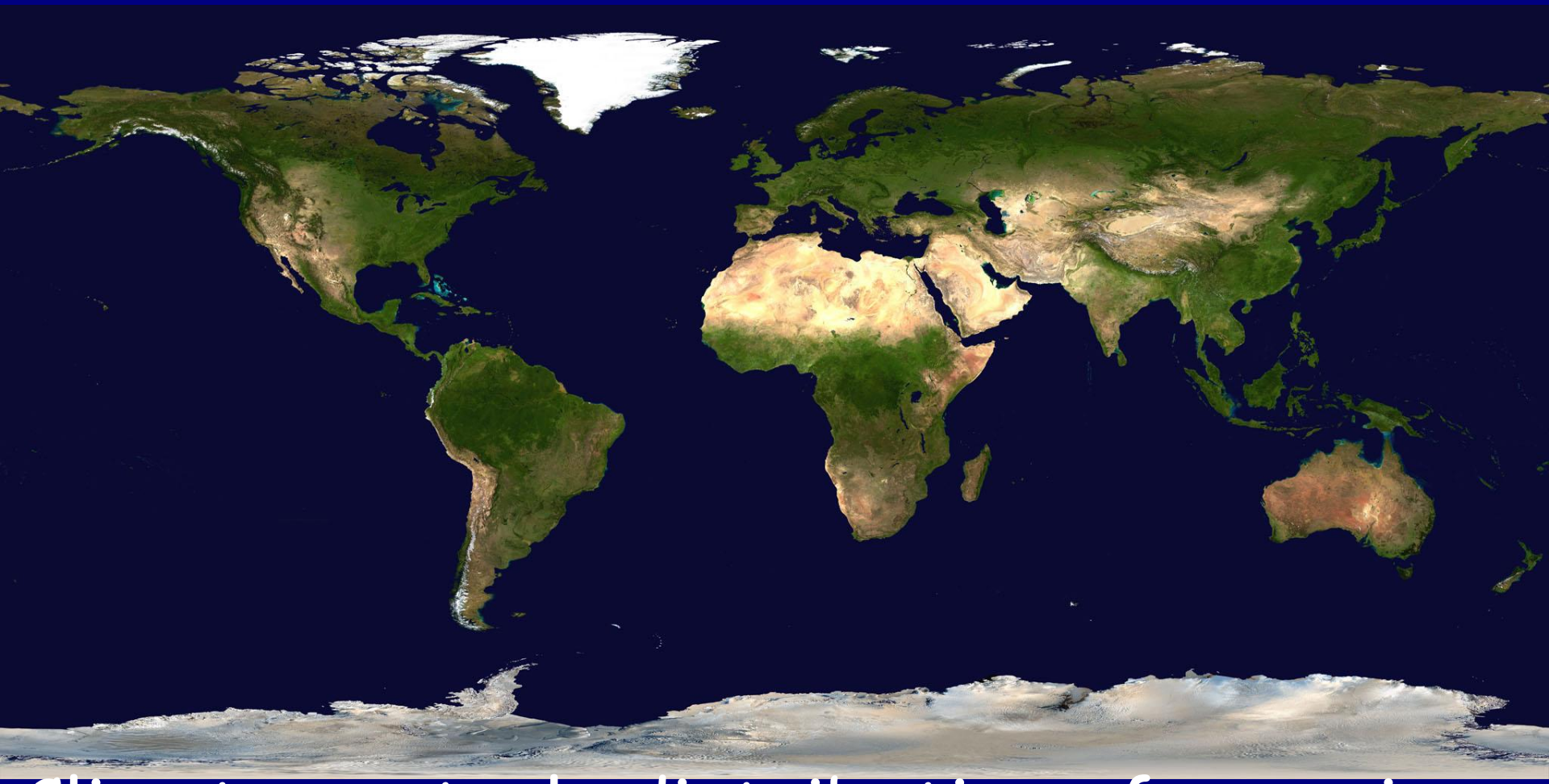
Biome



Climate controls distribution of organisms at global scale

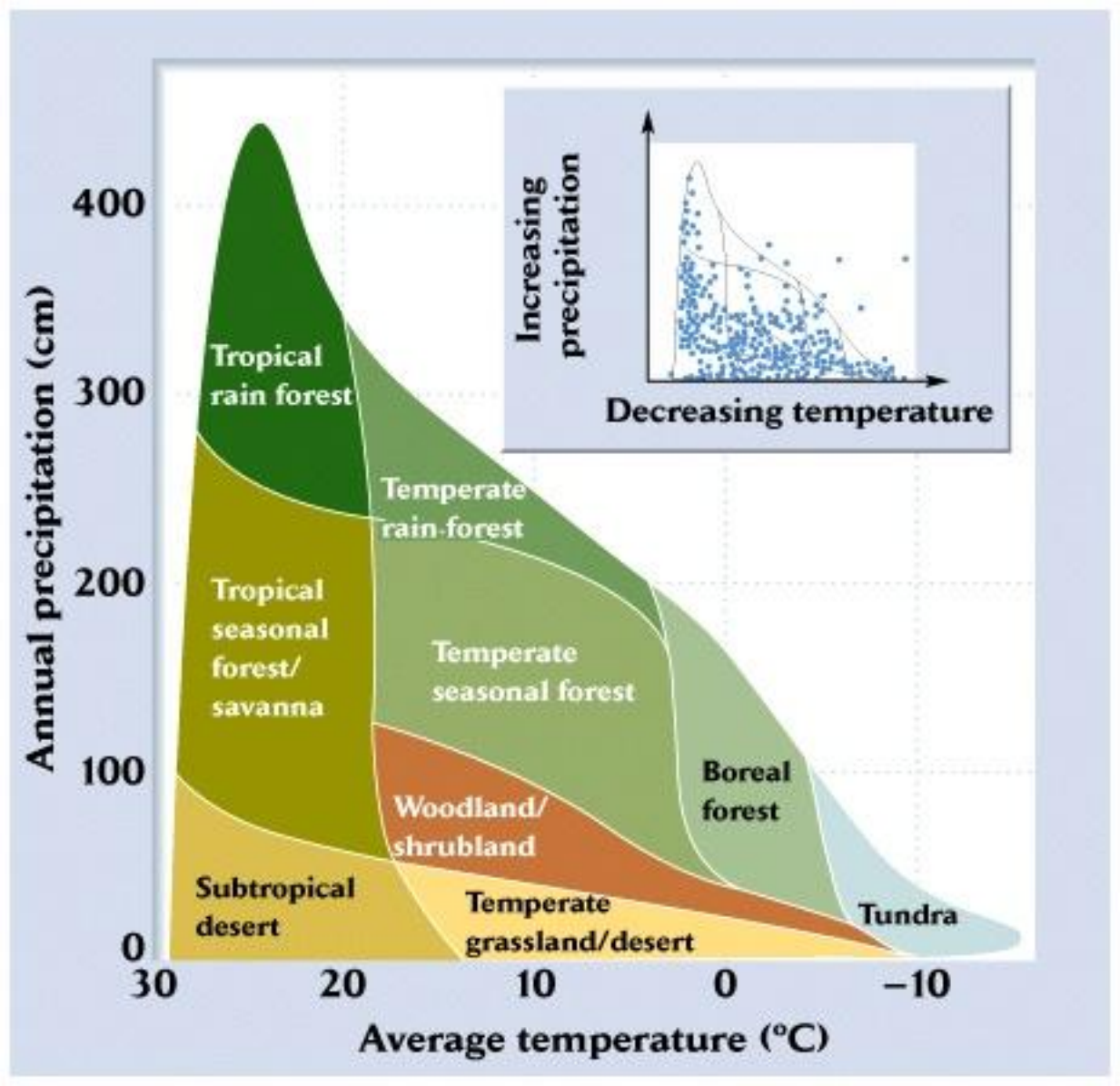
Biome

a major regional terrestrial community with its own type of climate, vegetation, and animal life

