

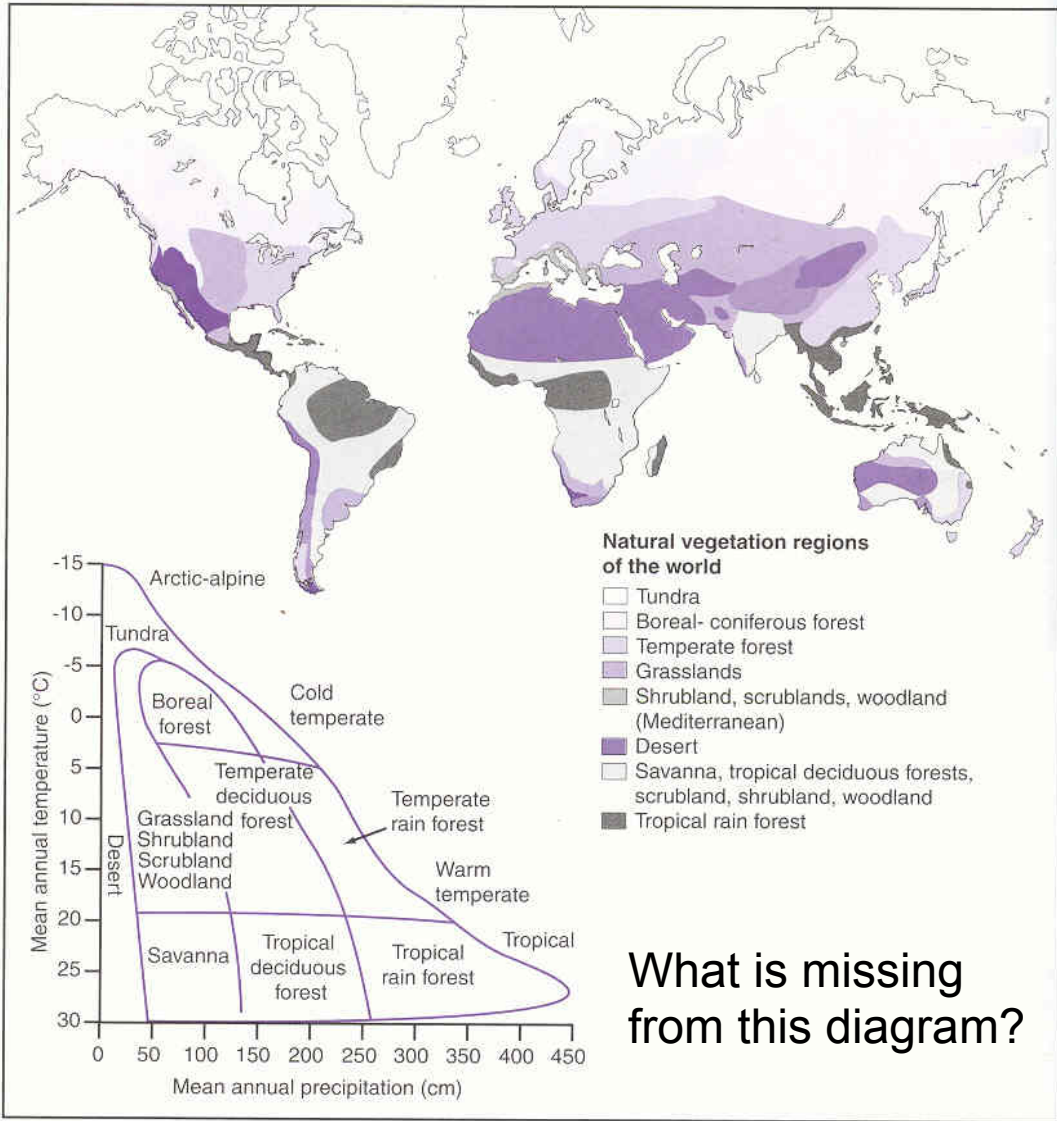


Ecology - Biomes

Delineation of Terrestrial and
Aquatic Biomes on Earth

Let us review for a moment

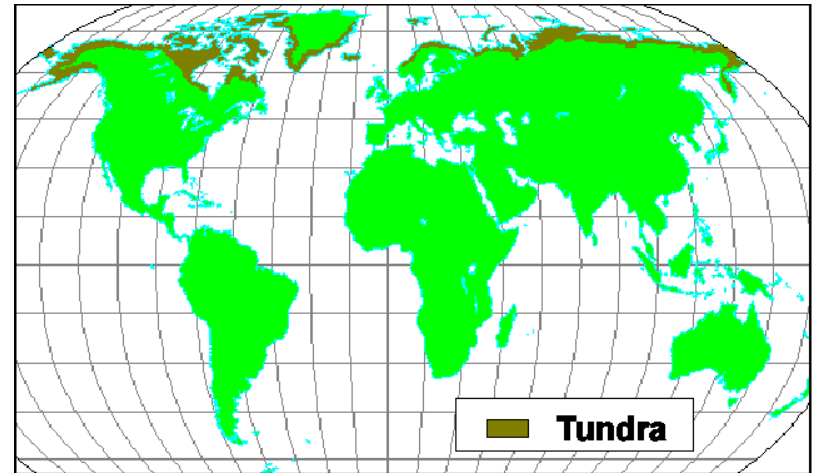
- **Biomes** are stable ecosystems characterized by major vegetation and animal types that exhibit particular suites of climatic attributes
- Now we will look at the various biomes
 - The distribution of these ecosystems on a global scale
 - Current status and
 - Threats to these systems

