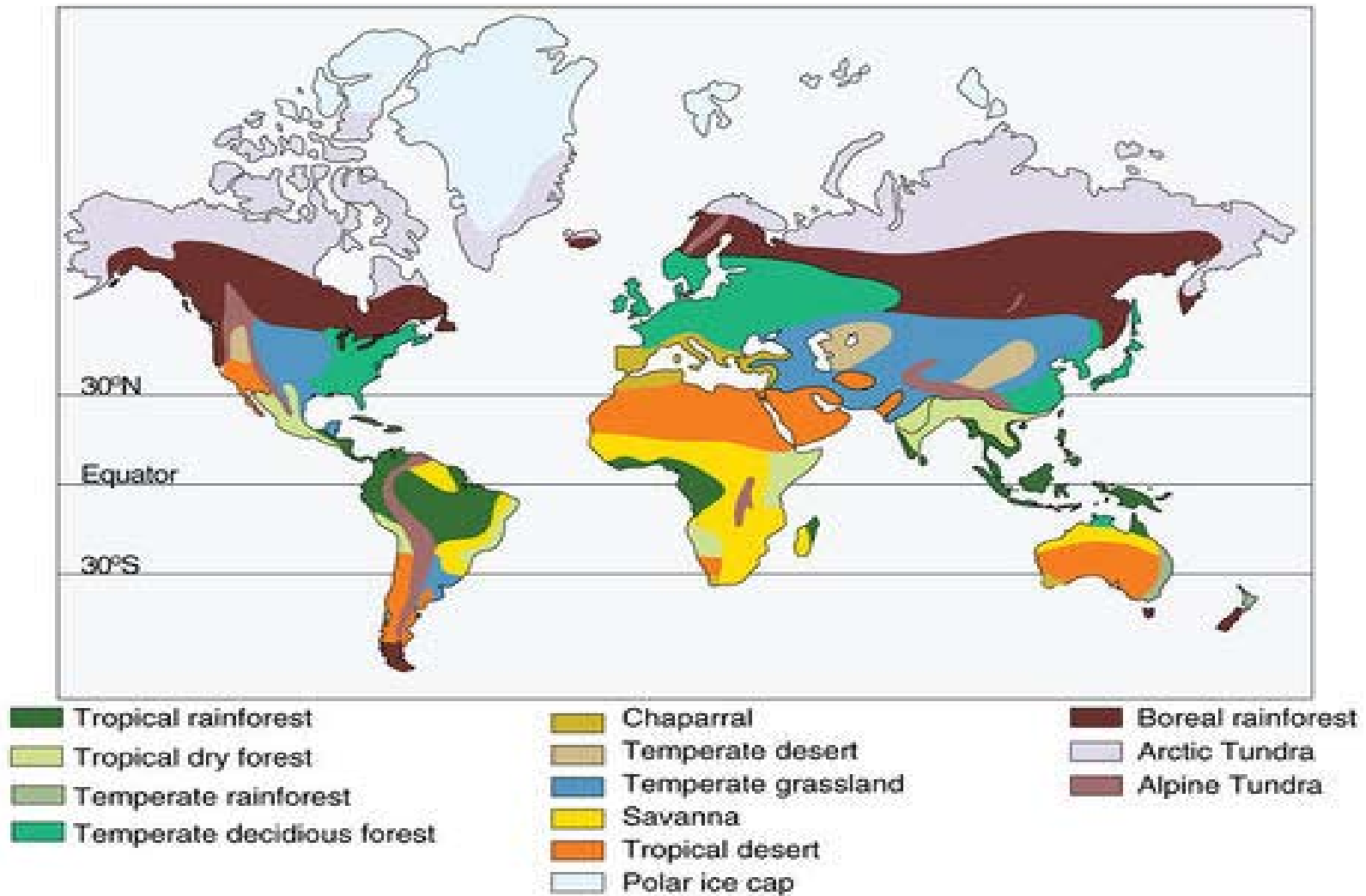


The image features a background with a green-to-yellow gradient and a pattern of faint, overlapping hexagons. A white rectangular box is positioned on the right side, containing the word "Biomes" in a bold, green, sans-serif font. Above the white box is a solid dark grey rectangle, and a thin green horizontal line is located at the bottom of the white box.