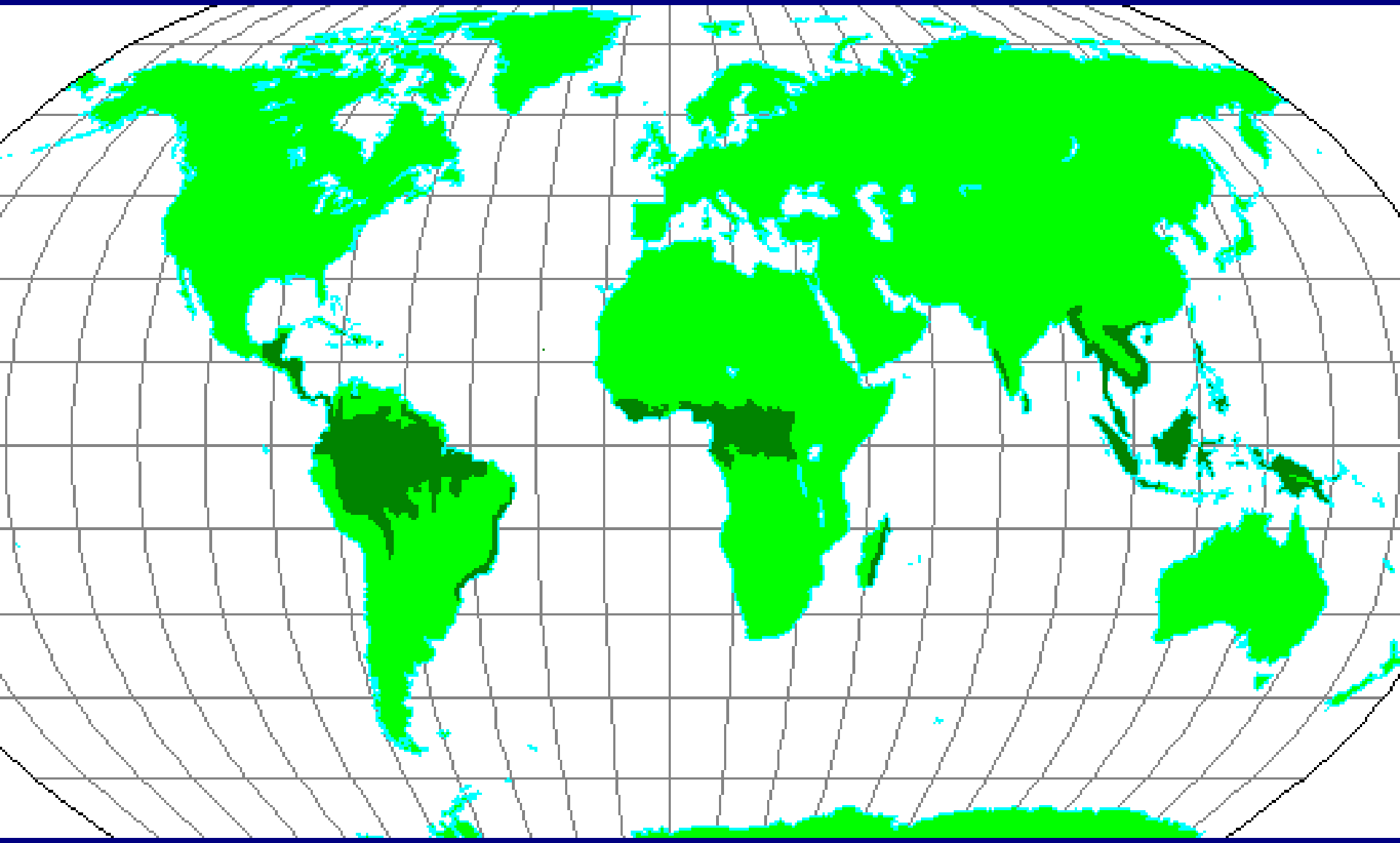
Ecotone

boundary between two biomes

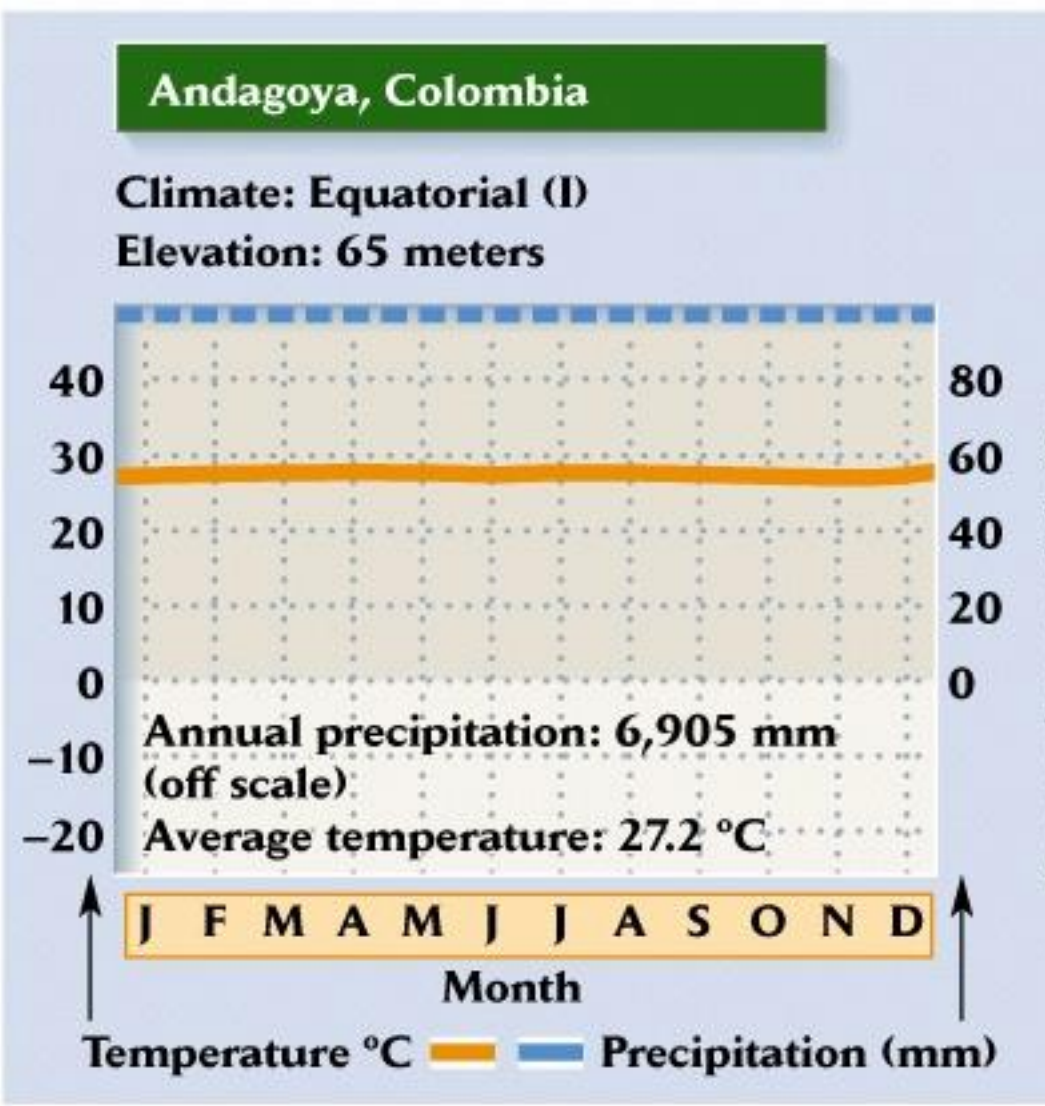
Whittaker Diagram



Tropical Rain Forest



Tropical Rain Forest



-found near the equator

-temperature varies little from approximately 23°C

-the length of daylight varies from 12 hours by less than one hour

-rainforest>2000mm

Walter climate diagram

Tropical Rain Forest

(a) Cloud forest during dry season, central Panama.

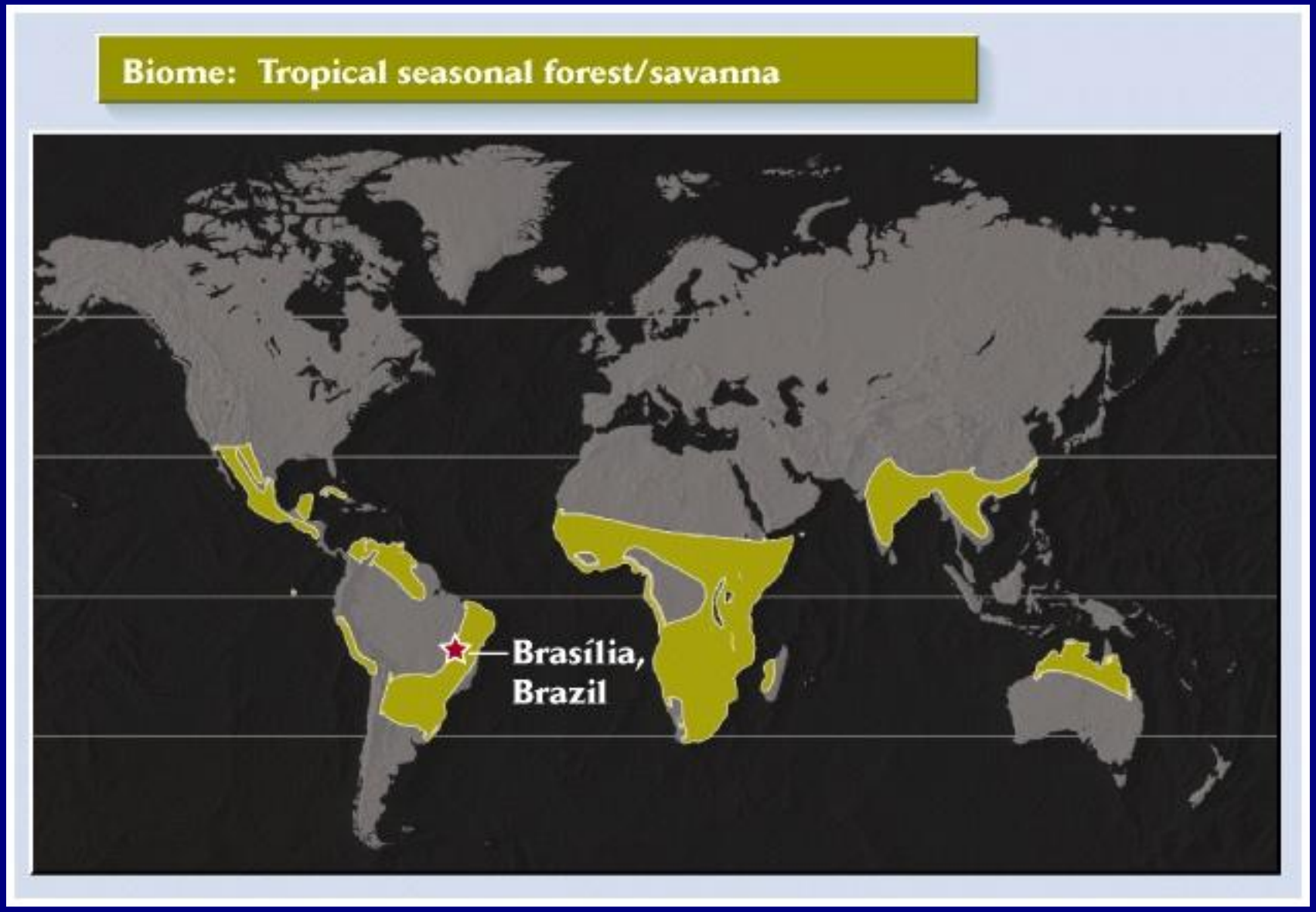
(b) Mid-elevation cloud forest, Jamaica, West Indies.

-canopy trees up to 55 m tall

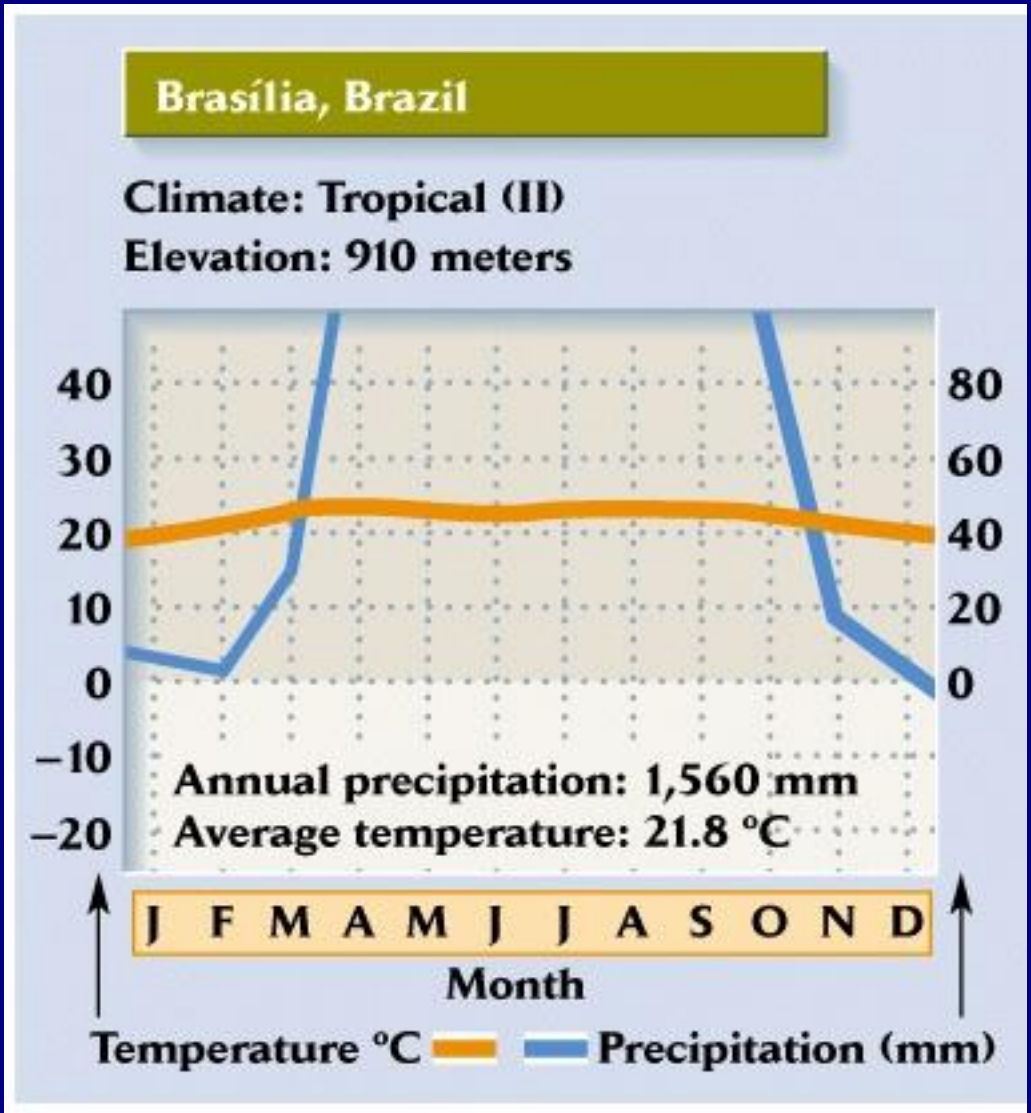
-soils are generally unfertile

-nutrients and carbon stored in plant biomass, not soils

Tropical Savanna/Seasonal Forest



Tropical Savanna/Seasonal Forest



-found in the tropics (but > 10° latitude)

-pronounced dry season
with <5 cm rainfall in some months

Tropical Savanna/Seasonal Forest

(a) Acacia trees with weaverbird nests, Kenya, East Africa.

