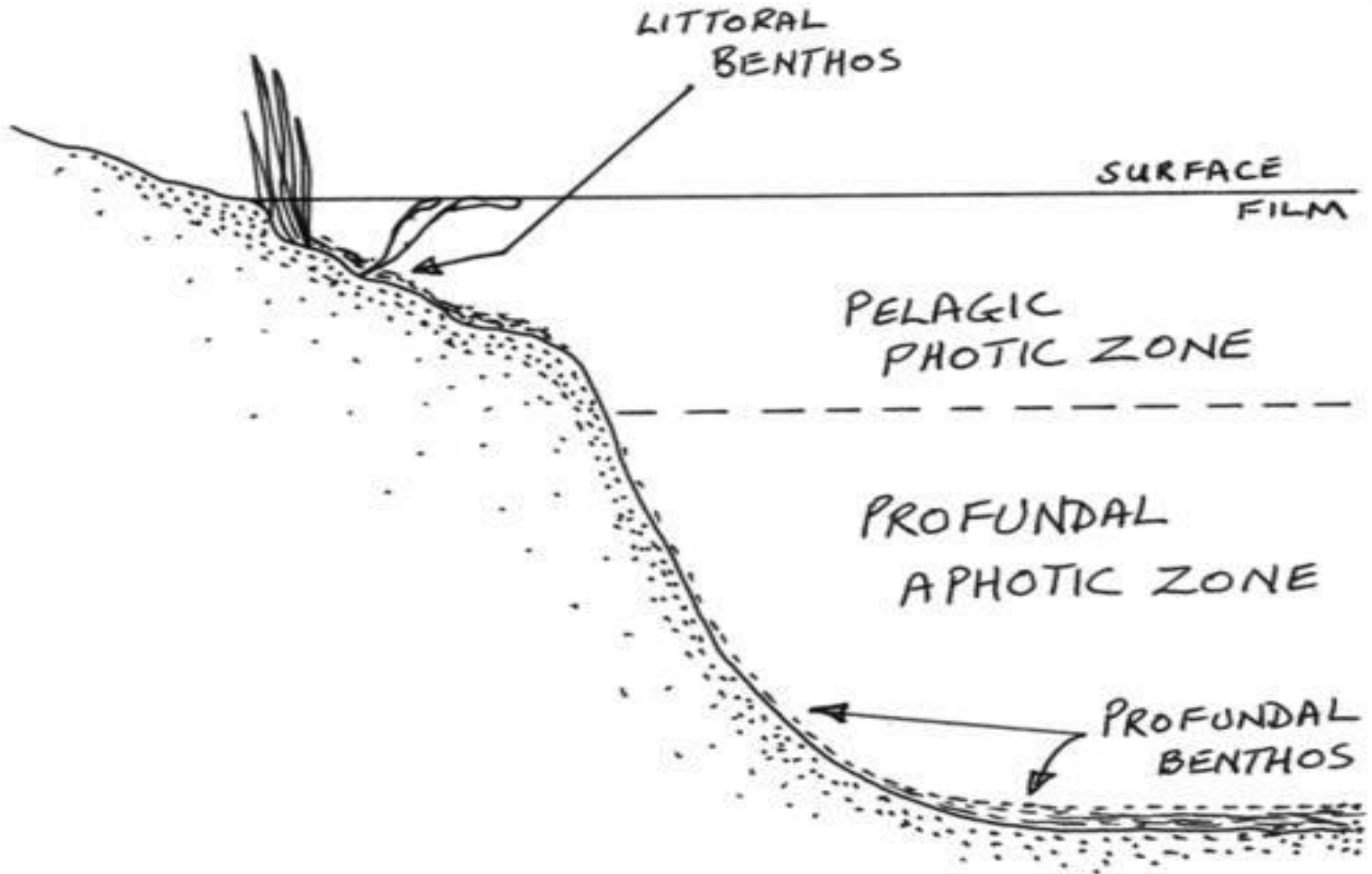
Freshwater Ecosystems

- The three main types of freshwater wetlands are bogs, marshes, and swamps.
- **Bogs** are wetlands that typically form in depressions where water collects.
- **Marshes** are shallow wetlands along rivers.
- In **swamps**, which often look like flooded forests, water flows slowly.
- All freshwater systems form
 - Just a fraction of the Earth's water
 - 0.01%** = one -hundredth of one percent
- Occupy less than **1** percent of the Earth's surface

• **Parts of a lake**

- **Littoral zone: near shore**
 - **Nutrient rich, lots of plant and animal life**
 - **Warm**
- **Limnetic zone: near surface, open water**
 - **Lots of light**
 - **Lots of plankton**
- **Profundal zone: deeper, little light**
- **Benthic zone: the bottom, little light, low oxygen**

Parts of a lake



Estuaries

- Estuaries are wetlands formed where rivers meet the sea.
- Estuaries contain a mixture of fresh and salt water, and are affected by the ocean tides.
- **Salt marshes** are temperate-zone estuaries dominated by salt-tolerant grasses above the low-tide line, and by sea grasses under water.
- **Salt marshes** occur in estuaries along seacoasts in the temperate zone.
- **Mangrove swamps**: They are coastal wetlands that occur in bays and estuaries across tropical regions.
- The dominant plants are salt-tolerant trees, called mangroves, with sea grasses common below the low-tide line.