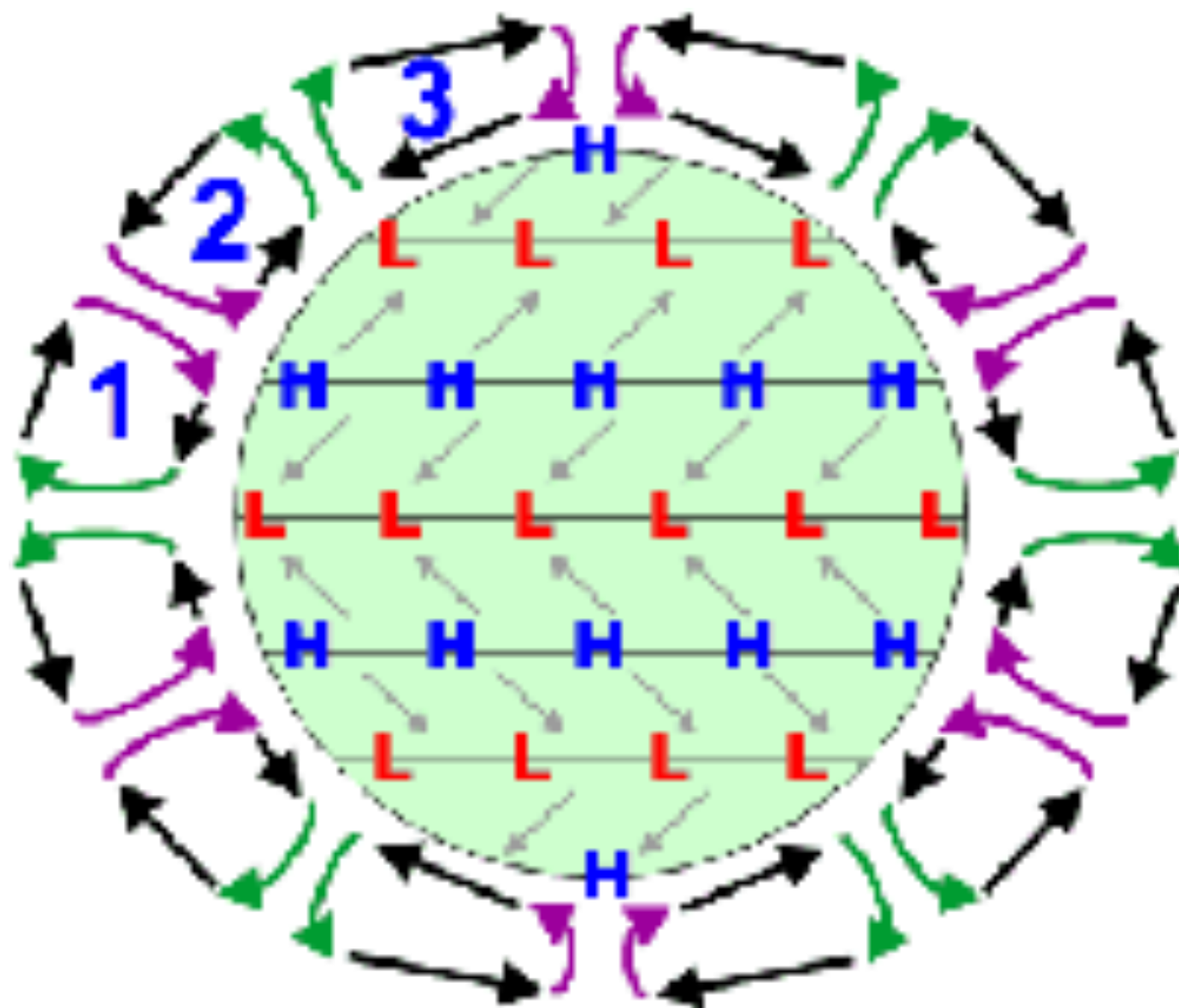


What is missing from this diagram?

Arctic Location/Climate

- North of 50° Latitude
- Major changes in day length
- Cold winters, short mild summers
- Average temp. below freezing
- Low precipitation < 15 cm/year







From a “heterogeneity” perspective, it is a rather simple system

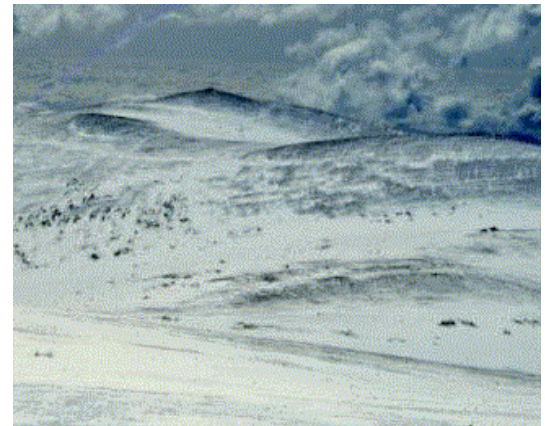
Arctic Structure

- Fragile vegetation
- Plant close to ground
No trees
- Bad soils,
Permafrost
- Woody shrubs on
well-drained soils
- Typically high winds



Alpine Tundra

- High altitude with same temp characteristics
- Main difference is variation in daylight
- Above timberline
- Cascades, Rockies, Himalayas, Kilimanjaro



Arctic & Alpine Plants



Arctic & Alpine Animals



Physiologically
– move,
hibernate or
deal with it!