Biomes

Terrestrial biomes are classified by the climate, their biodiversity, and the types of primary producers.





Alpine tundra in the Alps Mountains of Switzerland in Europe



Arctic tundra on the northern coast of Alaska in the United States

Tundra

Other names:

Arctic tundra (high latitudes)
Alpine tundra (high altitudes)

Climate: Arctic, acrid

Growing season: Very short

Soil quality: Very poor

Biodiversity: Very low

Plants: Mosses, grasses, and lichens; few herbaceous plants; no trees.

Animals: Insects; birds (summer only); no amphibians or reptiles; mammals such as rodents, arctic hares, arctic foxes, polar bears; caribou (summer only); mountain goats and chinchillas (alpine tundra only)

Taiga (Boreal Forest)



Boreal forest in central (inland)
Alaska, United States

Boreal Forest

Other names: Taiga, northern conifer forest

Climate: Subarctic, semi-arid

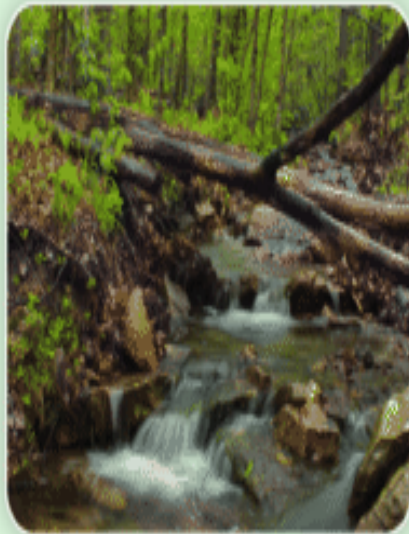
Growing season: Short

Soil quality: Poor

Biodiversity: Low

Plants: Conifers such as cedar, spruce, pine, and fir; mosses and lichens

Animals: Insects; birds (mainly in summer); no amphibians or reptiles; mammals such as rodents, rabbits, minks, raccoons, bears, and moose; caribou (winter only)



Temperate deciduous forest in Pennsylvania, eastern United States

Temperate Deciduous Forest

Other names: Temperate hardwood forest, temperate broadleaf forest

Climate: Temperate, semi-humid

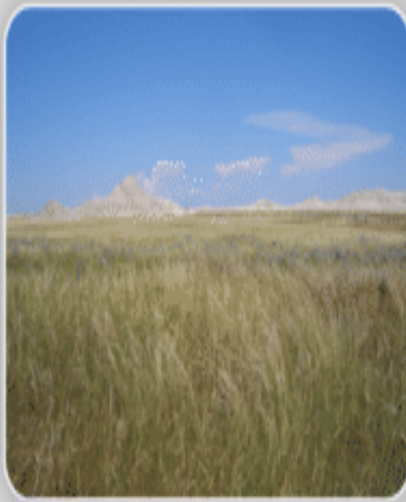
Growing season: Medium

Soil quality: Good

Biodiversity: High

Plants: Broadleaf deciduous trees such as beech, maple, oak, and hickory; ferns, mosses, and shrubs; many herbaceous plants

Animals: Insects, amphibians, reptiles, and birds; mammals such as mice, chipmunks, squirrels, raccoons, foxes, deer, black bears, bobcats, and wolves



Temperate grassland in Nebraska,
midwestern United States

Temperate Grassland

Other names: Prairie, outback, pampa, steppe

Climate: Temperate, semi-arid

Growing season: Medium

Soil quality: Excellent

Biodiversity: Medium-high

Plants: Grasses; other herbaceous plants; no trees

Animals: Invertebrates such as worms and insects; amphibians, reptiles, and birds; mammals such as mice, prairie dogs, rabbits, foxes, wolves, coyotes, bison, and antelope; kangaroo (only in Australia)