Marine Ecosystems

The well-lit upper layer of the ocean is known as the **Photic zone**.

Algae and other producers can grow only in this thin surface layer.

Below the Photic zone is the **Aphotic zone**, which is permanently dark.

Chemosynthetic autotrophs are the only producers that can survive in the Aphotic zone.

marine biologists divide the ocean into zones based on the depth and distance from shore:

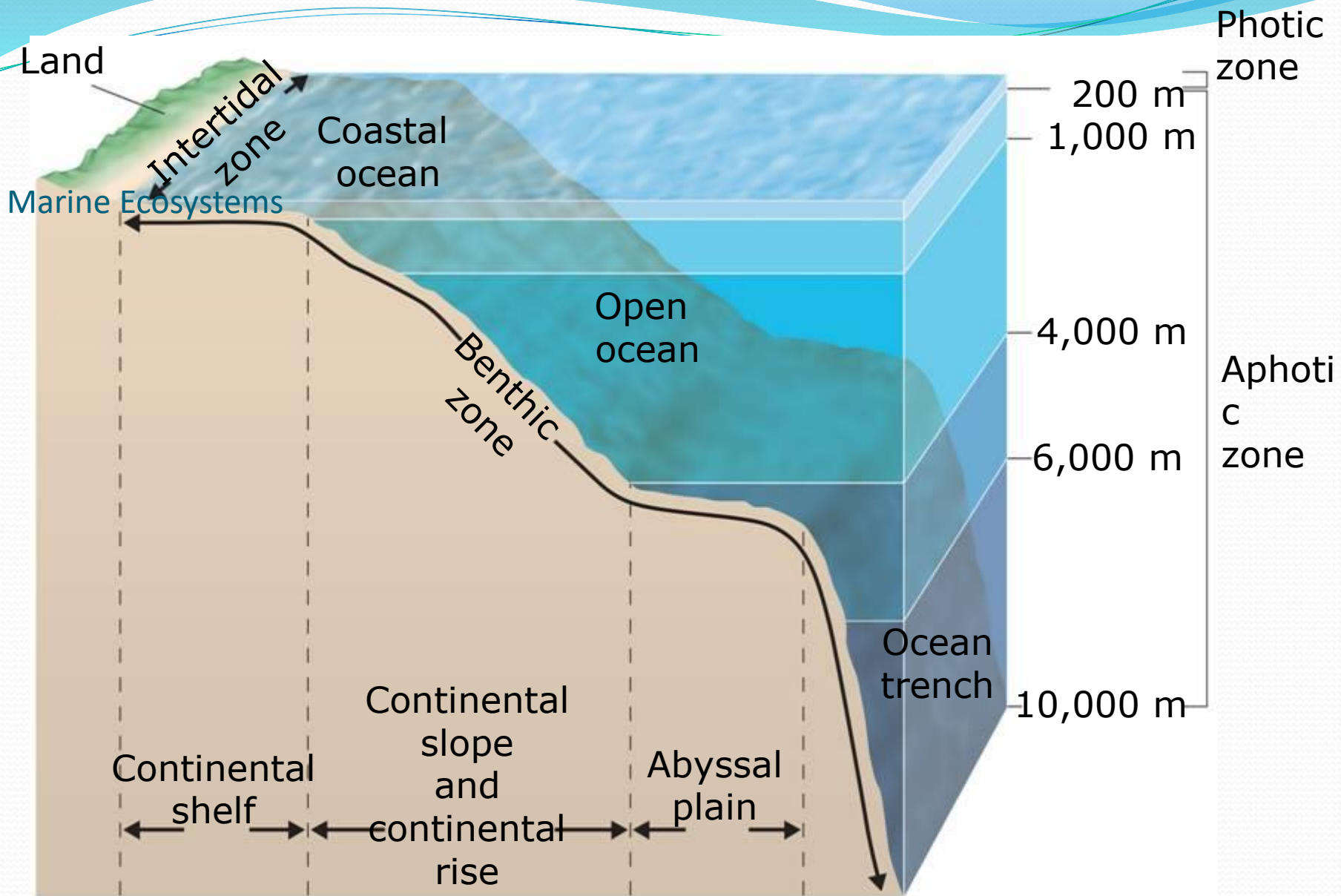
- **the intertidal zone**
- **the coastal ocean**
- **the open ocean**

• **Intertidal Zone**

- Organisms that live in the intertidal zone are exposed to regular and extreme changes in their surroundings.
- Competition among organisms in the intertidal zone often leads to **zonation**,

• **Coastal Ocean**

The **coastal ocean** extends from the low-tide mark to the outer edge of the continental shelf. It falls within the Photic zone, and photosynthesis occurs throughout its depth. The coastal ocean is often rich in plankton and many other organisms.



Kelp forests: غابات عشب البحر

- A dominant communities of **giant brown algae** productive in the coastal ocean which support a complex food web.



Coral Reefs

الشعاب المرجانية

- Found in tropical coastal waters, named for the coral animals whose calcium carbonate skeletons make up their primary structure.