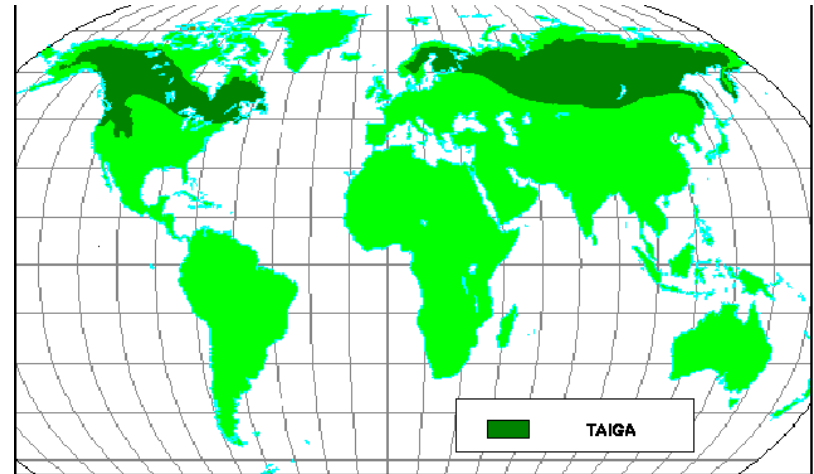
Arctic Status

- Damage to permafrost
- Mineral exploration
- Oil spills & development
- Arctic National Wildlife Refuge (ANWR)
- Alpine - less exploitable
- Recreational impacts



Boreal Forest- Location/Climate

- Microthermal/
Subarctic climate
- 45-75° N latitude
- Long winters, short
summers
- Summer moisture
- Soils typically poor
and well drained



Boreal Forest-Structure



Boreal Forest - Plant Types

- Evergreen (genera *Pinus*, *Picea*, *Abies*, *Larix*)



Boreal Forest-Animals



Boreal Forest - Status

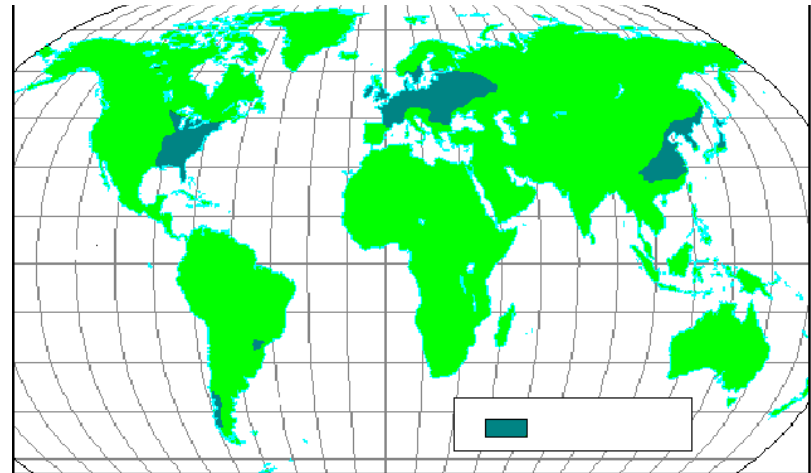




Temperate Forest- Location/ Climate

- 20° and 50° **North** (generally) latitude
- 5 ° C to 20 ° C temperature range
- Winters cool to cold with some frost
- **50-250** cm annual ppt
- Soils tend to be relatively fertile
- Broadleaved/Mixed and Coniferous

Temperate Forest Structure



- Broadleaved/Mixed (Deciduous)

Temperate Forest - Plants



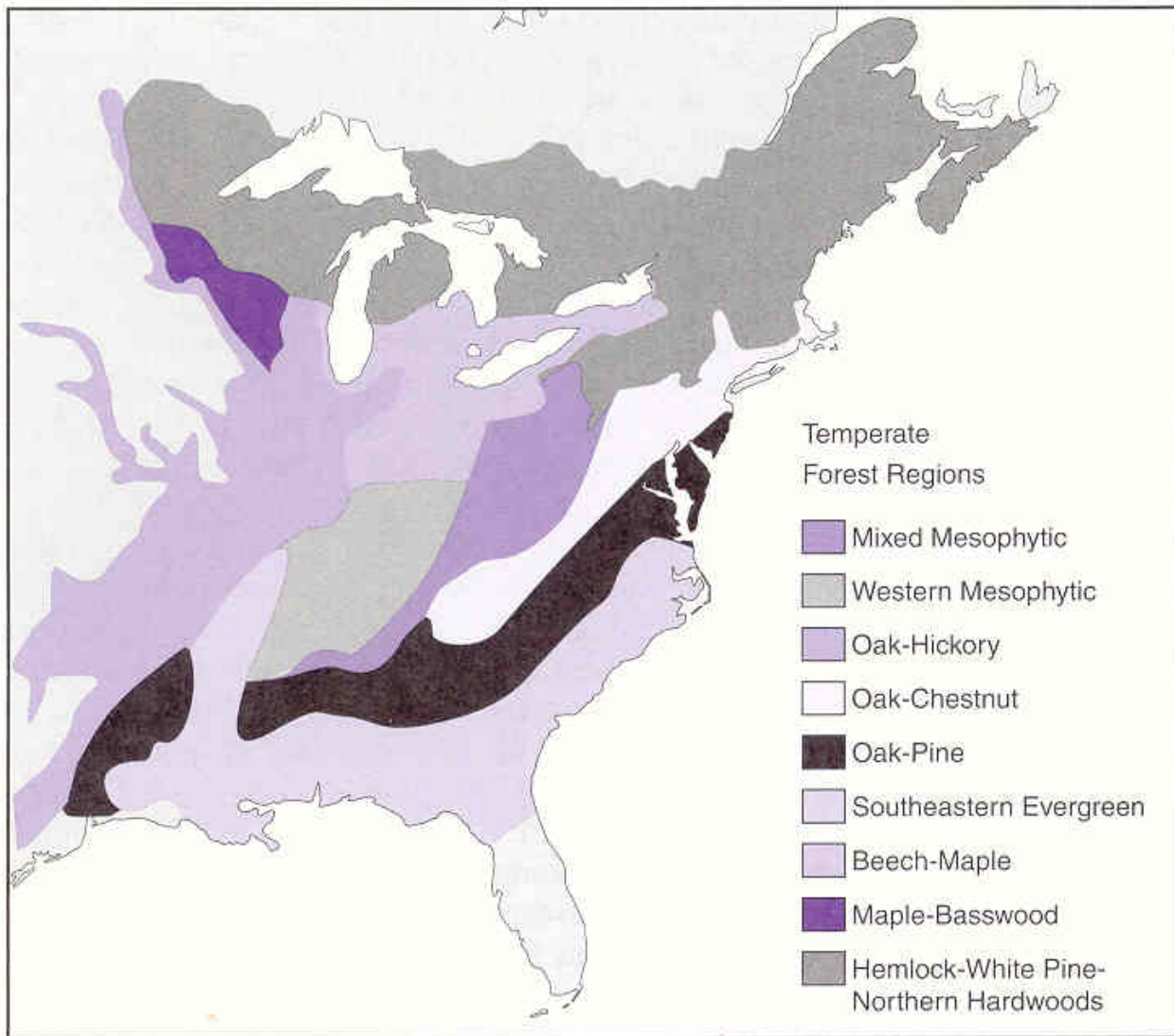


FIGURE 6.20 Eastern North American temperate forest formations (after Archibold, 1995).