(b) Tropical savanna in Orinoco Basin of eastern Colombia.

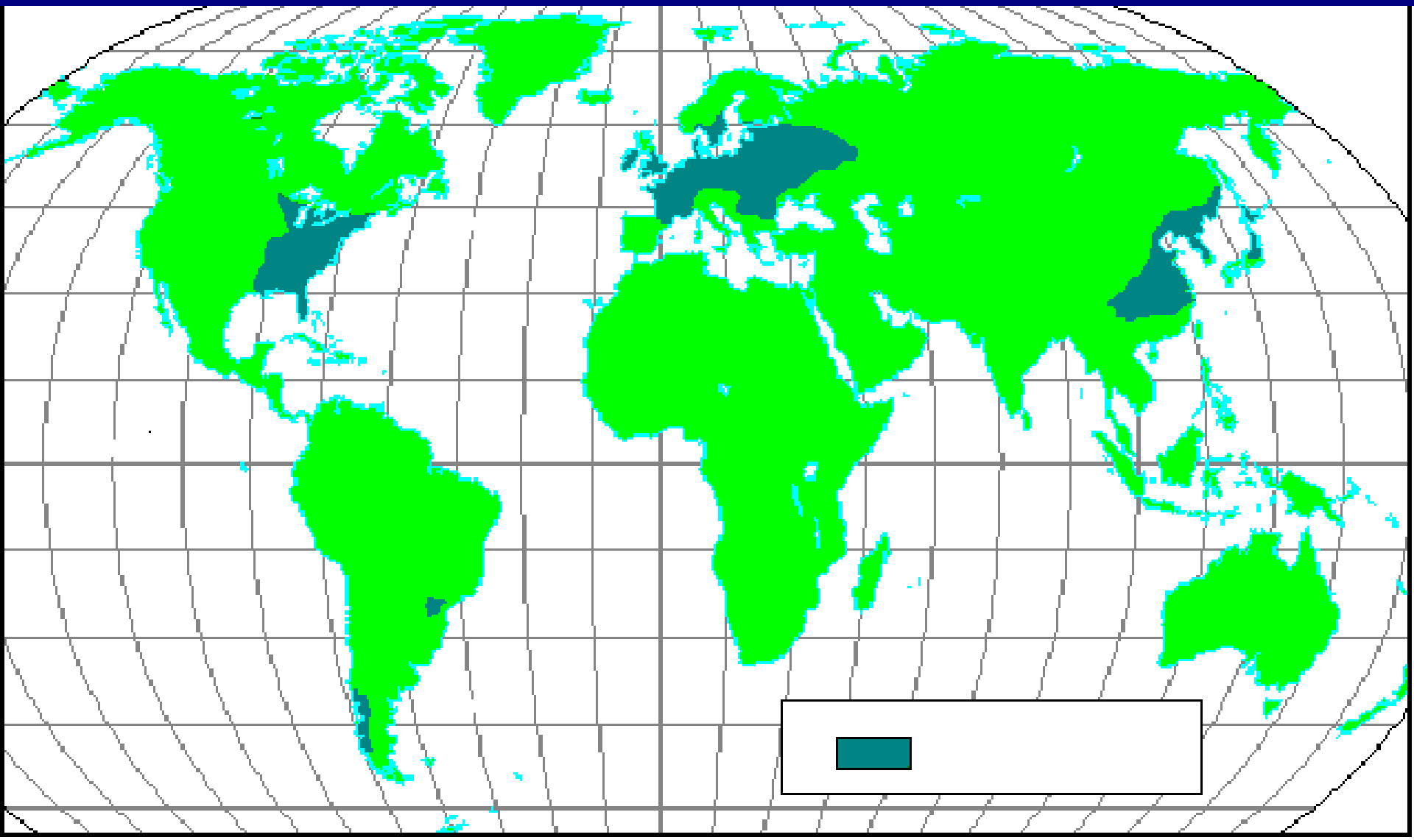
-scattered trees and grass

-tropical biome (rainforest plus seasonal forest) is largest biome based on land area

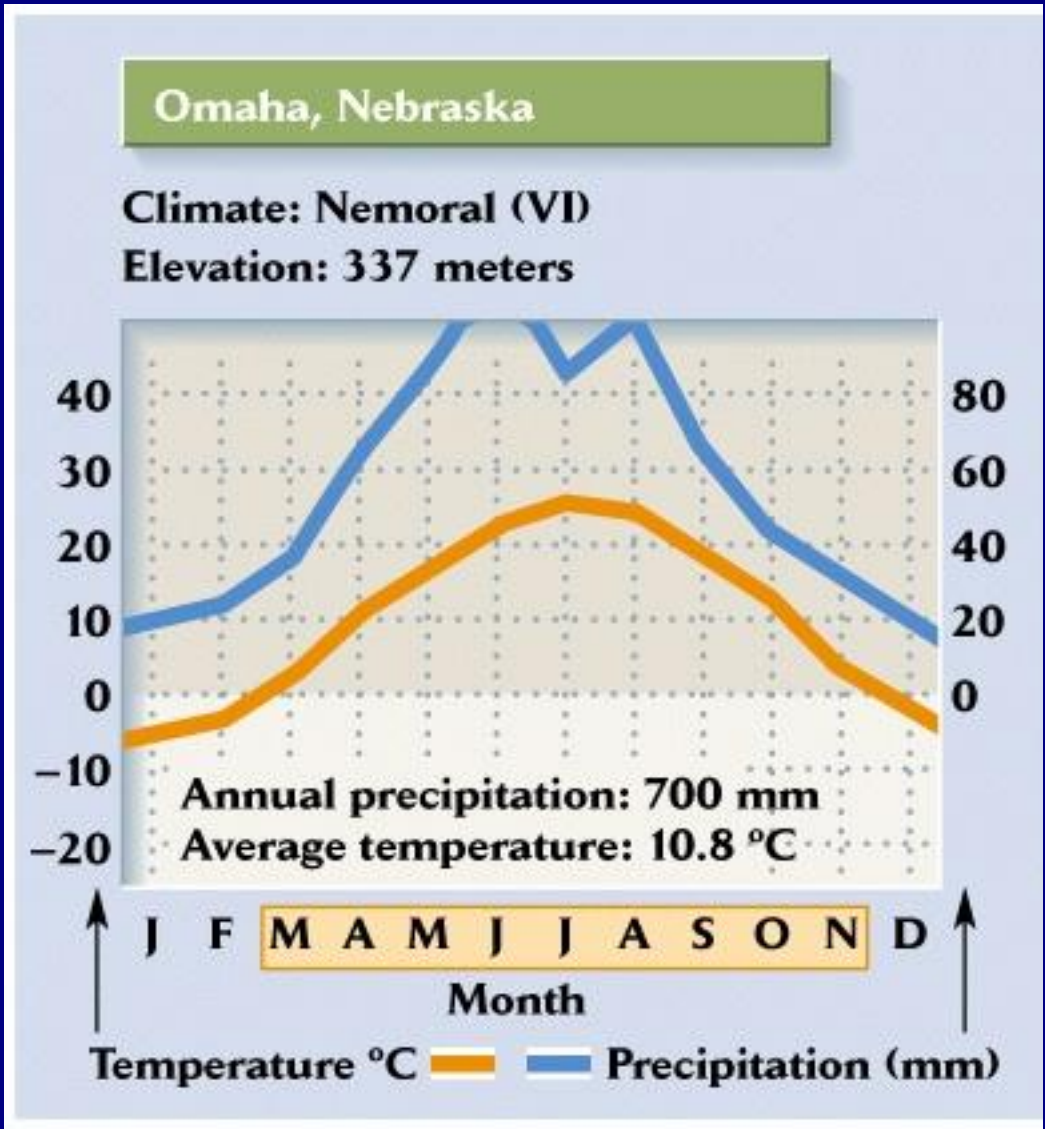
Tropical Savanna/Seasonal Forest

-fire & grazing by animals also contribute to predominance of grasses

Temperate Forest



Temperate Forest



-distinct winter season,
frost a defining feature

-summer season usually moist with ppt > evapotranspiration

Temperate Forest

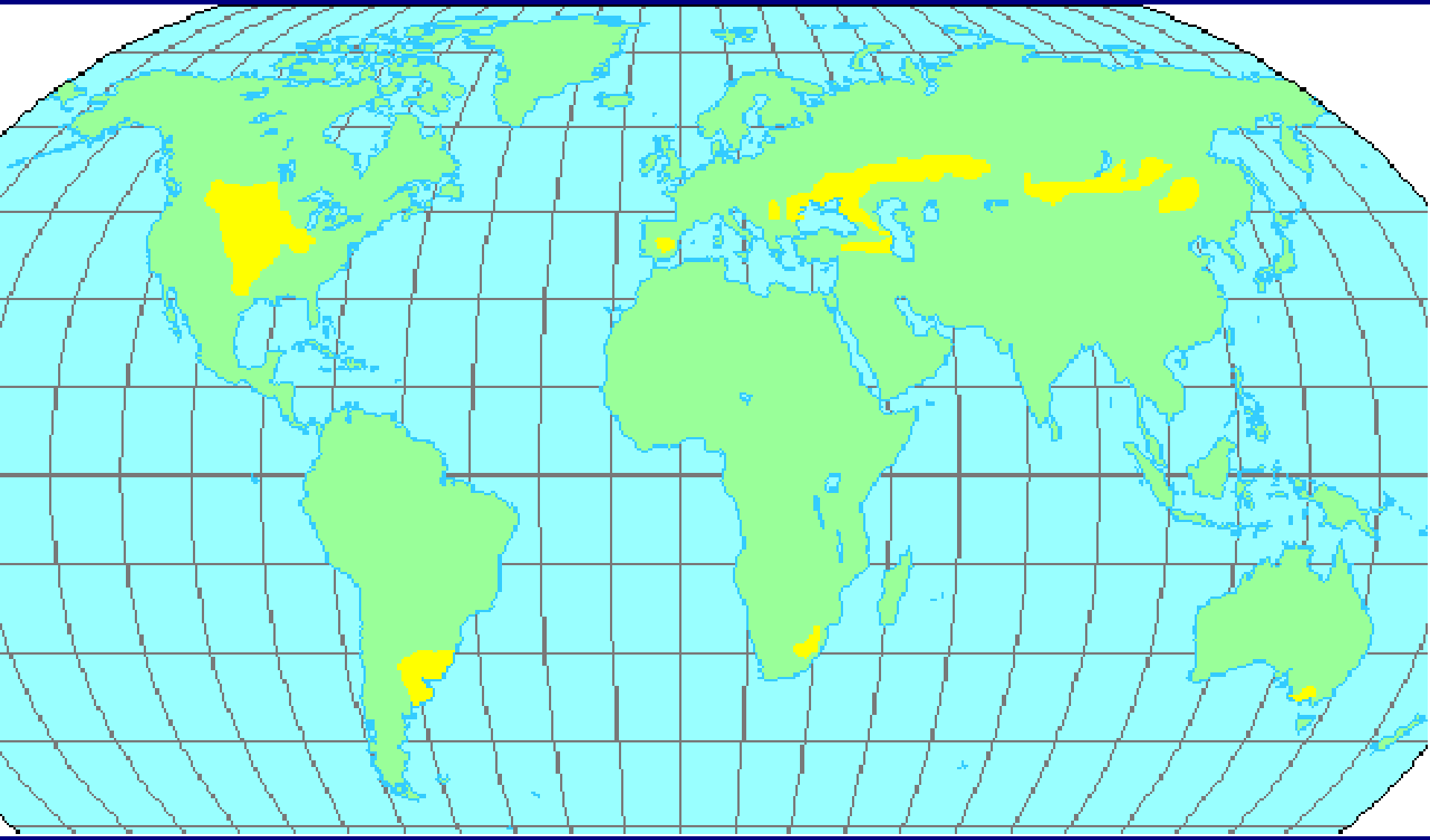
(a) Beech–maple forest in fall, New York.

