Chapter 1
The Ocean as a Habitat

Chapter Concepts Outline

1.1 THE CHANGING MARINE ENVIRONMENT
Understanding of the sea requires a shift in perspective toward a “geological perspective” that allows for our five-billion-year history and vast distances greater than several thousand kilometers.

The interrelated concepts of continental drift and plate tectonics have radically changed our view of the ocean’s structure.

1.2 THE WORLD OCEAN
Visualizing the World Ocean
← Earth’s oceans exist as a large inter-connected system of mixing seawater.

Seeing in the Dark
← Water is nearly opaque to light, yet very transparent to sound.

1.3 PROPERTIES OF SEAWATER
Pure Water
← The unique characteristics of pure water are established by an electrical charge separation within water molecules that forms hydrogen bonds between adjacent water molecules.

Seawater
← Salt water contains a great variety of dissolved salts, gases, and other inorganic and organic substances.
← These dissolved molecules and compounds affect many characteristics of seawater, including its density, osmotic properties, buffering capacity, and other biologically significant features.

1.4 THE OCEAN IN MOTION
The sea is constantly moving, both horizontally and vertically. Winds, waves, tides, currents, sinking water masses, and upwelling all contribute to the remarkable homogeneity of the world ocean.

Wind Waves
← The character of wind-driven ocean waves depends on the wind’s speed, duration, and fetch.

Surface Currents
Ocean surface currents are driven by stable patterns of surface winds.
Ocean Tides
← Ocean tides are driven by the gravitational interactions of the Sun, Earth, and Earth’s moon.

Vertical Water Movements
← Vertical circulation of ocean water results from density-driven sinking processes.

1.5 CLASSIFICATION OF THE MARINE ENVIRONMENT
Energy from the sun warms the sea’s surface and creates winds that result in a two-layered world ocean, with a shallow, well-mixed, warm, sunlit layer overlaying a much deeper, cold, dark, high-pressure layer of slowly moving water below.

The three-dimensional marine environment can be separated into two broad divisions: the benthic realm of the sea floor and the pelagic water column.

These in turn may be subdivided into smaller categories based on water depth, light availability, and ambient temperature.

The marine environment is a large and complex system, so we create classification systems to better understand the relationships between the physical characteristics of the ocean.