Temp. Forest - Animals



Temperate Forest Structure



- Coniferous
- PNW, SW

Temp. Forest - Animals



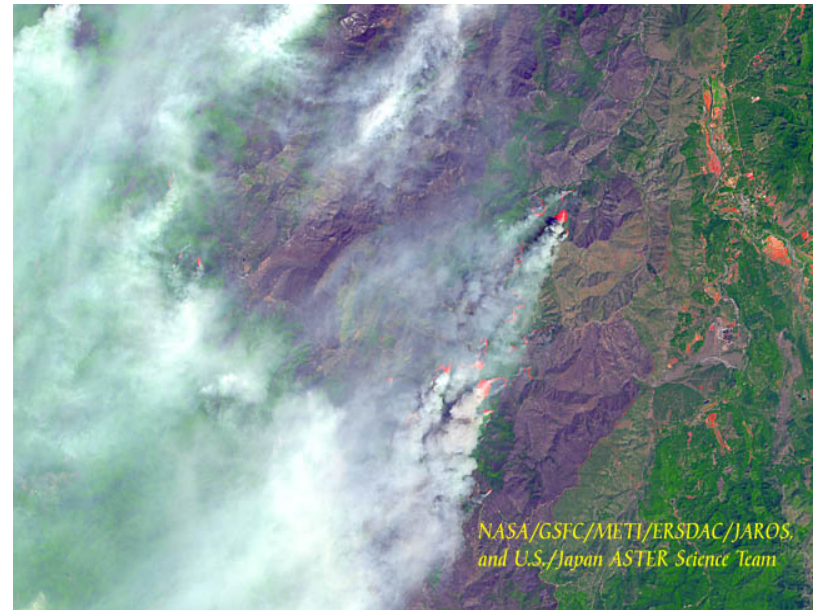
Temp. Forests - Status

- Logging



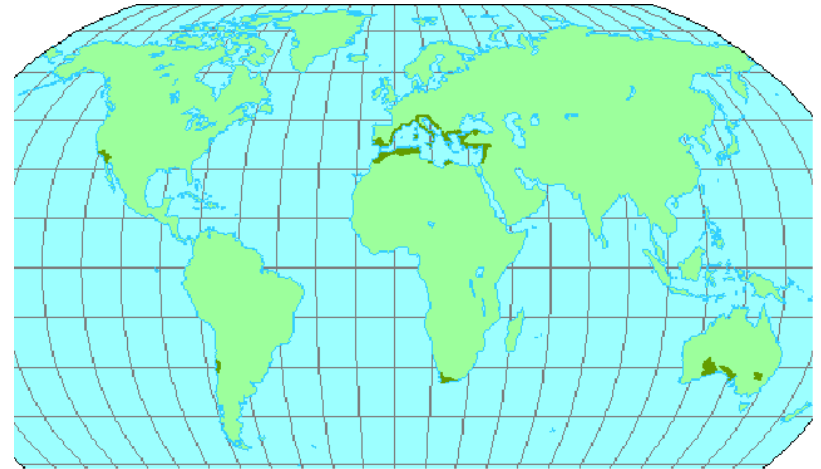
Temp. Forests - Status

- Fire suppression



Mediterranean- Location/Climate

- Thin soil, high winter rainfall, low summer rainfall, frequent fires ("Fire-adapted" ecosystem)
- Evergreen shrubs, pines, scrub oaks, sclerophyllous leaves
- Mule deer, woodrats, chipmunks, lizards, birds are common



Mediterranean Structure



Mediterranean Plant Types



Mediterranean Animals



Mediterranean Status

Major place for agriculture, but
bad erosion

Intense development for housing
if water is available

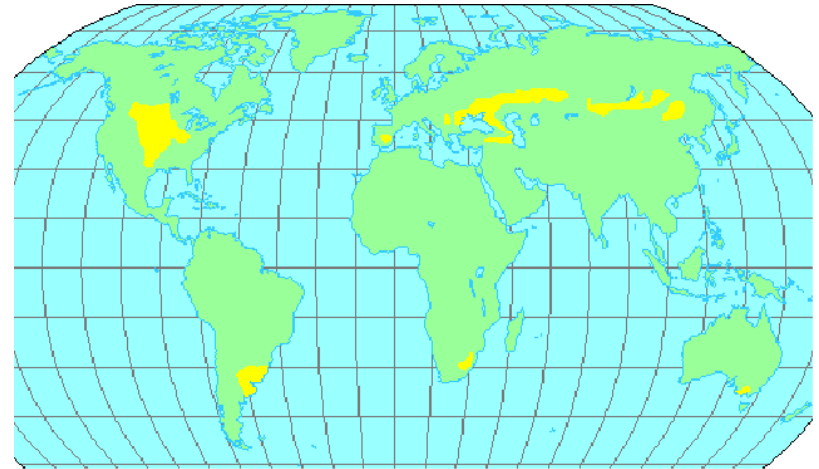
Fire cycle is increasingly short

Vegetation used to be more oaks,
Olives, cedars, pines
increasingly only shrubs



Grassland- Location/Climate

- Once prairies, now farmland (high productivity)
- Mainly grasses (bluestem, bunchgrass); no trees
- Rainfall: moderate (25-75 cm/year)
- Temperature moderate, but wide range (-30 to over 100 F)