(b) Young deciduous forest in winter, Massachusetts.

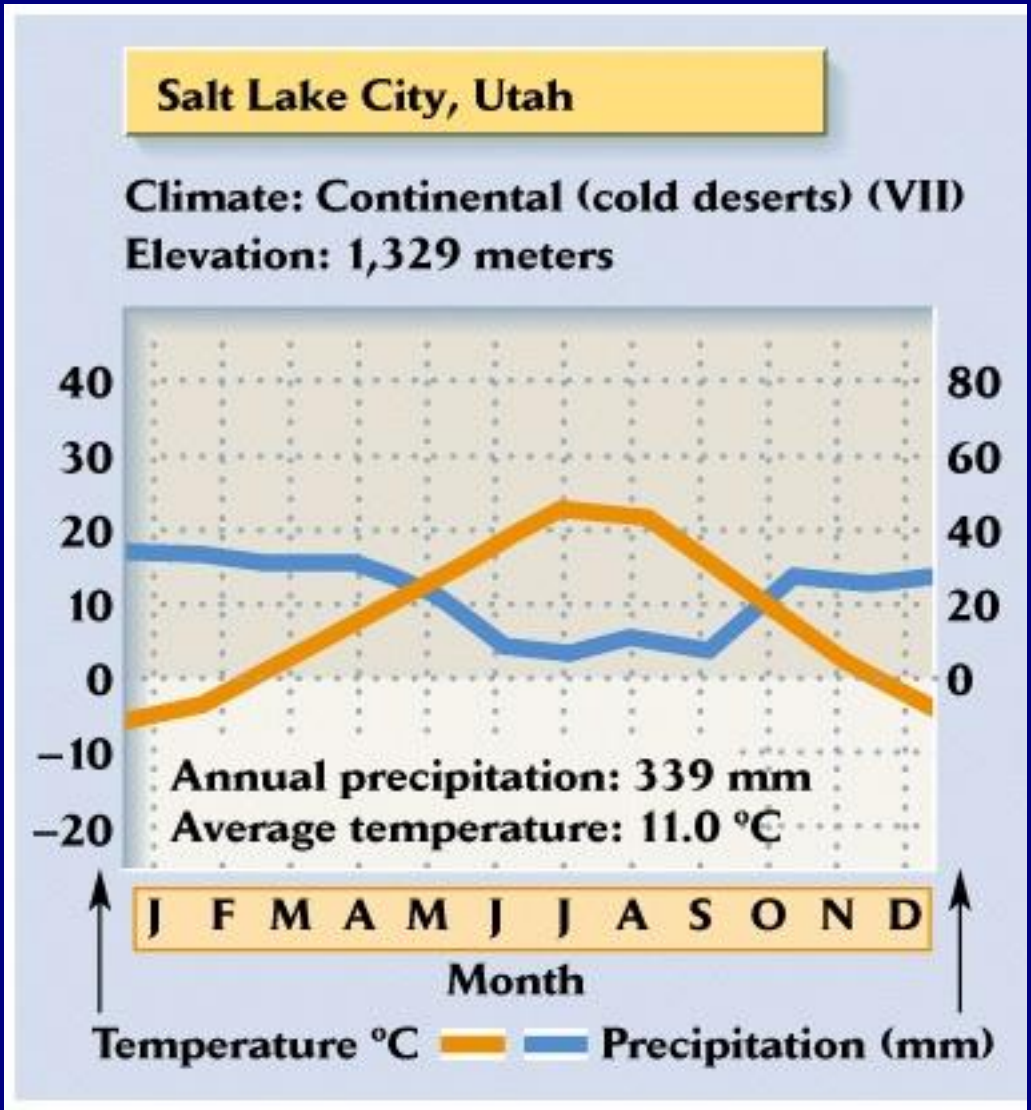
-relatively large tree biomass

-also called the deciduous forest,
but contains evergreen needle trees as well

Temperate Grassland/Shrubland



Temperate Grassland/Shrubland



-similar to tropical savanna, but with cold winter

-relatively hot summer

-potential evapotranspiration > ppt

Temperate Grassland/Shrubland

(a) Great Basin grassland, western Colorado.

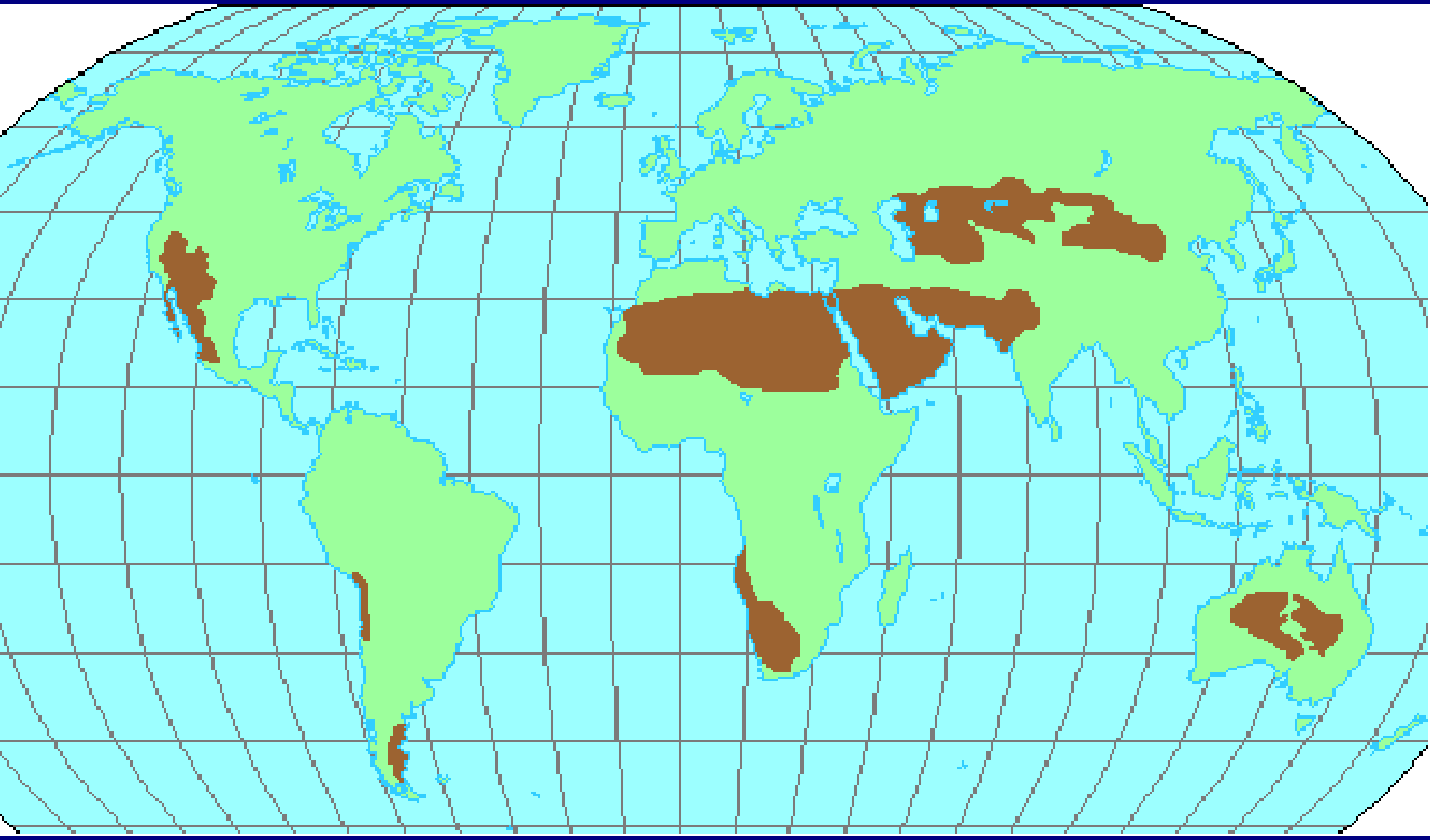
(b) Sagebrush, eastern Washington.

-scattered trees and shrubs

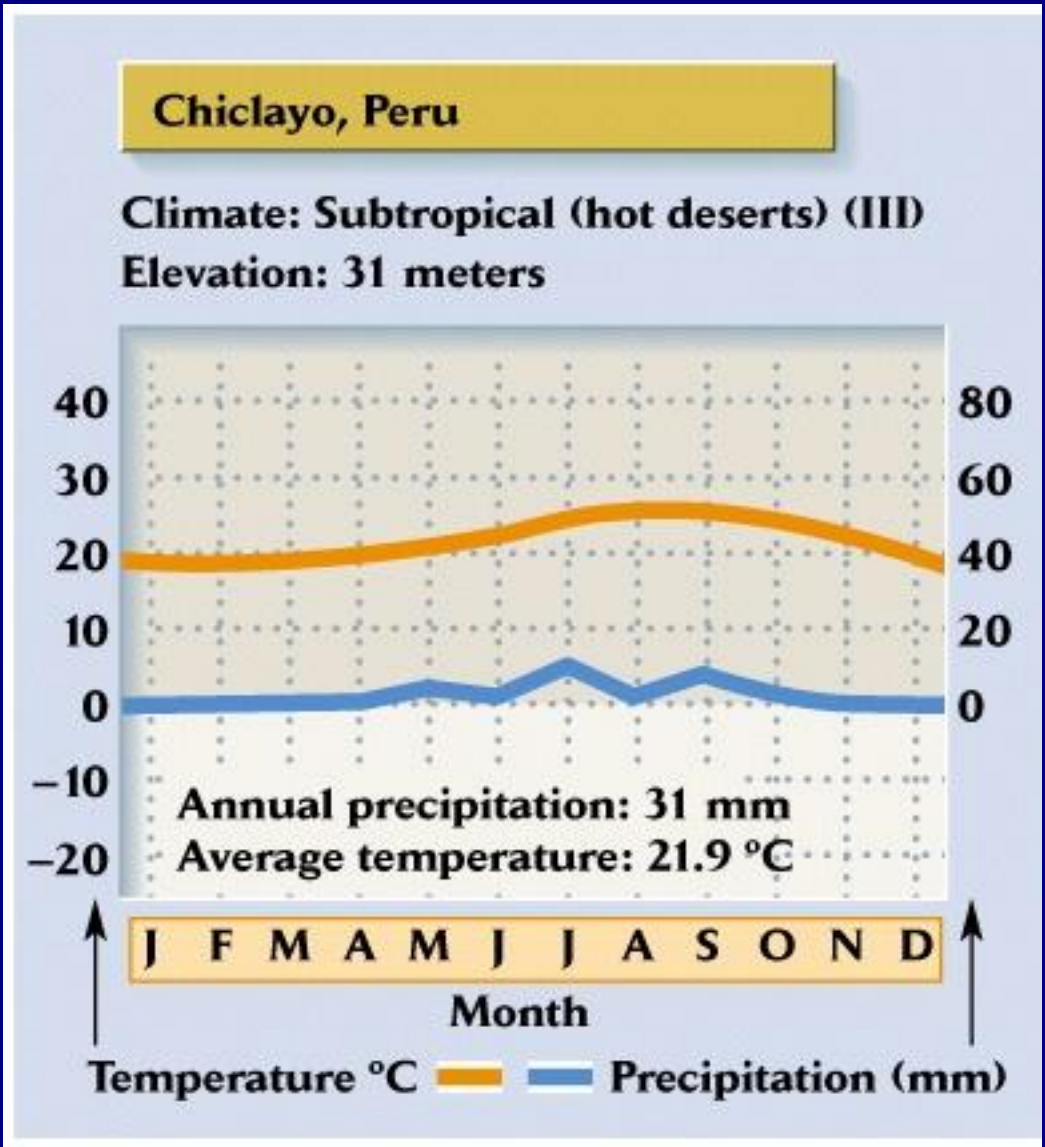
-trees are short

-fire & grazing by animals also contribute to predominance of grasses, but that depends on climate

