Biome Name	Abiotic Factors	Biotic Adaptations Plants	Biotic Adaptations Animals	Threats to Biome
Forests				
Tropical Rain Forest	**Precipitation:** about 250 cm/year, humid **Soil:** thin, not many nutrients due to rapid decay **Location:** found in a belt around the equator, strong sunlight all year = little variation in temp.	Plants grow in layers. The canopy receives about 95% of the sunlight leaving little sun for the forest floor. As plants die, their remains are quickly decayed for other organisms to use.	Specialists: many organisms are adapted to exploit a specific resource. Camouflage is common as is other ways to escape predators.	TR used to cover about 20% of the world, now they cover 7% Biggest threat: Humans strip the TR for logging and animals & entire civilizations are without homes. What can you do? Promote sustainable use of TR products.
Temperate Deciduous Forest	**Precipitation**: 30-100 in/yr, in all forms (rain, snow, etc.) **Soil**: Deep soil layers, rich in nutrients **Location**: Found in temperate zone	Canopy layers: Less dense than TR, most sunlight reaches the ground, more ground dwelling plants Seasonal changes: FOUR seasons of about equal length	Survival strategies? Lose winter coat, adapt to many seasons, eat from different layers of the forest.	Many forests are cleared to provide housing for humans. Careful use of the resource can provide a renewable system if we don't take too much habitat away.
Taiga **aka Northern Coniferous Forest or Boreal Forest**	**Precipitation**: 100 in/yr, mostly snow **Growing season**: Very short **Location**: Found only in Northern Hemisphere.	Conifers: Roots long to anchor trees, needles are long and thin, low sunlight and poor soil	Survival strategies? Adapt for cold winters, burrow, hibernate, warm coat, etc.	Mining operations can irreparably damage this fragile ecosystem. Pollution left behind can also put animals and plants at risk.

Biome Name	Abiotic Factors	Biotic Adaptations Plants	Biotic Adaptations Animals	Threats to Biome
Grasslands, Chaparral, Deserts and Tundra				
Tropical Grassland: Savanna	**Precipitation**: 25-150 in/yr Fire plays a large role in this ecosystem **Location**: Found in tropics, near equator. Contain the greatest number of grazing animals on Earth.	Grows in Tufts Resistance to Drought Many plants have thorns and sharp leaves to protect against predation.	Feeding strategy: Limited food leads to vertical feeding Reproduction: Reproduce during rainy season—ensures more young survive Adapt for short rainy season—migrate as necessary	Invasive species Changes in fire management Because of their low elevation, some savannas are threatened by minor rises in sea level associated with global climate change
Temperate Grasslands: Prairie and Steppe	**Precipitation**: less than 50 in/year precipitation **Mountains**: Mountains often play a role in climate characteristics **Location**: Found in Russia and the Ukraine.	Most abundant are plants called Bunch grasses, fine bladed grasses that grow in clumps to preserve water Sod-forming grasses that won't dry out or blow away in wind.	Many migrate, hibernate or burrow during extremes in temp and precipitation.	Overgrazing…nomadic tribes have started to spend more time in one location. Infrastructure development (roads, buildings, etc). Unmanaged hunting and poaching is destroying herds of animals.
Chaparral	**Location**: Primarily in coastal areas with Mediterranean climates. About 300 N and S of the equator. **Climate:** hot, dry summers, mild, wet winters. Slight variations in seasonal temperatures.	Mostly low-lying shrubs and small trees. Many plants have leathery leaves to resist water loss. Many plant species have oils in leaves to help them resist fire…the fire will take out "weaker" plants that don't belong.	Camouflage: To avoid predation Food: Many animals will change their diet as the season changes.	Human development—very desirable climate for humans to live.

Biome Name	Abiotic Factors	Biotic Factors Plants	Biotic Factors Animals	Threats to Biome
Desert	**Precipitation**: <10 in/year **Soil:** Little to no topsoil due to high winds. Minerals not deep in soil, Too dry for decay.	Store water -Spines -Succulents -Thick, waxy cuticle -Shallow, broad roots	Get water from food Thick outer coat, Burrow during day, Large ears Smaller animals-less surface area	Residential development Off road recreational activities destroy habitat for plants and animals. Some plants are removed by collectors, endangering the population.
Tundra	**Precipitation**: <25 in/year **Climate**: Temp rarely higher than 10^0C. Short growing season. **Location**: Found north of the Arctic Circle	Growing close to the ground Having shallow roots to absorb the limited water resources. Trees grow less than 1 m high!	Small ears Insulation, thick coat	One of the most fragile biomes on the planet. The tundra is slow to recover from damage. Oil drilling is proposed in Alaska and other areas.
Freshwater Ecosystems				
Lakes and Ponds	**Littoral zone**: nutrient rich area found close to shore **Benthic zone**: bottom of the lake where no sunlight can reach.	Plants are floating algae and plants along shoreline	Animals live in or near water long legs and beaks for food longt tails for movement	All water systems are being polluted and degraded by human impact
Wetlands				
Marshes	**Uses for**: Animal/plant homes, carbon "sink", and water recharge areas, removing pollutants. **Different types**: saltwater and freshwater.	Very shallow with land occasionally exposed Saturated soil Low oxygen in water and soil Emergent plants	Animals live in or near water long legs and beaks for food longt tails for movement	Previous backfilling and clearing for farmland or development has been a concern.
Swamps/ Bogs	**Location:** Found on flat, poorly drained land, often near streams	Large trees/shrubs Adapted to muddy soils Land soaked because of poor drainage	long legs and beaks for food longt tails for movement	All water systems are being polluted and degraded by human impact

Biome Name	Abiotic Factors	Biotic Adaptations Plants	Biotic Adaptations Animals	Threats to Biome
Rivers	At headwaters, usually cold and highly oxygenated. As it flows, it will broaden out, warm up and this completely changes the biota you'll find.	Will vary based on where in the river they are.	At the headwaters, organisms need to hang on.	Industry uses water to dispose of waste products. Runoff from homes and other places causes changes in acidity, pollution, etc. Dams alter the flow of the water.
Marine Ecosystems				
Estuaries	**Definition**: Fresh and salt water meet	Very productive biome because it receives lots of light and nutrients.	Often used as nursery for young.	Many ports are found on estuaries—pollution Human population
Coral Reefs	**Location**: Close to equator. Consistent water temperature Shallow water Low in Nutrients	large cells to take in the sun's energy many symbiotic relationships	Breeding area for many fish	Temperature is important, too hot or too cold and the animals can't live there to create limestone Human intrusion (scuba diving) is damaging if you touch/step on the reef Pollution is also a concern.
Ocean	Open ocean is one of the least productive areas on earth, too little sunlight to support plant growth. Covers nearly ¾ of the Earth's surface.	Plants are micro and macroscopic. Have floating plants.	Zooplankton—sea's smallest herbivores. Deep ocean animals feed on detritus—floating debris in the water column.	While the oceans are vast, they are becoming more polluted. Overfishing and some fishing methods are destroying fishing grounds.
Polar Ecosystems	Can be considered marine ecosystems since the base of food chain is phytoplankton	**Antarctic--** Penguins live here—only continent not used by humans.	**Arctic--** Relatively shallow, lots of nutrients for large variety of animals in food web, people, seals and polar bears found here.	Reserves of minerals draw humans to these fragile ecosystems. The main threat to wildlife has been the increase in tourism—garbage left behind.