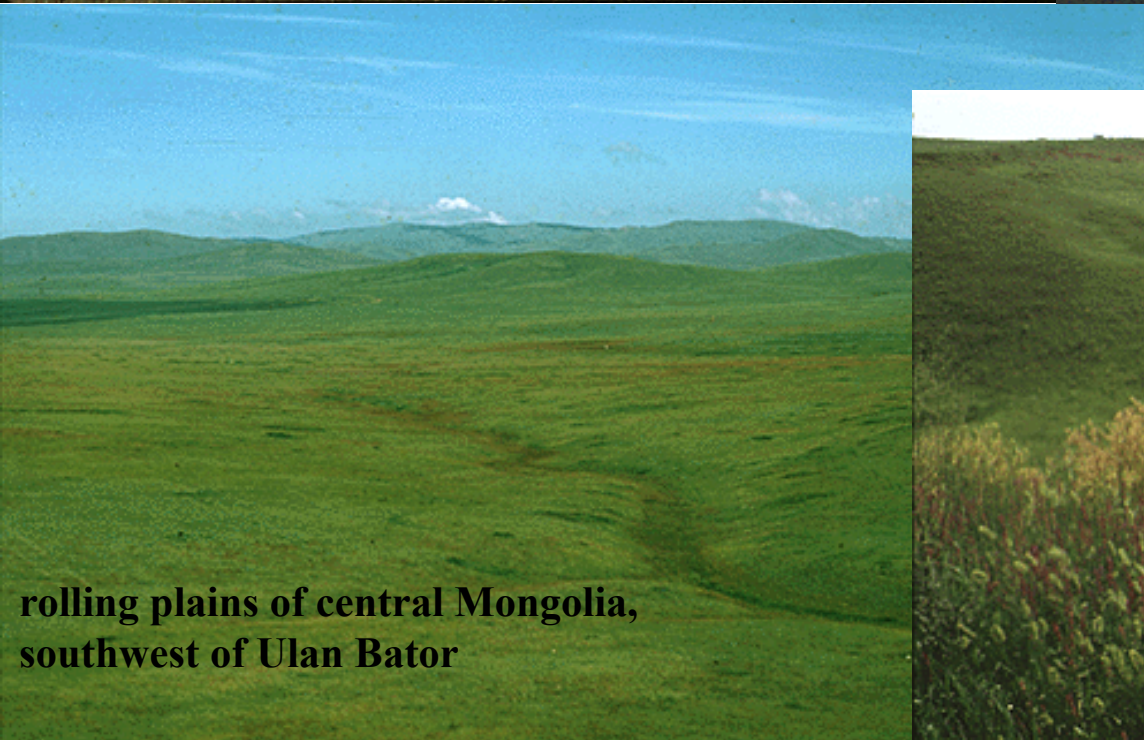




**Mixed grass steppe in
Southern Russia near the Azovi Sea**



A remnant of the tall-grass prairie in Kansas



**rolling plains of central Mongolia,
southwest of Ulan Bator**



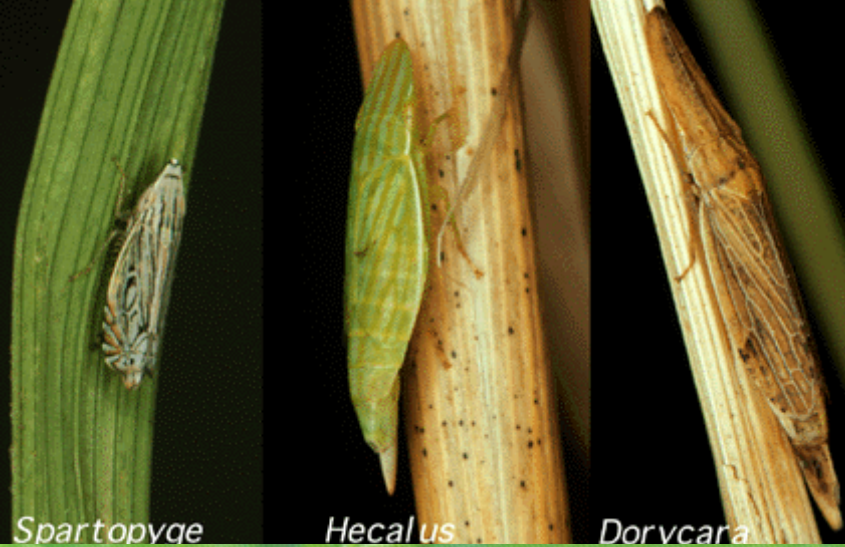
Mixed-grass steppe in Central Hungary

Grassland Plant Types



Grassland Animals





Spartopyge

Hecalus

Dorycara



Grassland Status

Converted to agriculture

Changes in fire regime

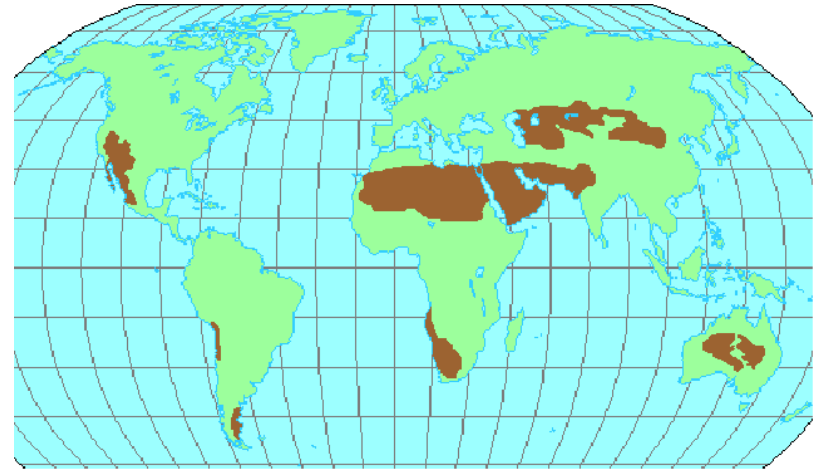
Overgrazing by live stock

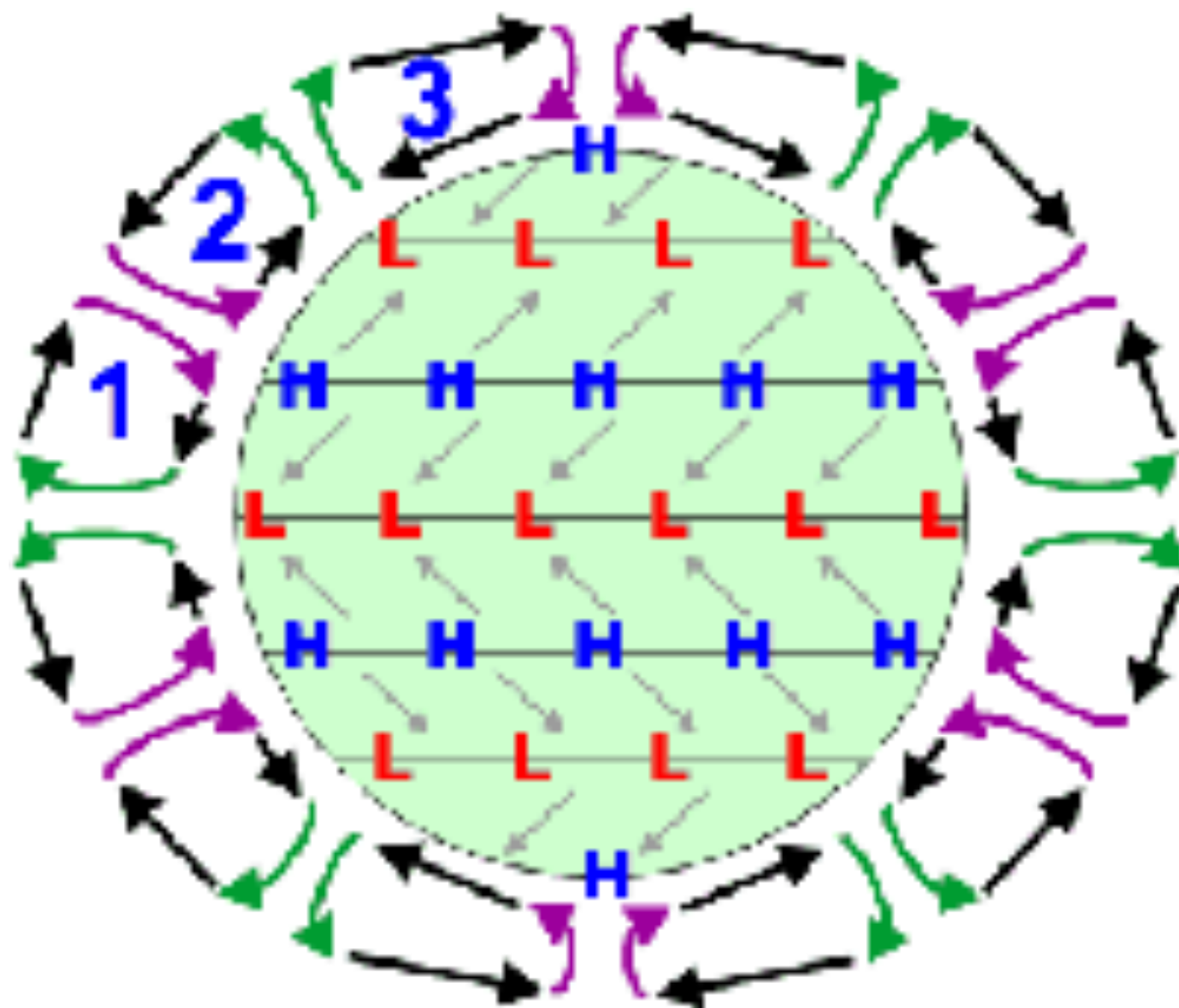
Conversion to desert through
takes on water



Desert- Location/Climate

- Lay within the Tropical Belts 15° - 35° N and 15° - 35° S
- Summers very hot, short winter little rainfall
- Rainfall is less than 50 cm/year
- Hot & Dry Deserts
- Cold Deserts





Desert Structure

Sparse vegetation





Desert Plant Types

e.g. cacti, creosote bush, yucca, joshua tree
few or no leaves, taproots, and thick epidermis on plants



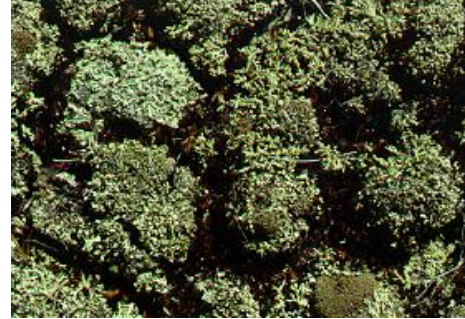
Desert Animals

kangaroo rat, lizards, snakes, owls, vultures
nocturnal, burrowing, concentrated urine in animals