Desert



Desert



-hot or cold deserts exist

-low precipitation <25cm, sporadic

-potential evapotranspiration > ppt

Desert

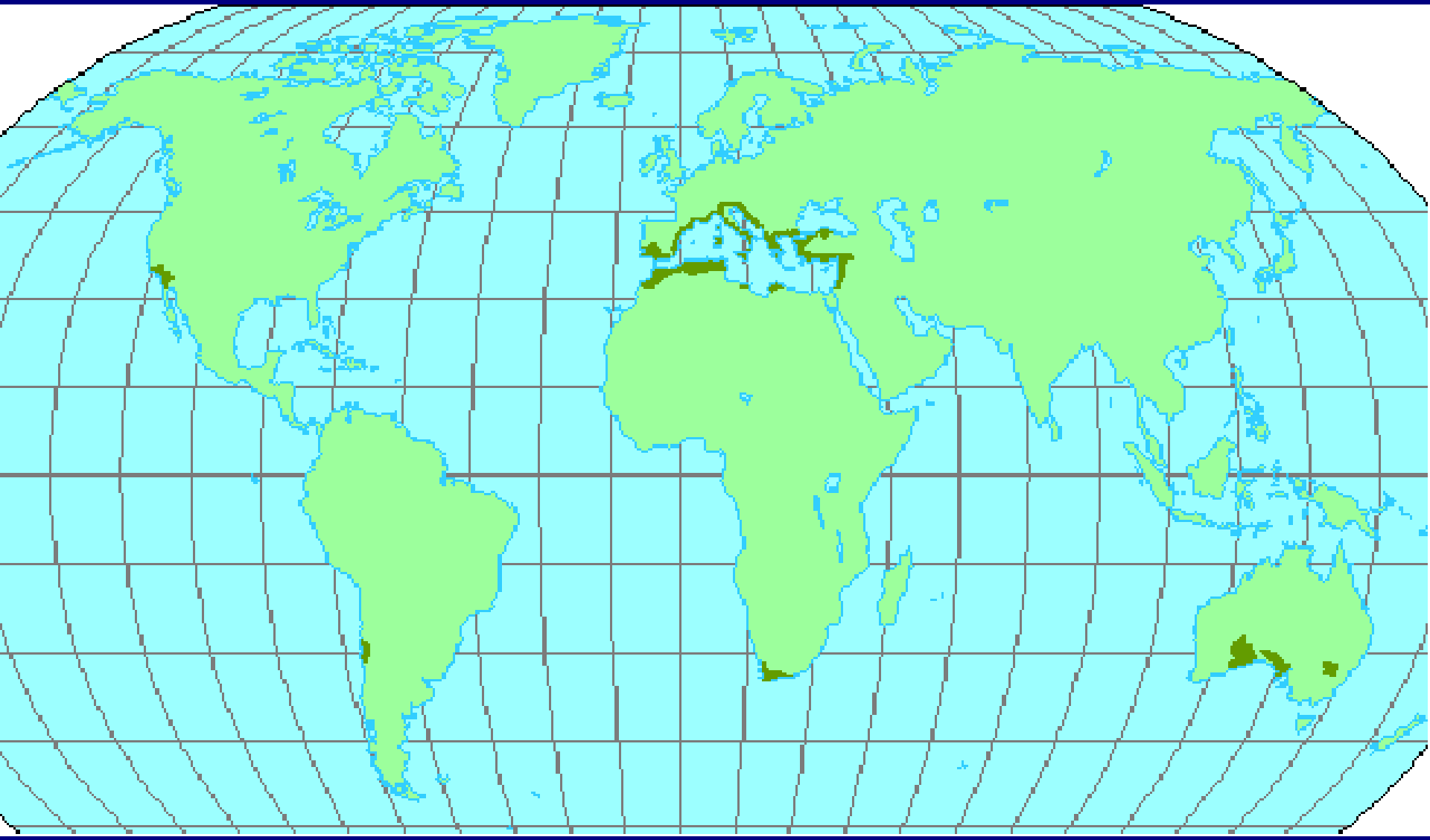
(a) Cholla cactus in northern Sonora, Mexico.

(b) Sahuaro cactus in southern Arizona.

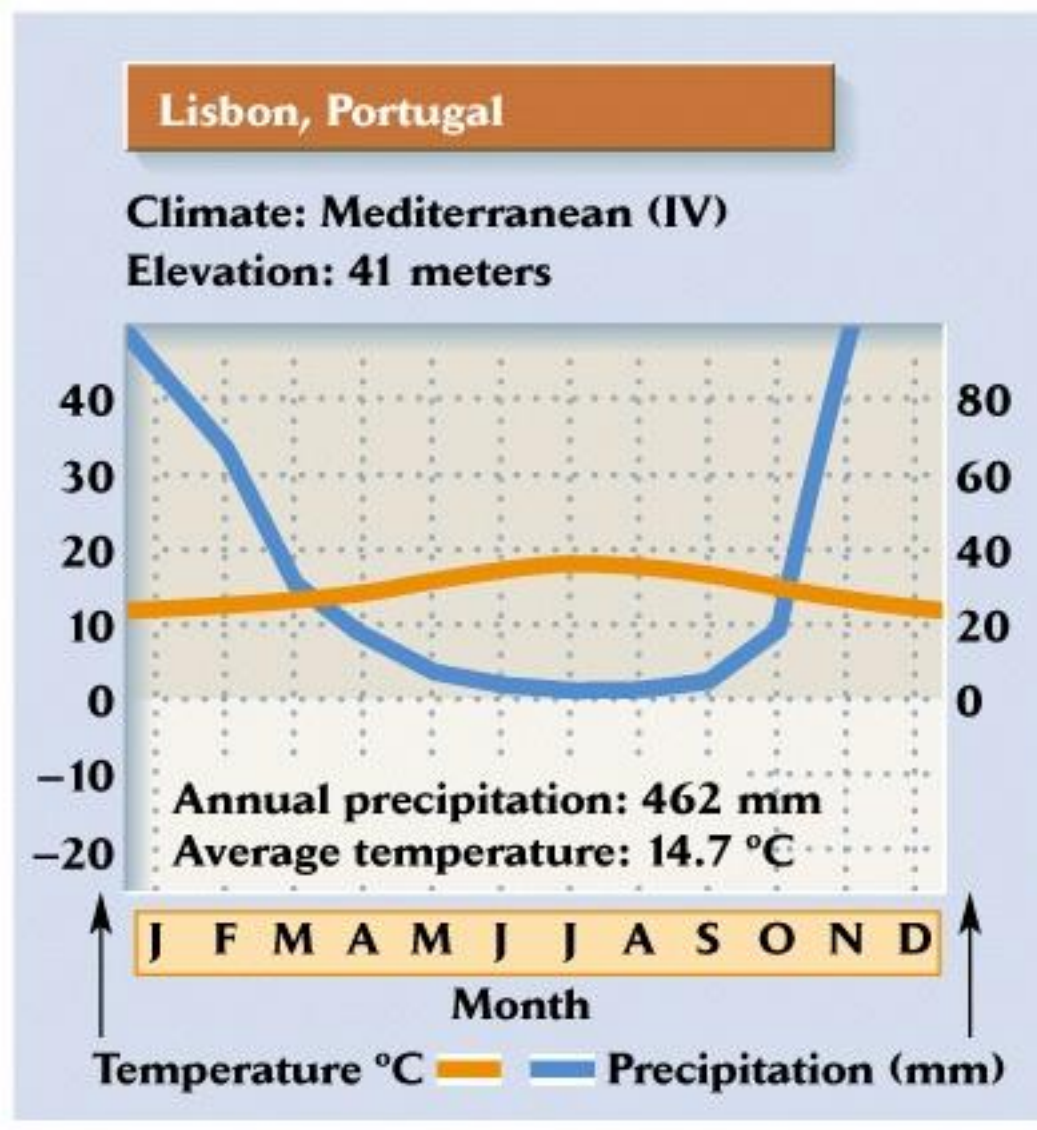
-thorny plants

-other adaptations to conserve water

Chapparal



Chapparal



-mild winters

-seasonal rainfall winter rain, summer drought

-maritime influence cold ocean currents continental winds

Chapparal

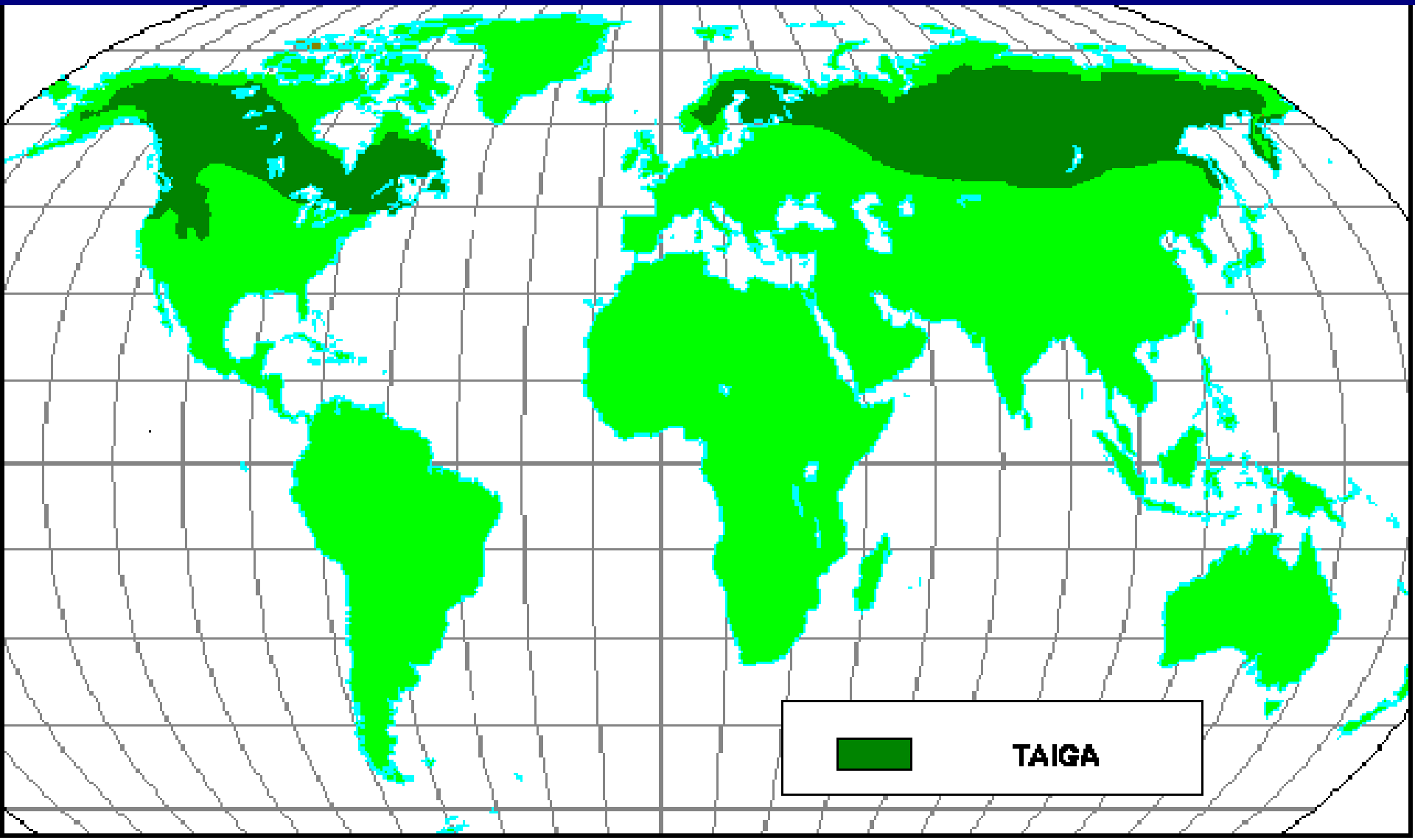
(a) Chaparral at wet site at low elevation with infrequent fire, southern California.

