

1. Temperate Rain Forests

Huge trees, moderate maritime climate, lots of precipitation

- a. Structure
 - i. Tall, dense canopy of needle-& small broad-leaf evergreens
 - ii. Deciduous &/or evergreen sub-canopy
 - iii. High biomass and productivity
 - iv. Not much canopy diversity. Higher sub-canopy diversity
- b. Distribution
 - i. West Coasts: Northern California to SE Alaska
 - ii. Southern tip of New Zealand
 - iii. Southern Chile (mixed evergreen needle-leaf and broadleaf evergreen trees)
- c. Climate
 - i. “Marine West Coast”
 - ii. Lots of precipitation, winter high.
 - iii. Drier summers
 - iv. Mild temps (oceanic influence):
- d. Disturbance
 - i. Windfall
 - 1. Nursery logs
 - ii. Infrequent fire, only in extreme dry years
 - iii. Infrequent landslide due
 - 1. to extreme precipitation
 - 2. earthquakes
 - 3. Volcano eruptions
 - iv. Humans: Logging, Clearing for development

Non-Forested Biomes

2. Mediterranean Shrublands

- a. Structure
 - i. Shrubs
 - ii. Dominant species: Chamise, Ceanothus, Mountain Mahogany, Oaks
 - iii. “Sclerophyllous” Vegetation: hard leathery leaves
 - iv. Leaves are evergreen or drought-deciduous and generally very small
- b. Mediterranean Shrublands: Structure
Two different types in California
 - i. Coastal Sage Scrub: *2-layered*
 1. Shrubs = 1 m tall spaced far apart
 2. Lots of grasses and forbs “understory”
 3. Located along the coast (low elevation)
 - ii. Chaparral: *a thick wall of shrubs*
 1. 2 to 5 dominant shrub species
 2. Lacks much understory in mature stage
 3. Located at higher elevations than C.S.S.
- c. Distribution
 - i. 5 disjunct locations
located on west coasts of continents between 30-40 degrees latitude
 1. Southern California: *Chaparral, C.S.S.*
 2. South America (Chile): *Matorral*
 3. Australia: *Heath*
 4. South Africa: *Fynbos*
 5. Mediterranean Sea: *Maquis or Matorral*
- d. Climate
 - i. Winter high in precipitation

- ii. Definite summer drought
- iii. Temperatures mild in winter, mild to hot in summer
- iv. Similar patterns to Temperate Rain Forest
- e. Disturbance
 - i. Landslides, Floods
 - ii. Fire is very important!
 - iii. Frequent fires
 - iv. Re-sprouting shrubs (quick return interval)
 - v. “Fire Followers”
 - vi. Human disturbances: clearing for development, changing fire regime (suppression vs acceleration)

3. Deserts

Characterized by very low precipitation

- a. Warm deserts
 - i. Lower latitudes, warmer temperatures
 - ii. Subtropical High Pressure Zones
 - iii. Moderately Complex Structure
 - iv. Shrub layer
 - v. Annual grasses and forbs (after rains)
 - vi. “Tree” layer: Saguaro cacti, Joshua Trees
 - vii. Moderate biodiversity
 - viii. Low productivity, low biomass
- b. Cold deserts
 - i. Cold Winters, Warm Summers
 - ii. Rainshadow Deserts
 - iii. Low diversity, productivity, and biomass

- iv. Lacks a “tree” layer
 - v. Few cacti
 - vi. Dominated by shrubs and grasses
- c. Case studies of North American Deserts
- i. Chihuahuan Desert
 - 1. Warm Desert
 - 2. Yuccas, Creosote Bush
 - 3. Summer high precipitation (Monsoon)
 - 4. Texas, New Mexico, Northern Mexico
 - ii. Sonoran Desert
 - 1. Warm Desert
 - 2. Arizona, California, Northern Mexico
 - 3. Two precipitation highs
 - 4. High biodiversity
 - 5. Lots of large cacti
 - a. Saguaros
 - b. Organ pipe cactus
 - iii. Mojave Desert
 - 1. Warm/Cold Desert
 - 2. Southeastern California, Southern Nevada, Northwestern Arizona
 - 3. Creosote Bush
 - 4. Joshua Trees
 - 5. Winter high Precip.
 - iv. Great Basin Desert
 - 1. Cold, rainshadow desert
 - 2. Winter high precip.

3. Sagebrush, Rabbitbrush, Greasewood
4. Eastern Oregon, Nevada, Utah, parts of Idaho and Wyoming

d. Disturbances

- i. Wind and water erosion
- ii.
- iii. Flooding during rain events
- iv.
- v. Not much fire historically
- vi.
- vii. Human
 1. Off road vehicles
 2. Changes in fire regime
 3. Grazing
 4. Mining
 5. Exotic species: Cheat Grass
 - a. Invasive exotic species
 - b. Grows between shrubs
 - c. Highly flammable
 - d. Shrubs burn, don't come back
 - e. Cheat Grass thrives with fire
 - f. Sagebrush shrubland → Cheat grass
 - g. A "positive feedback"

4. Temperate Grasslands

- a. Tallgrass vs. Shortgrass: *A precipitation gradient*
- b. Tall Grass Prairie
 - i. Grasses and Forbs
 - ii. Historically maintained by fire (2-4 year interval)
 - iii. Without fire, may become a deciduous forest
 - iv. Moderate to low biomass, but high productivity
 - v. Best soils in the world (Mollisols)
 - vi. Dominated by agriculture
- c. Short Grass Prairie
 - i. Dominated by short grasses, forbs and shrubs
 - ii. Drier than Tall Grass Prairie

- iii. Less fire because less fuel
- iv. Soils productive, not as rich as tall grass
- v. Biomass and productivity fairly low
- vi. Grazing and agriculture (irrigation needed)

5. Arctic and Alpine Tundra

a. Properties

- i. Vegetation consists of grasses, sedges, forbs, and low shrubs (willows)
- ii. Biomass and productivity are low
- iii. Biodiversity is low/moderate
- iv. Vegetation adapted to extreme cold

b. Arctic vs. Alpine Tundra

c. Arctic Tundra

- i. High latitudes
- ii. Precipitation may be low
- iii. Permafrost soils
- iv. Surface soils are wet
- v. Extreme cold winters
- vi. Large temperature ranges

d. Alpine Tundra

- i. High altitudes
- ii. Precipitation tends to be high (mountain snows)
- iii. Large temp range
- iv. Wind disturbances