Desert Status

Expansion of desert Biome
result of agriculture
overgrazing



Summer grazing damages
cryptogamic crust



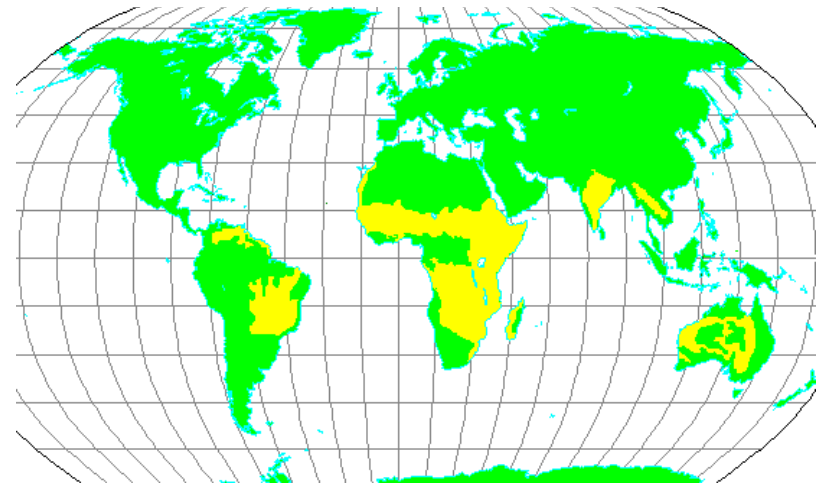
Erosion

Salinization -
salts build up in irrigated soils

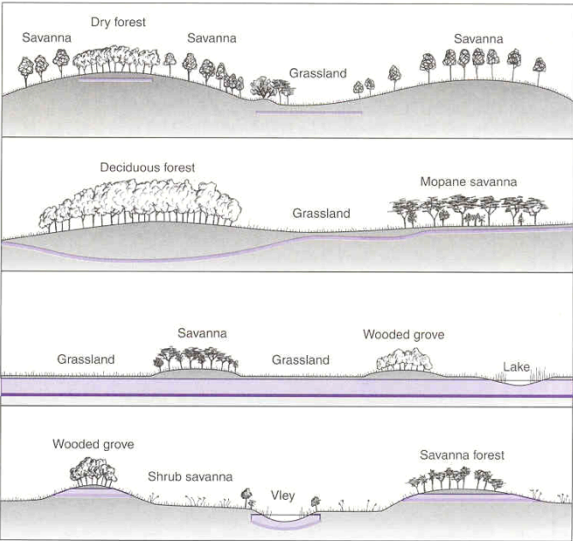


Savanna- Location/Climate

- Between 30° N and 30° S
- Mean monthly temperatures at or above 64° F
- In areas with distinct dry season
 - At least 5 months
 - Each with < 10 cm rainfall



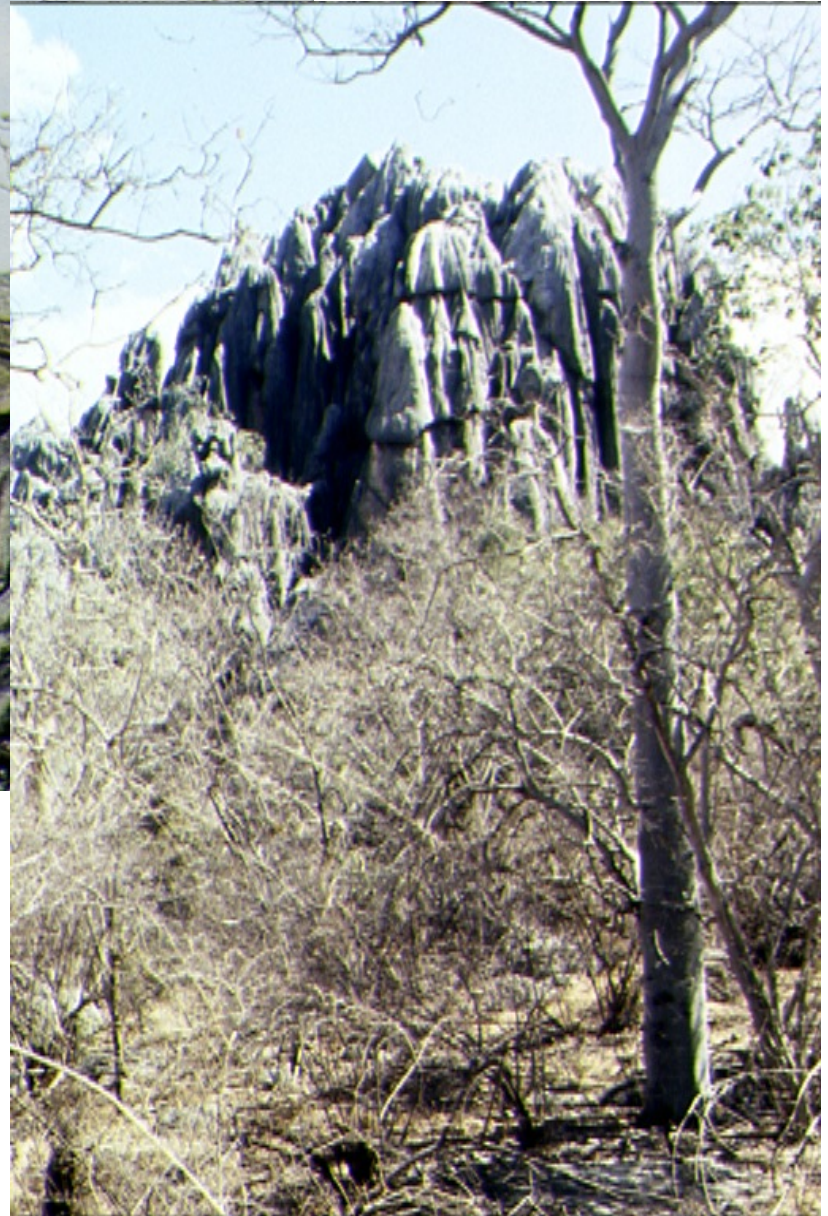
Savanna-General Structure



■ Hard pan soil layers

Savanna-Plant Forms

- Would progress to seasonally dry forest but for disturbance
 - Poor soil
 - Fire
 - Grazing
- Continuous cover of perennial grasses (1-2 m tall)
- Drought-resistant and fire-resistant
- Scattered trees include: oak, pine, palm, acacia