(b) Fynbos vegetation in the Cape region of South Africa.

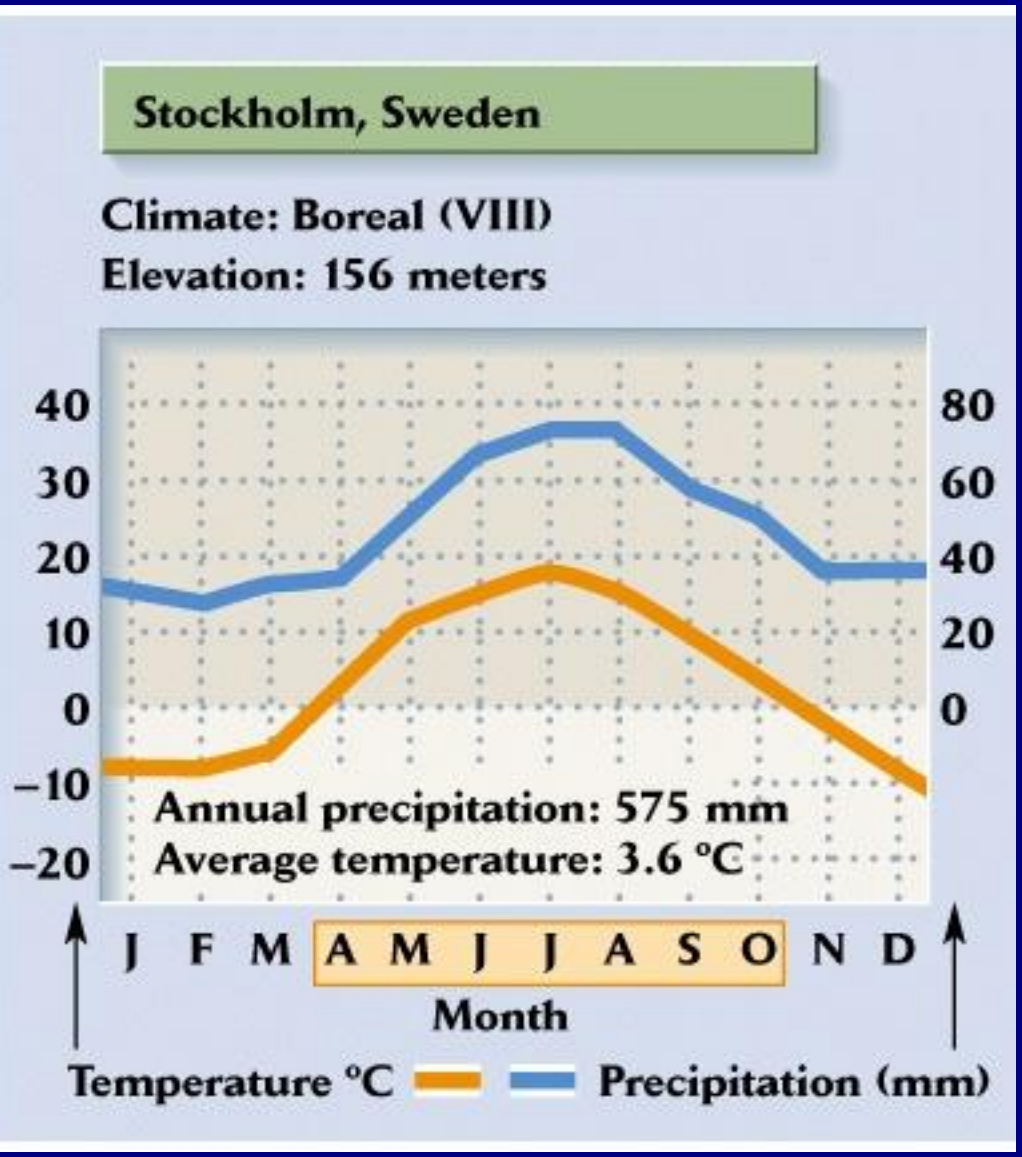
-sclerophyllous plants

-adaptations to fire

Boreal Forest



Boreal Forest



-severe winters, MAT can be < 0 deg C

-ppt is low, but evapo-transpiration low

-short growing season

Boreal Forest

(a) Boreal forest, near Fairbanks, Alaska.

(b) Boreal forest with willow scrub in fall, Denali National Park, Alaska.

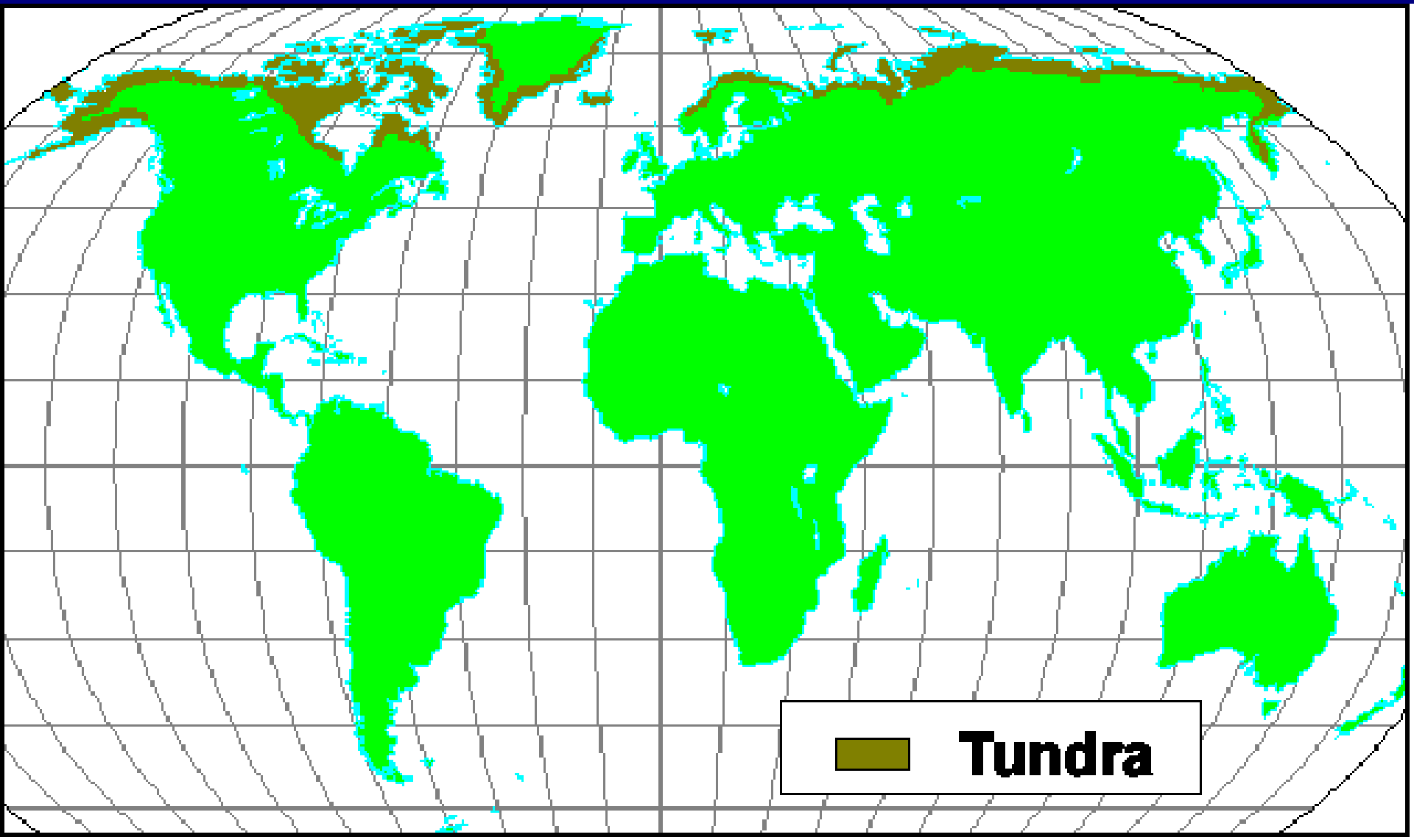
-10-20 m trees evergreen needle and deciduous

-second largest biome, on an area basis

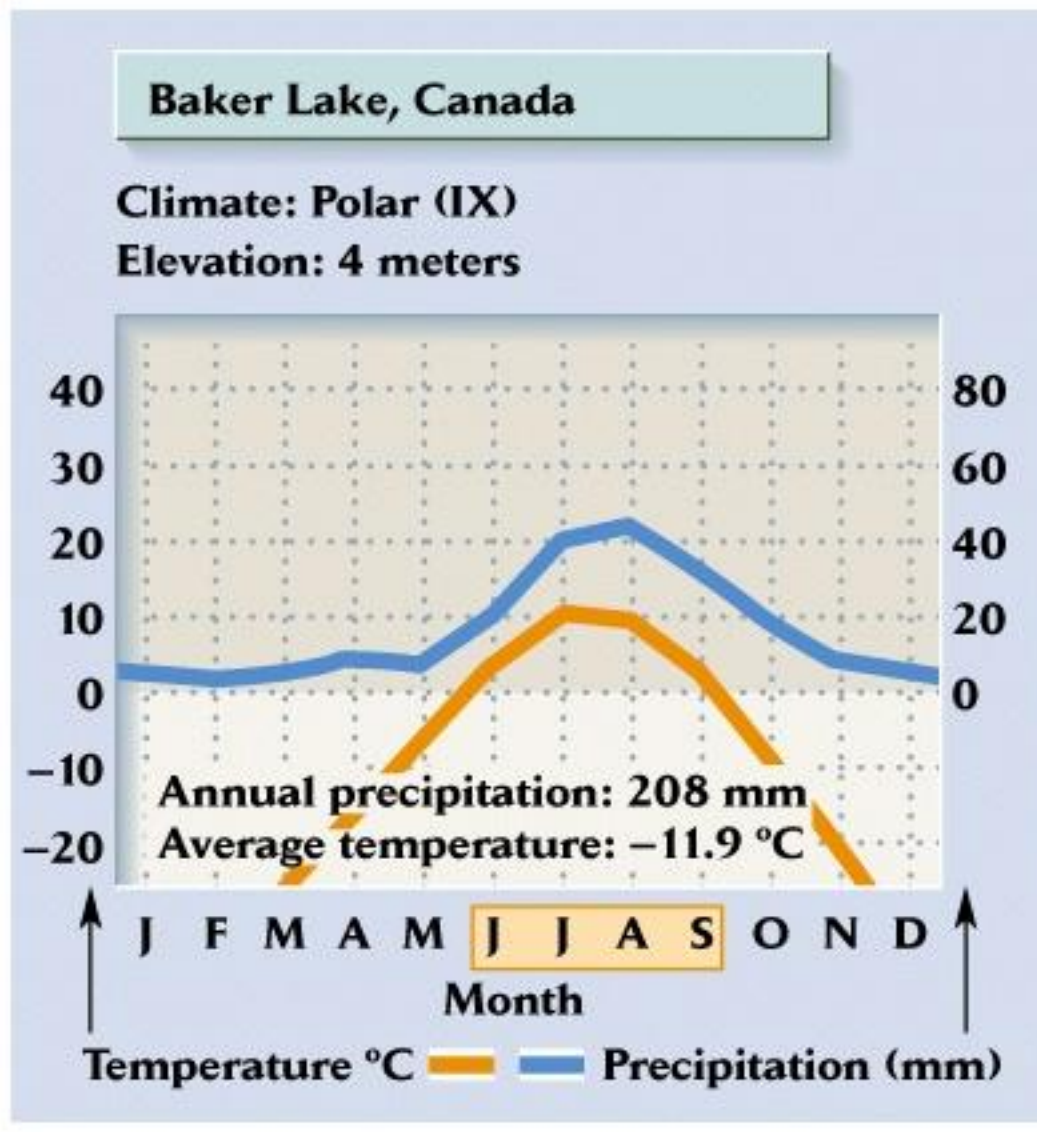
-fire dominated, but on longer timescale than grassland