Chaparral in southern California,
United States

Chaparral

Other names: Mediterranean scrub forest

Climate: Temperate, semi-arid

Growing season: Medium

Soil quality: Poor

Biodiversity: Low-medium

Plants: Shrubs and small trees such as scrub oak and scrub pine

Animals: Insects, reptiles, and birds; mammals such as rodents and deer



Desert in southern California,
United States

Desert

Climate: Temperate or tropical, arid

Growing season: Varies

Soil quality: Very poor

Biodiversity: None-low

Plants: Plants adapted to dryness, such as cacti, sagebrush, and mesquite; virtually no plants if extremely arid

Animals: Insects, reptiles, and birds; mammals such as rodents and coyotes



Tropical rainforest in Ecuador,
South America

Tropical Rainforest

Climate: Tropical, humid

Growing season: Year-round

Soil quality: Excellent

Biodiversity: Very high

Plants: Tall flowering, broadleaf evergreen trees; vines and epiphytes; few plants on forest floor

Animals: Insects, amphibians, reptiles, and birds; mammals such as monkeys, sloths, leopards, jaguars, pigs, and tigers



Elephant grazing in its grassland ecosystem.

Tropical Grassland

Other names: Savanna

Climate: Tropical, semi-arid

Growing season: Year-round

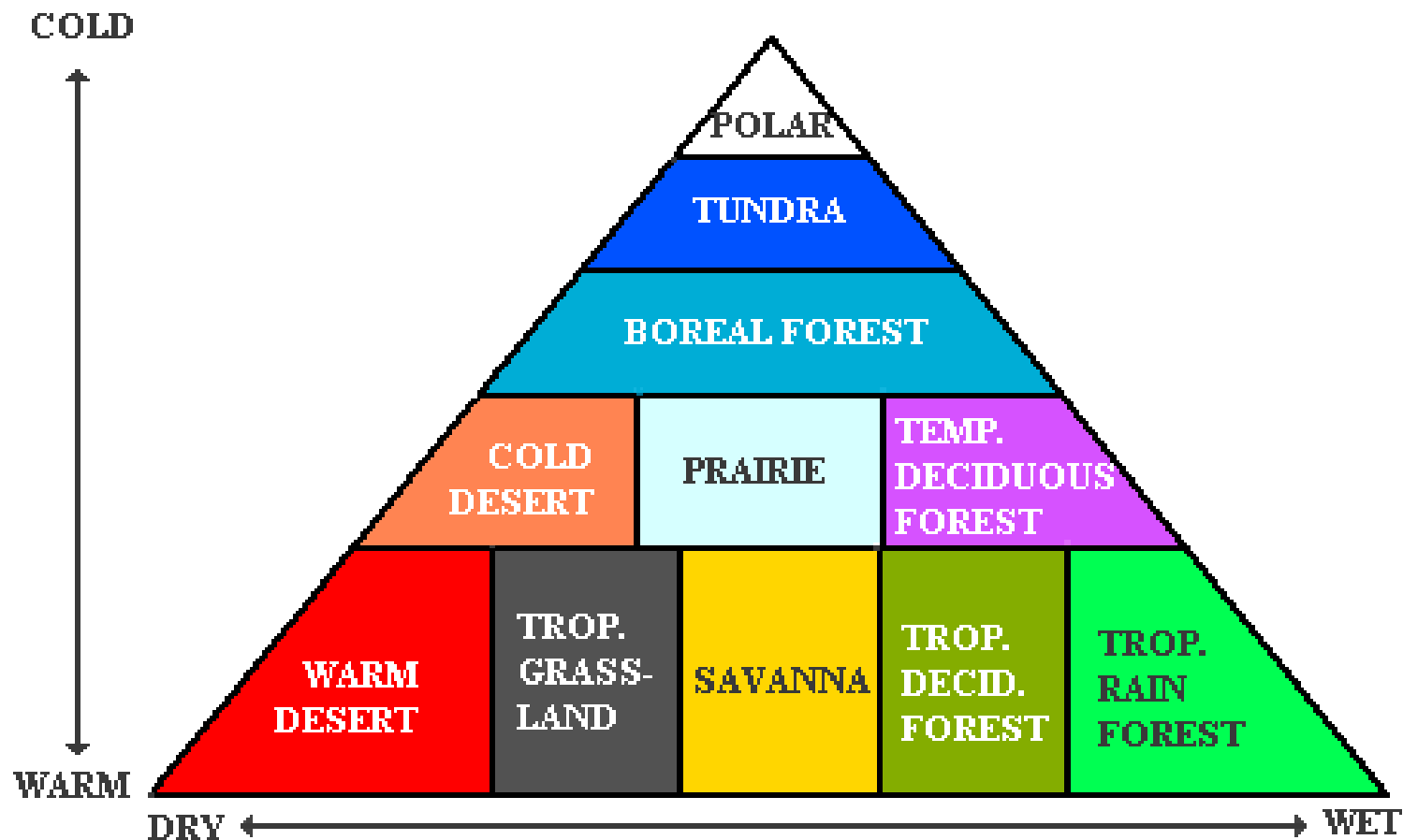
Soil quality: Poor

Biodiversity: Low-medium

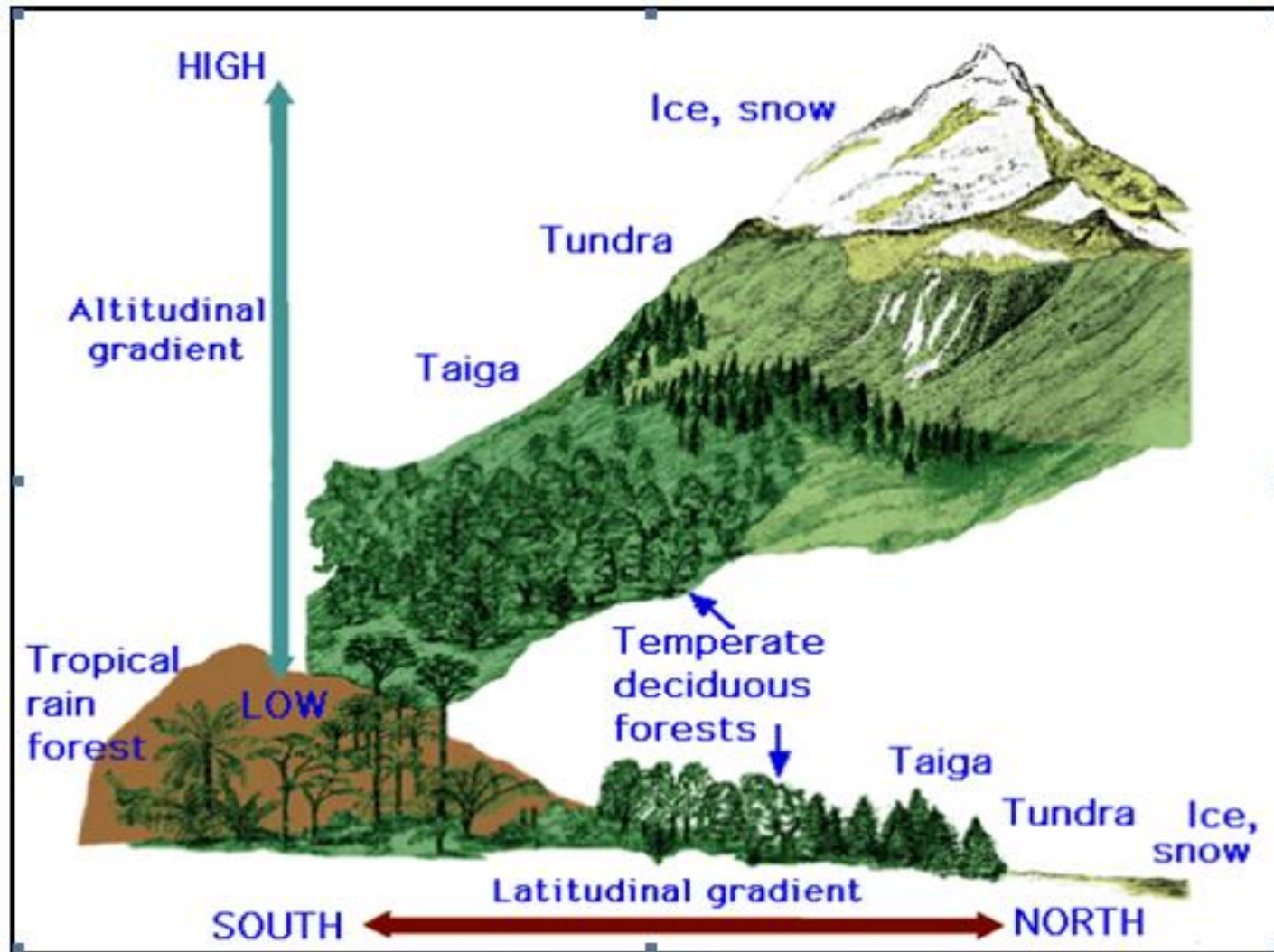
Plants: Grasses, scattered clumps of trees