Wet and dry season tropical deciduous vegetation in Australia



African and Australian
savanna vegetation in dry
season

Savanna-Animals

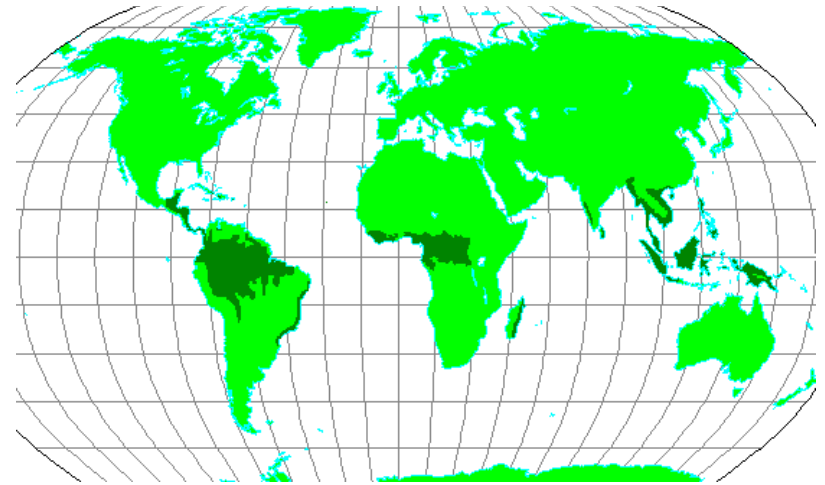
- World's largest diversity of ungulates
- Many animals are herbivores
 - Antelopes, buffalo, wildebeest, zebras, rhinos, giraffes, elephants, hippos
 - Often travel in herds
- Carnivores include
 - Cats (lions, leopards, cheetahs), dogs, and hyenas
- Termites
 - Detritivores important in soil formation
 - Build large termitaries that can be used as shelter by other animals

Savanna-Current Status

- Clearing trees for firewood
- Overgrazing
 - Patches of bare ground created
 - Fire no longer carries fire across landscape
 - Invasion by trees is possible
- Poaching

TRF- Location/Climate

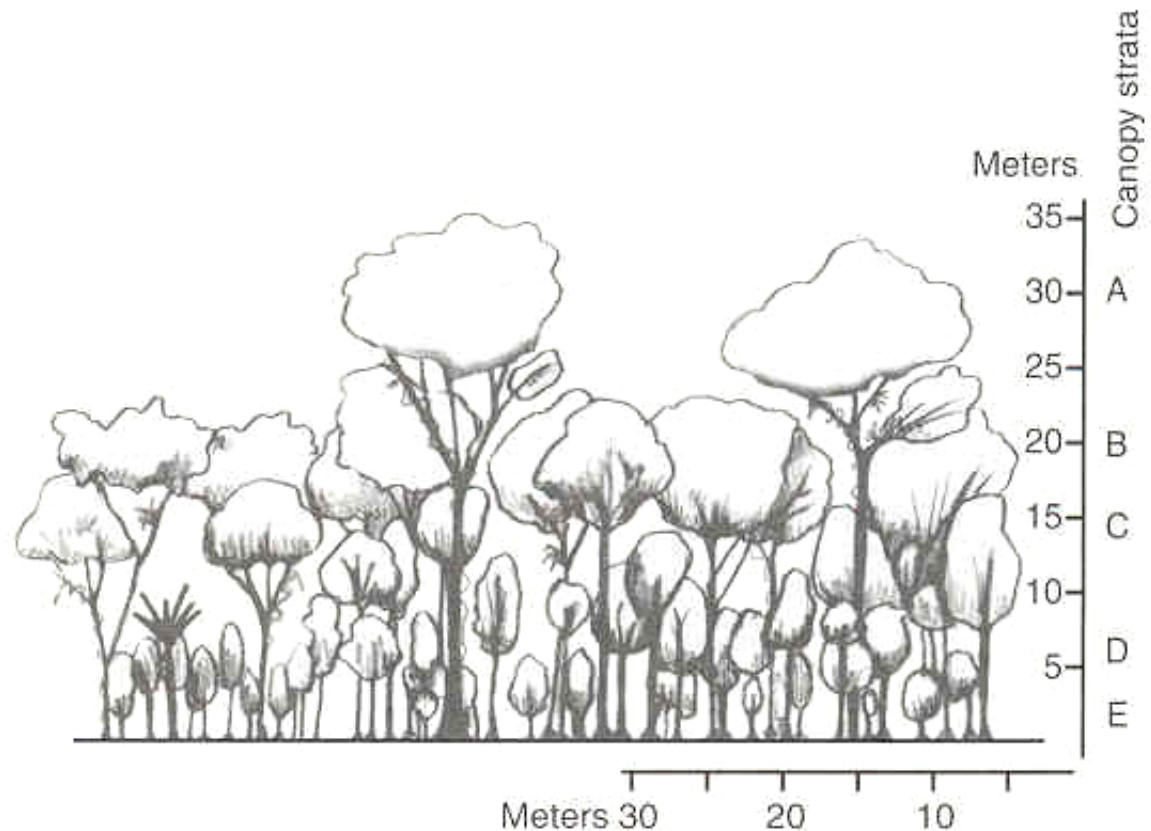
- Tropics: 30 N and 30 S
- Other habitat types
- Tropical rainforests
 - 10 N and 10 S
 - < 1km elevation
 - Constant temperature
 - Constant day length
 - Rainfall > 250 cm/yr



TRF-General Structure

Multilayered

- Emergent trees
- Canopy trees
- Sub-canopy
- Saplings and shrubs
- Herbaceous layer





The multi-layered canopy of tropical rainforest in Australia viewed from exterior and interior.