-more nutrients and carbon stored in soils than plants

Tundra



Tundra



-severe winters

-short growing season,
cool summer

-arctic or alpine

Tundra

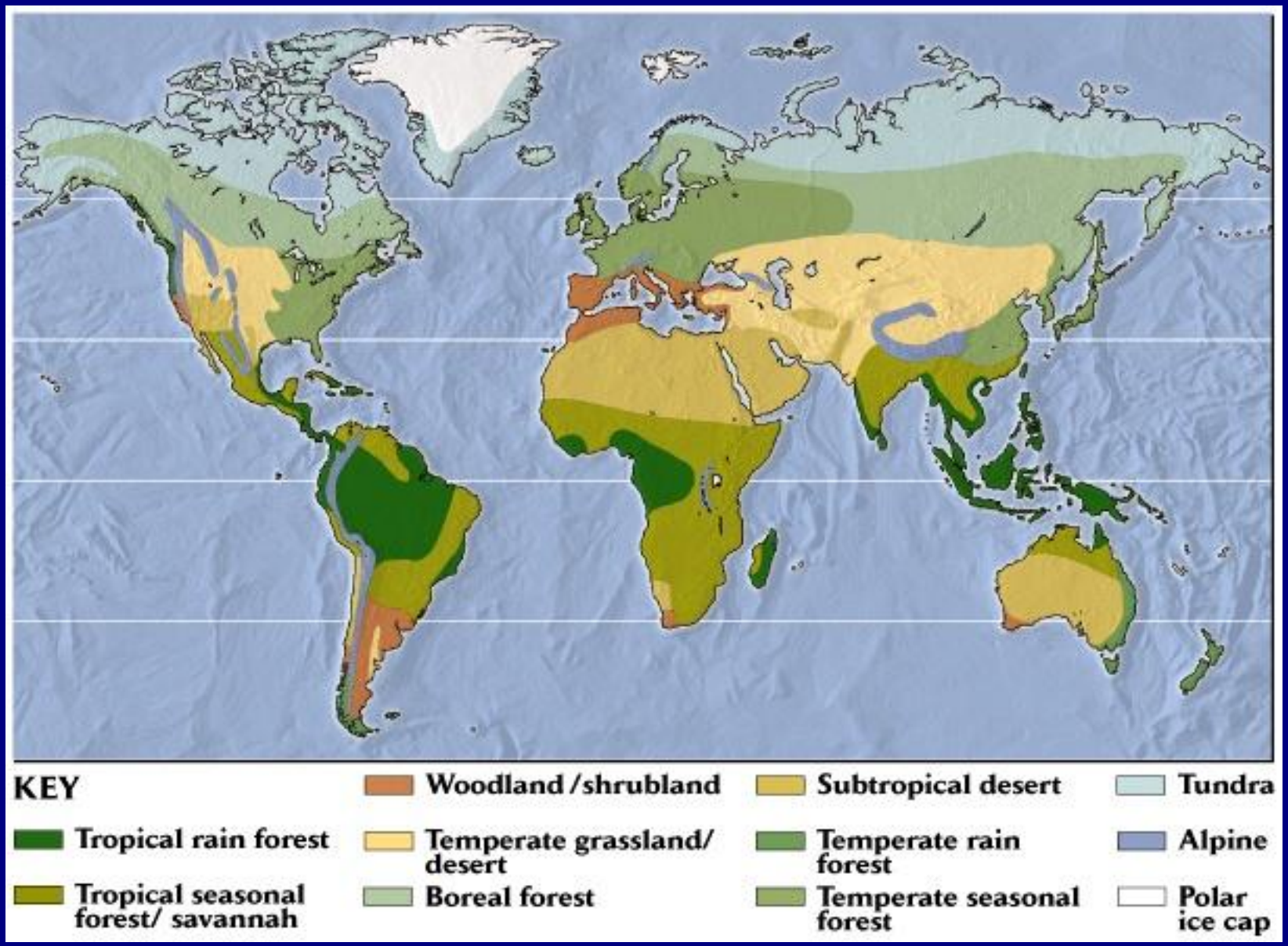
(a) Wet tundra near Churchill, Manitoba, Canada.

(b) Close-up of tundra vegetation with lichens and dwarf rhododendrons.

-no trees
sedges,low shrubs
mosses

-permafrost

The World's Biomes



Biome Jeopardy

Fire is key to the structure

It snows in the winter

In summertime, drought is likely

What biome is this?

Biome Jeopardy

Trees are an important part of the structure

Rainfall is typically sufficient

Fire is absent

Soils are typically nutrient poor

What biome is this?

Biome Jeopardy

The seasonal temperature is relatively uniform

Water is sometimes limiting

Fire is an important component

The mean annual precipitation can be ~1600 mm

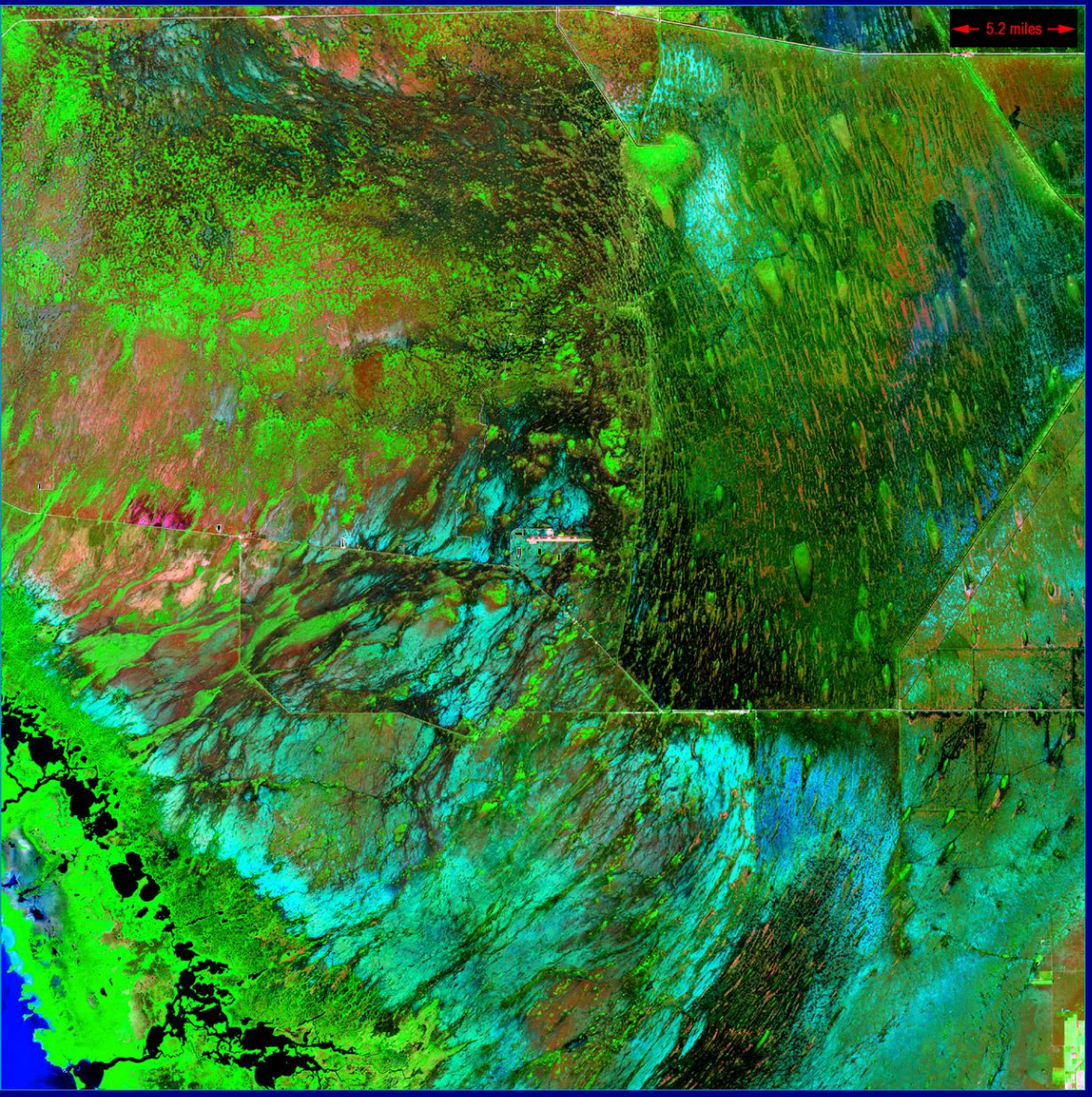
What biome is this?

Aquatic Systems

Aquatic plants (algae) often do not have characteristic structure.

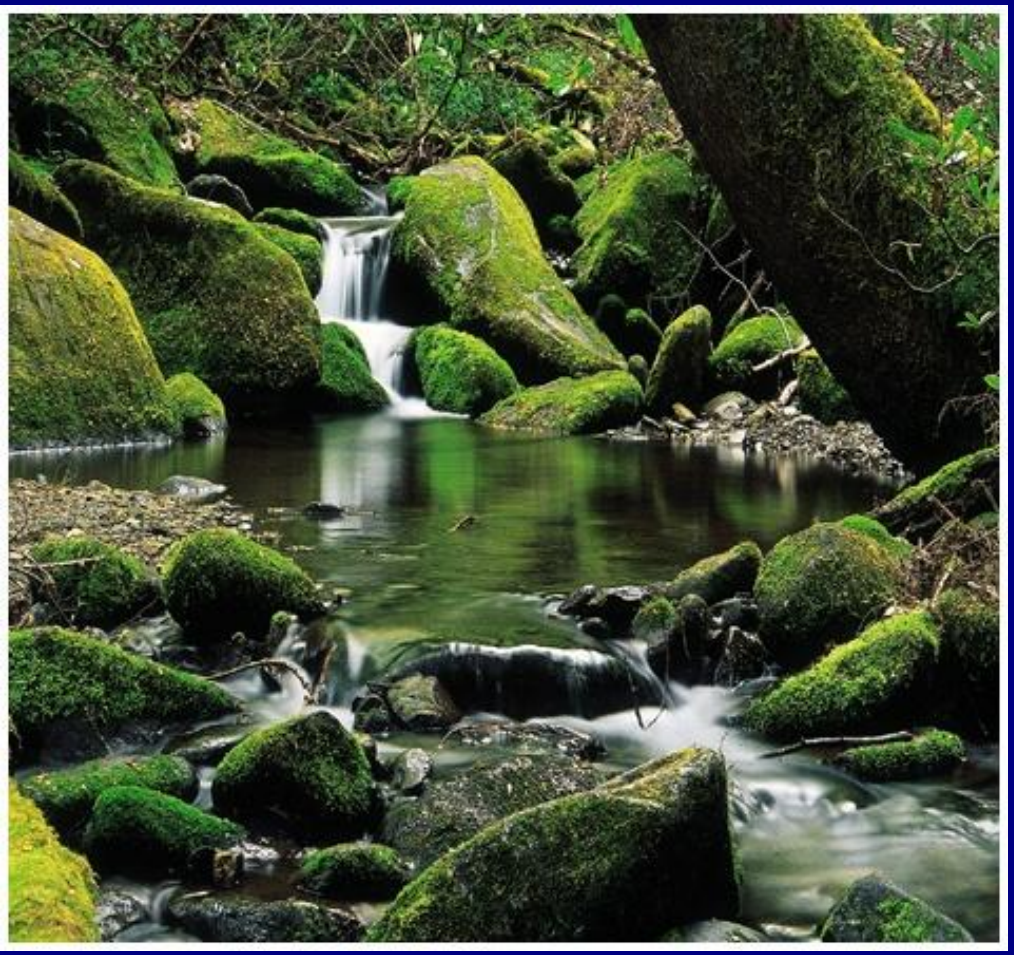
Systems are defined on physical factors: salinity, water movement, and depth