Animals: Insects, reptiles, and birds; mammals such as zebras, giraffes, antelopes, lions, cheetahs, and hyenas

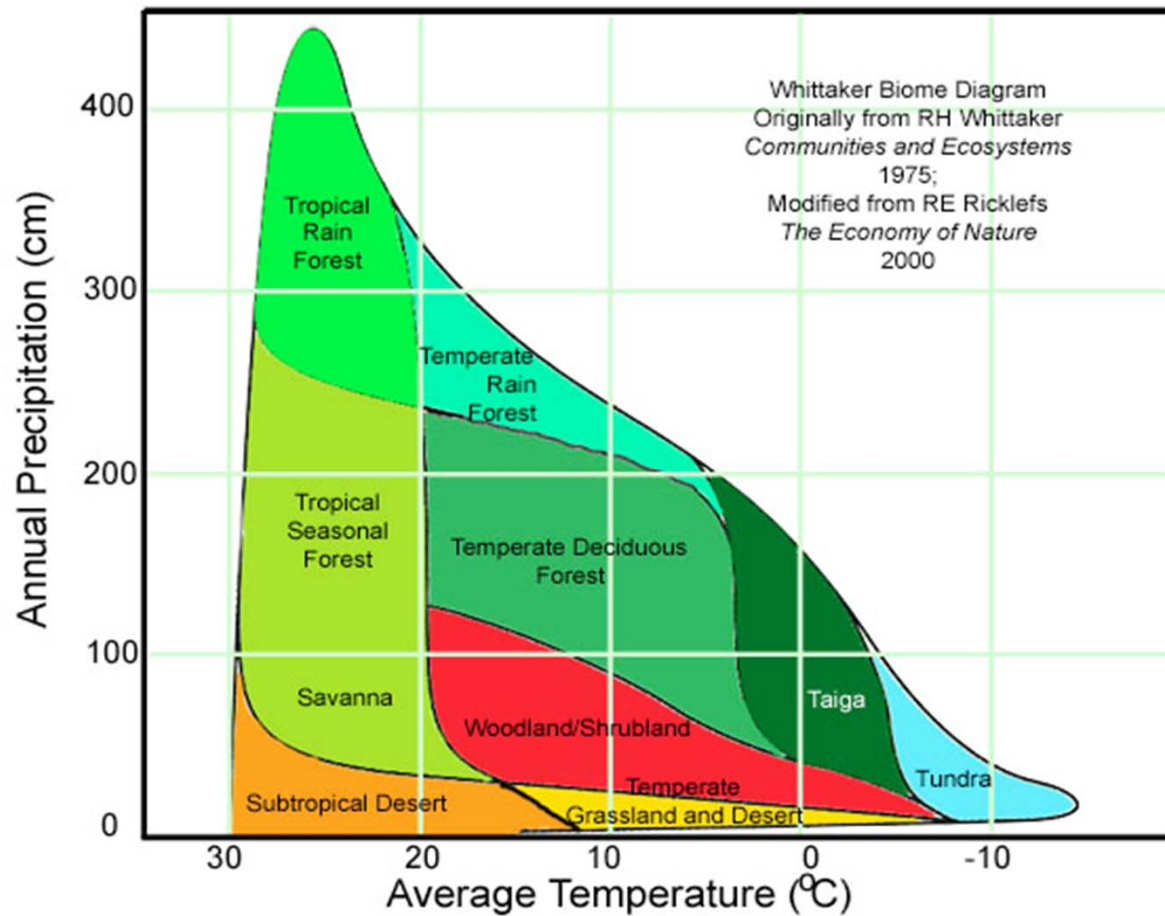
Climate & Land Biomes



Altitude vs. Latitude



Whittaker Biome Diagram

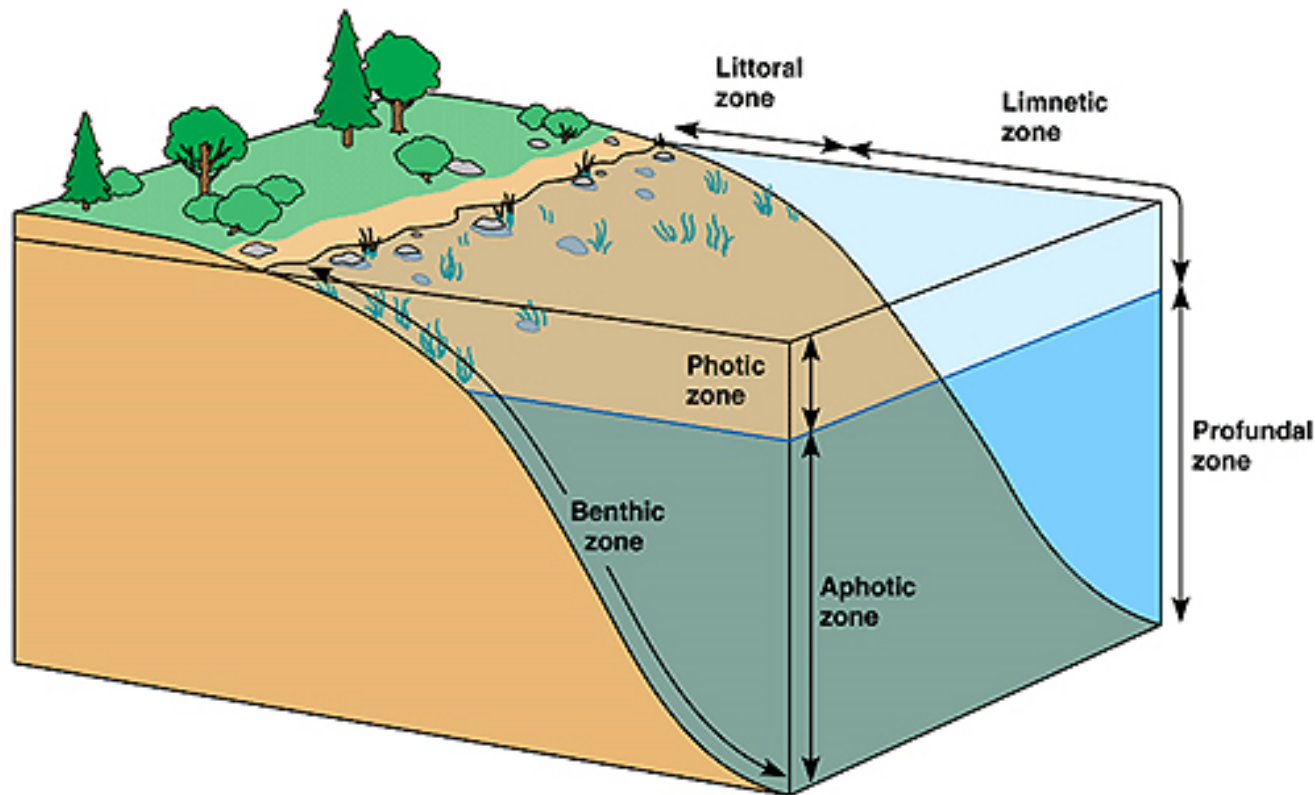


Freshwater Biomes

- **Freshwater is defined as having a low salt concentration, usually less than 1%. P**
- **plants and animals in freshwater regions are adjusted to the low salt content and would not be able to survive in areas of high salt concentration.**

