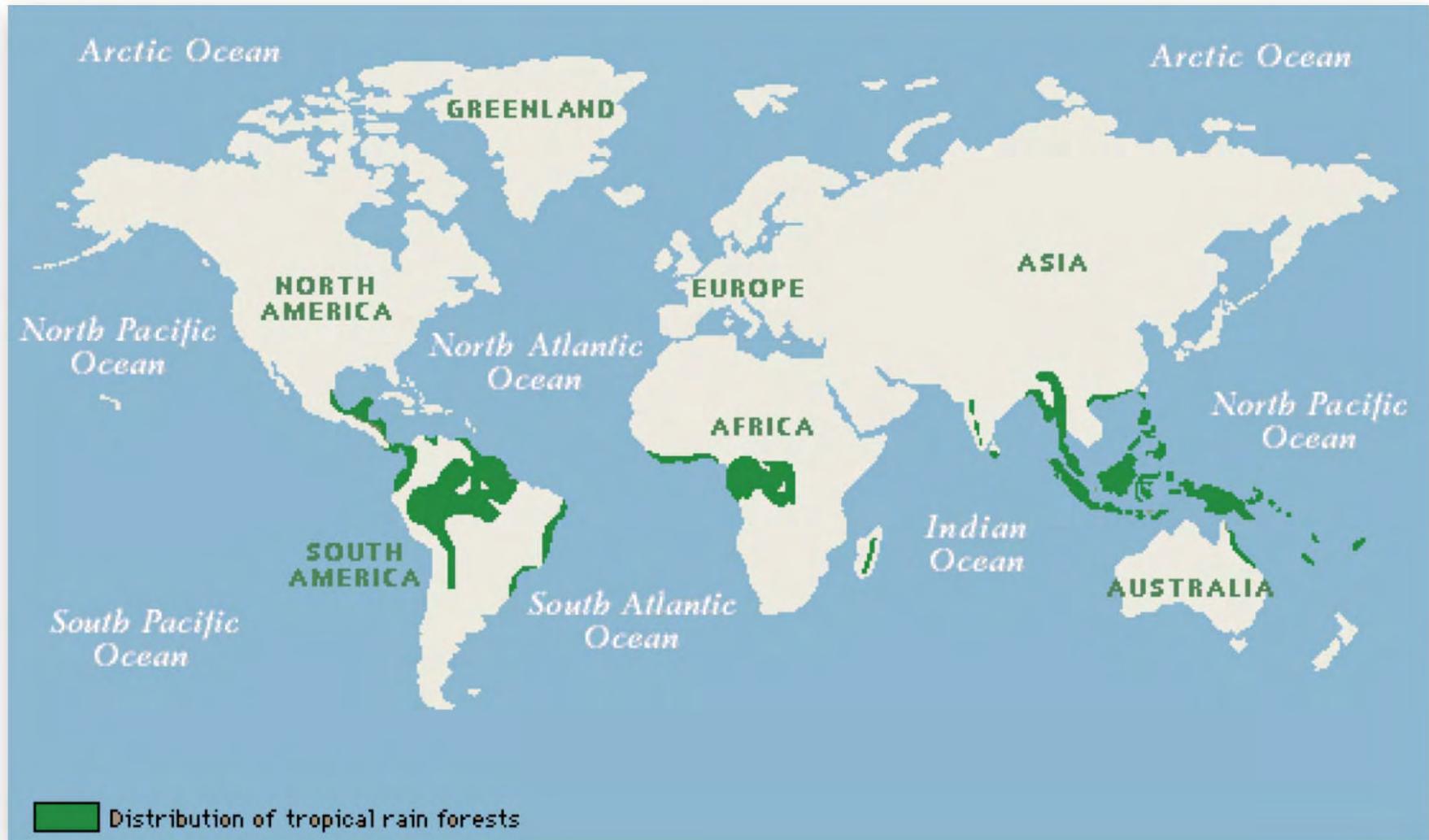


# Tropical Rainforest

A wide-angle photograph of a tropical rainforest. The foreground is filled with dense, vibrant green foliage, including several tall palm trees with long, thin trunks and large, feathery fronds. The middle ground shows rolling hills and valleys covered in a thick canopy of trees. In the background, more mountain ranges are visible, partially shrouded in a light mist or haze. The sky is filled with soft, white clouds, suggesting a bright but slightly overcast day. The overall scene conveys a sense of a vast, untouched natural environment.