Wetlands



-seasonally or continuously flooded land

Streams/Rivers

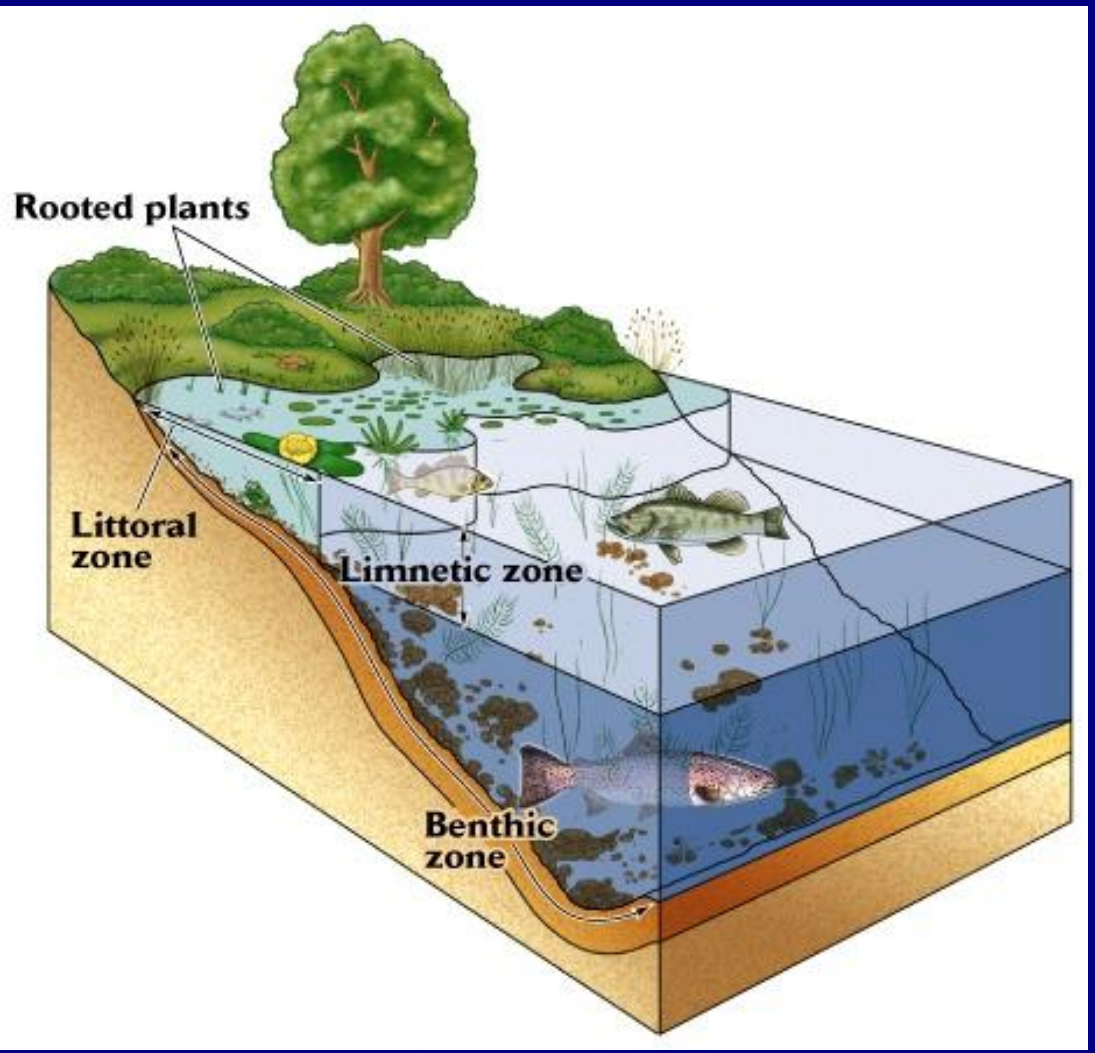


-characterized by downstream flow

-input from land to small streams important

-larger rivers more influence by in-river processes

Lakes



-subdivided into different habitats

-light an important basis of habitat subdivision

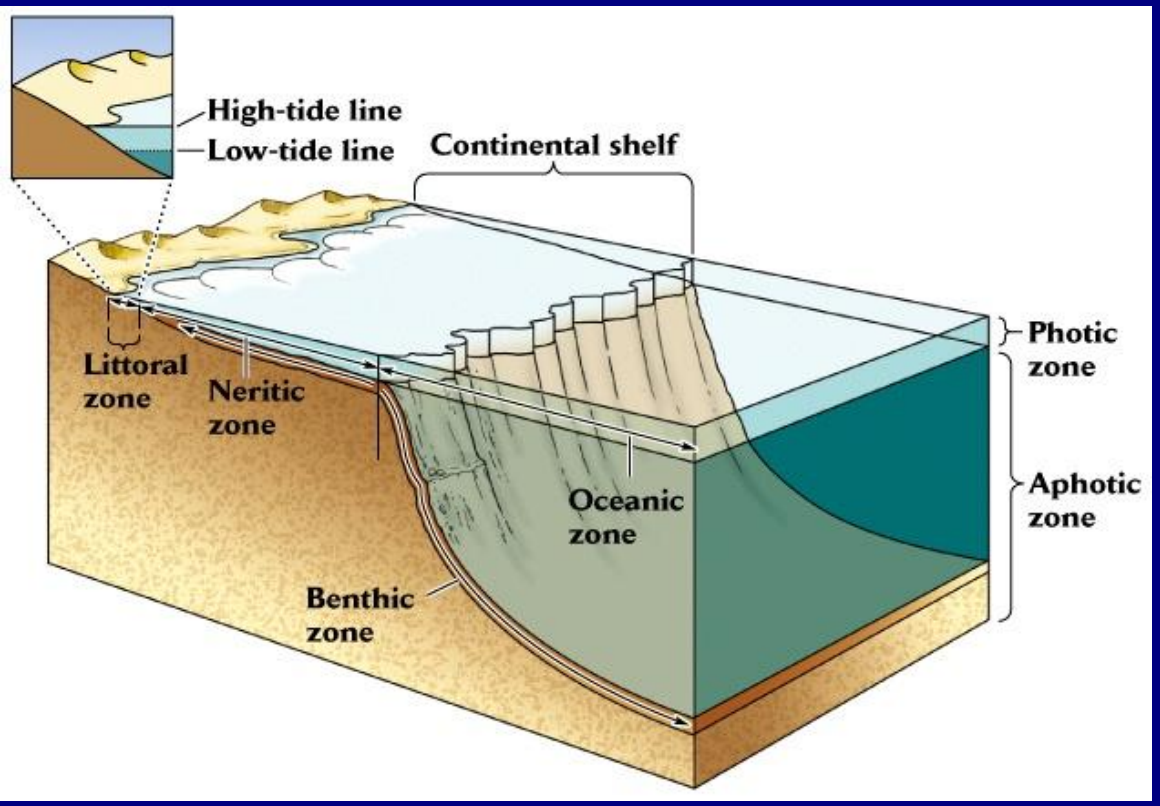
Estuaries

-where rivers meet ocean

-often adjacent to marsh (salt water wetland)

-productive and important habitats for marine species

Oceans



-also subdivided into many habitats

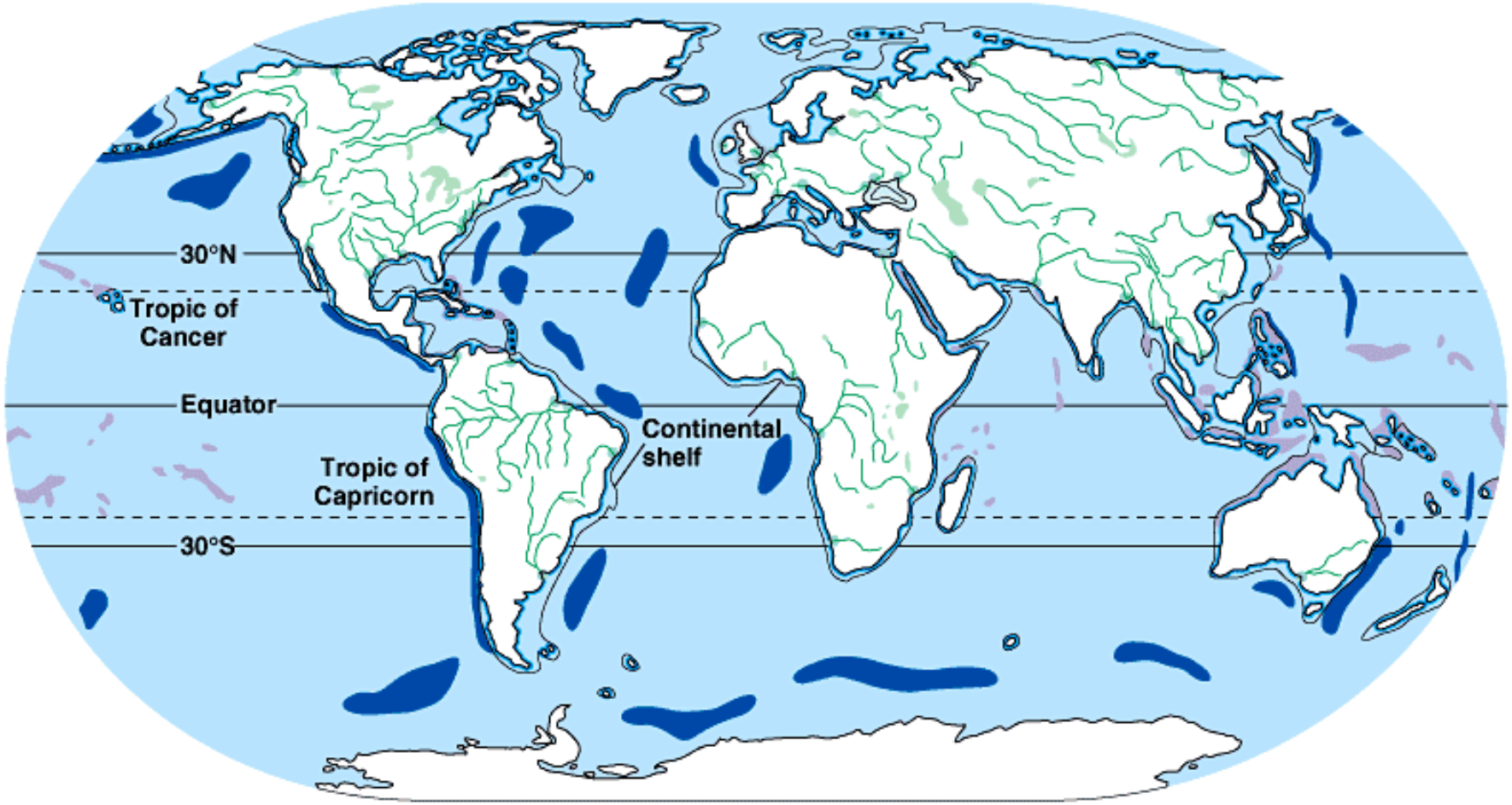
- light and proximity to shore/bottom (nutrients) are both key factors

Tropical Oceans

-coral reefs form >20degC

-the 'rainforest of the ocean'

Aquatic Ecosystems



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