Ponds and Lakes

- ✓ **range in size from just a few square meters to thousands of square kilometers.**
- ✓ **Many ponds are seasonal, lasting just a couple of months while lakes may exist for hundreds of years**
- ✓ **have limited species diversity since they are often isolated from one another and from other water sources like rivers and oceans.**
- ✓ **Lakes and ponds are divided into three different “zones” which are usually determined by depth and distance from the shoreline.**



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Ponds and Lakes

littoral zone - inshore, shallow, high light levels

limnetic zone - offshore, high light levels, upper regions of water column

profundal zone - aphotic

benthic zone - bottom substrate; often rich in detritus

Streams and Rivers

- **bodies of flowing water moving in one direction.**
- **The characteristics of a river or stream change during the journey from the source to the mouth.**
- **The temperature is cooler at the source than at the mouth. The water is clearer, has higher oxygen levels, with freshwater fish such as trout.**
- **Toward the middle part of the stream/river, the width increases, as does species diversity.**
- **Near the mouth of the river/stream, the water becomes murky from all the sediments it has picked up upstream, decreasing the amount of light that penetrate the water.**
- **With less light, there is less diversity of flora; lower oxygen levels can only house fish that require less oxygen, such as catfish and carp.**

Wetlands

- **areas of standing water that support aquatic plants; marshes, swamps, and bogs are all considered wetlands. Can be freshwater or saltwater.**
- **Flora include pond lilies, cattails, sedges, tamarack, black spruce, and cypress and gum (marshes).**
- **Wetlands have the highest species diversity of all ecosystems.**
- **salt marshes support different species of animals, such as shrimp, shellfish, and various grasses.**



Marine Biomes

- Marine regions cover about three-fourths of the Earth's surface and include oceans, coral reefs, and estuaries.
- Marine algae supply much of the world's oxygen supply and take in a huge amount of atmospheric carbon dioxide.
- The evaporation of the seawater provides rainwater for the land.
- Most stable of all biomes (think specific heat of water!)