All information for slides – Glen MacDonald 2003  
[Biogeography: introduction to Space, Time and Life](#)



Total area estimated at 17 to 19 million sq km

# How are Tropical Rainforests different than other biomes?

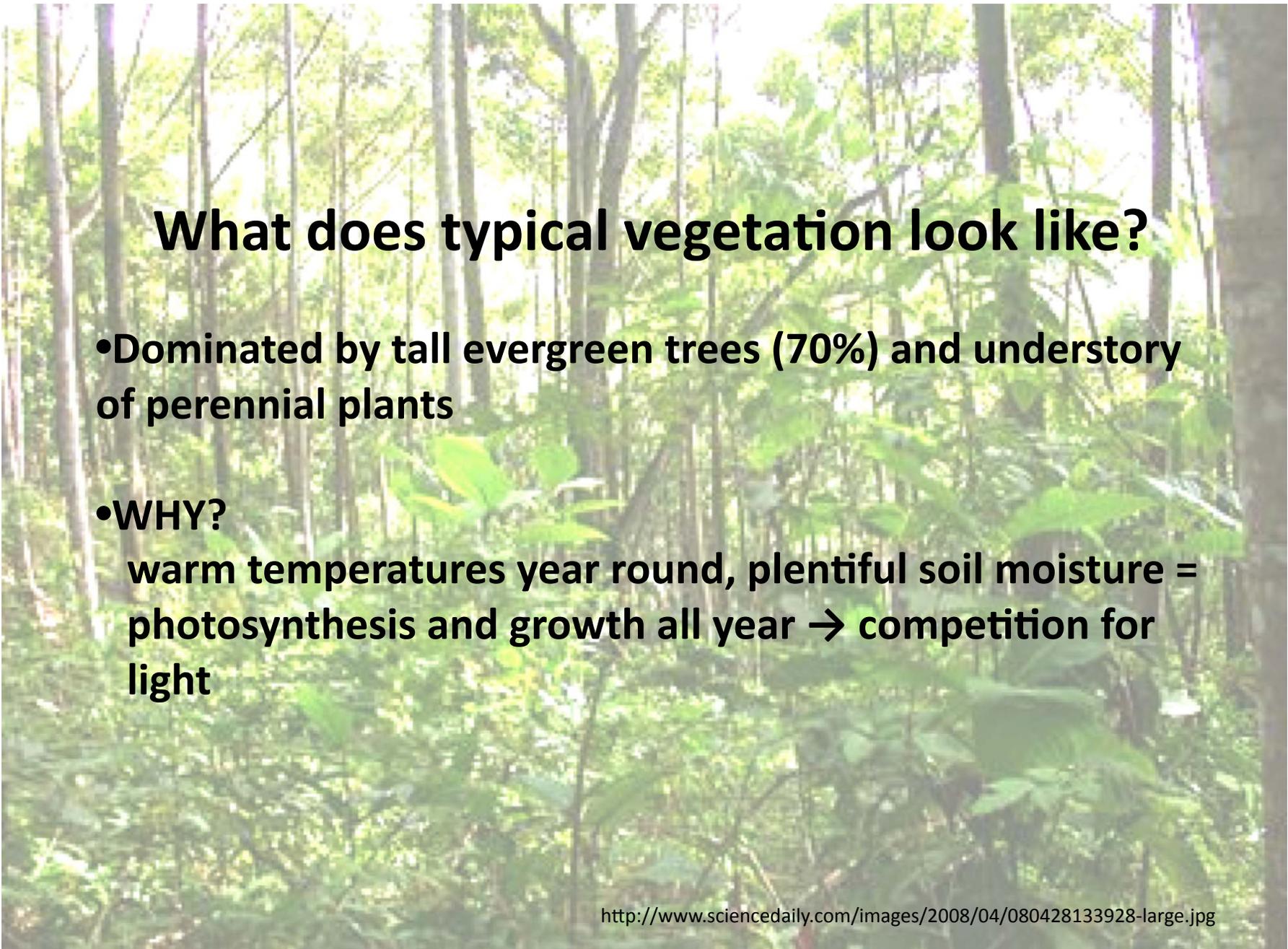
- Contain the greatest amount of standing biomass of any biome (40% of all plant species on earth found here)
- Contain the highest diversities of insects, birds and mammals in the world



[http://www.costaricaholiday.co.uk/Images/Packages/toucan\\_tortuguero.jpg](http://www.costaricaholiday.co.uk/Images/Packages/toucan_tortuguero.jpg)



[http://www.callunafineflowers.com/memorial\\_middle\\_school/webquest/studentwebsites/21/Pictures/morpho.jpg](http://www.callunafineflowers.com/memorial_middle_school/webquest/studentwebsites/21/Pictures/morpho.jpg)



## **What does typical vegetation look like?**

- **Dominated by tall evergreen trees (70%) and understory of perennial plants**

- **WHY?**

**warm temperatures year round, plentiful soil moisture =  
photosynthesis and growth all year → competition for  
light**

# Important plant & animal species

**Epiphytes** → sprout and grow on trunks and branches of trees , they cause mechanical strain on host and compete for light  
epiphytes can kill many host trees  
Ex: orchids, ferns, strangler fig

**Hummingbirds, beetles, tropical bats** → low wind speeds within the canopy makes wind dispersal of pollen and seeds inefficient, 90% of plant species depend on these insects and animals for pollination

[http://farm1.static.flickr.com/27/48582980\\_3e3ea9dca3.jpg?v=0](http://farm1.static.flickr.com/27/48582980_3e3ea9dca3.jpg?v=0)



<http://www.costaricanconnection.net/imgs/activities/Hummingbird.jpg>

# Climate

- **Never freezing temperatures, little seasonal temperature variation, very warm**
- **Receives 200 – 250 cm precipitation per year, some areas exceed 400 cm**
- **Dry seasons may occur → in the driest month 12cm precipitation**

# Natural Disturbances



Fires, landslides and windthrows  
create new areas for species to  
grow



<http://www.oxfam.org.uk/coolplanet/ontheline/explore/nature/rainforest/images/defores.jpg>

# Human Influences

- **Deforestation** – pasture and farming, commercial crops (coffee, bananas, rubber trees)
- **Logging** – removal of valuable hardwoods



# TEMPERATE RAINFOREST BIOME

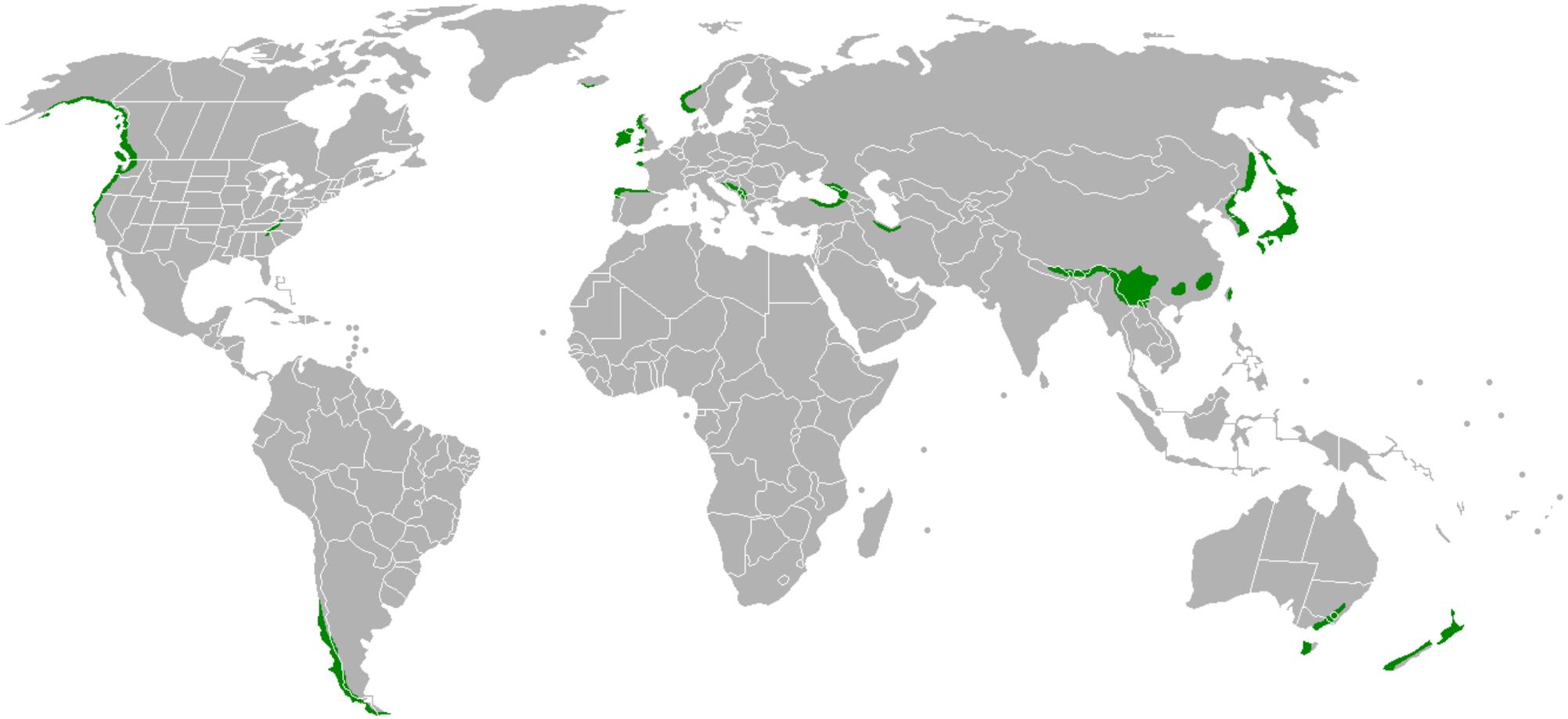
By Elisa Briesmeister  
Biogeography 310  
Dr. Jeff Hicke