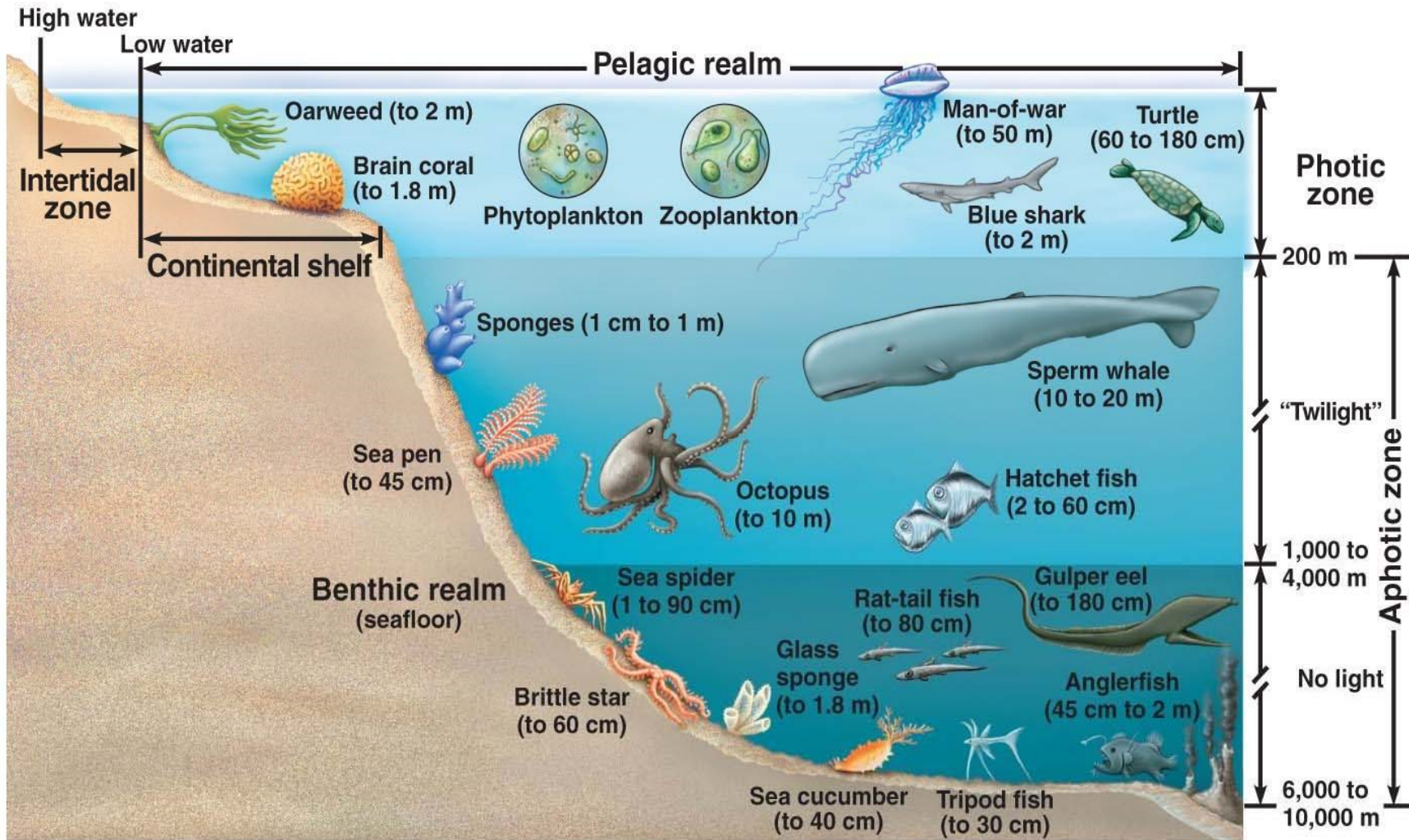
Oceans

- ✓ ***intertidal zone*** is where the ocean meets the land — sometimes it is submerged and at other times exposed, as waves and tides come in and out. Because of this, the communities are constantly changing.

Marine Biome (cont'd)

- ✓ **pelagic zone:** open ocean, generally cold with surface seaweeds many species of fish, and some mammals, such as whales and dolphins. Many feed on the abundant plankton.
- ✓ **benthic zone** is the area below the pelagic zone consisting of sand, silt, and/or dead organisms. Temperature decreases as depth increases, since light cannot penetrate through the deeper water. Flora include seaweed; fauna include all sorts of bacteria, fungi, sponges, sea anemones, worms, sea stars, and fishes.
- ✓ **abyssal zone:** deep ocean, very cold temperatures, high in oxygen, low in nutritional content. Supports many species of invertebrates and fishes. Along ocean floor, can have hydrothermal vents. Chemosynthetic bacteria thrive near these vents due to large amounts of hydrogen sulfide and other minerals.

Ocean Biome



Coral Reefs

- ✓ widely distributed in warm shallow waters. They can be found as barriers along continents (e.g., the Great Barrier Reef off Australia), fringing islands, and atolls.
- ✓ Corals are interesting since they consist of both algae and tissues of animal polyps
- ✓ Since reef waters tend to be nutritionally poor, corals obtain nutrients through the algae via photosynthesis and also by extending tentacles to obtain plankton from the water.



Estuaries

- ✓ **areas where freshwater streams or rivers merge with the ocean.**
- ✓ **algae, seaweeds, marsh grasses, and mangrove trees (only in the tropics), can be found here.**
- ✓ **Estuaries support a diverse fauna, including a variety of worms, oysters, crabs, and waterfowl.**