# ASPECTS OF CLIMATE

- RAIN! Obvious element of climate= *precipitation*
  - At least 200 cm, up to 400 cm in warmer areas.
  - Rain or Snow
    - snow becomes more likely at higher elevations.
- Warmer temperature and higher precipitation than wet Boreal forests.
- Mild temperature regimes (MacDonald, 2003, p. 176)
  - 5°C - 20°C

# WORLD DISTRIBUTION

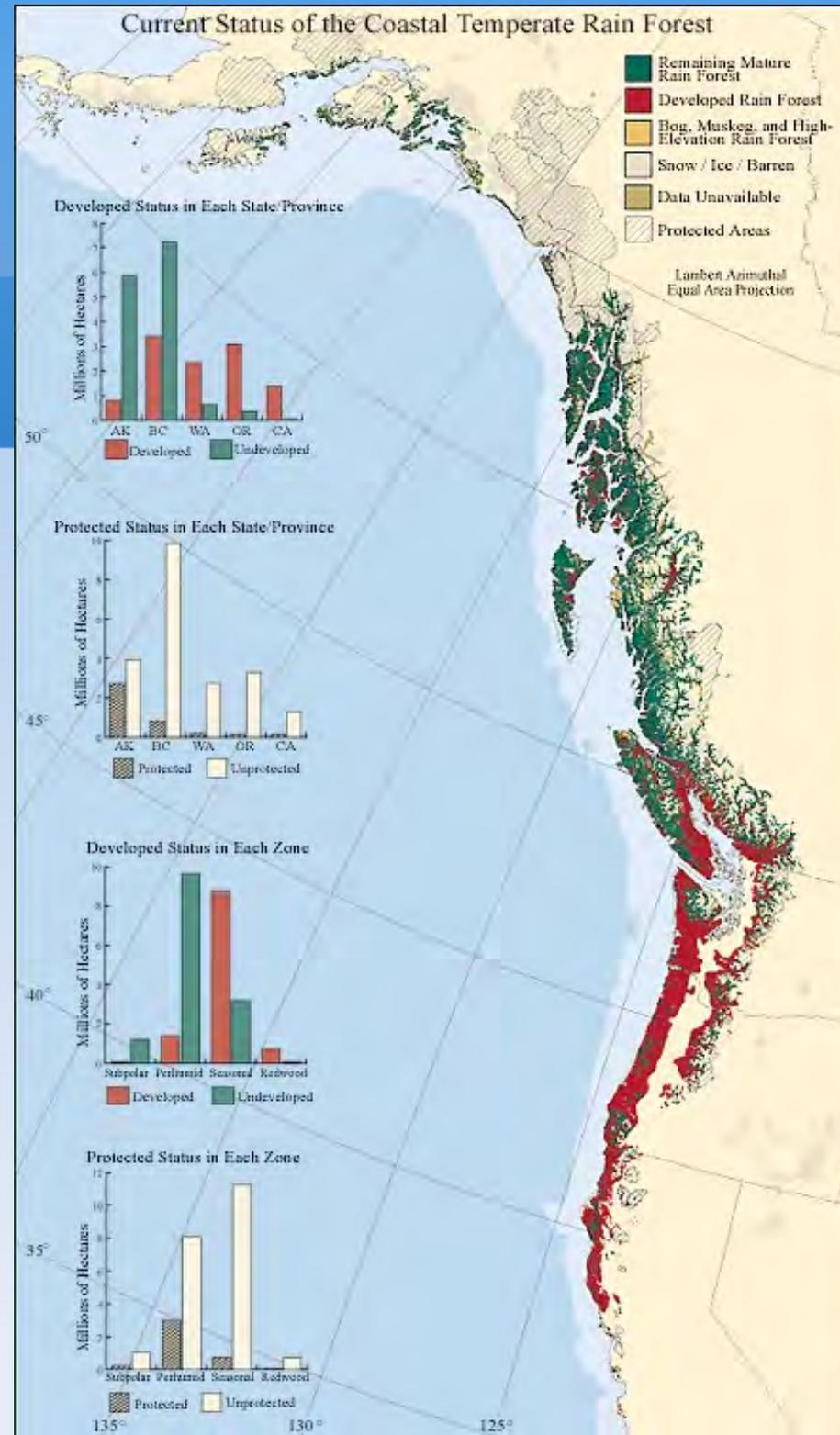
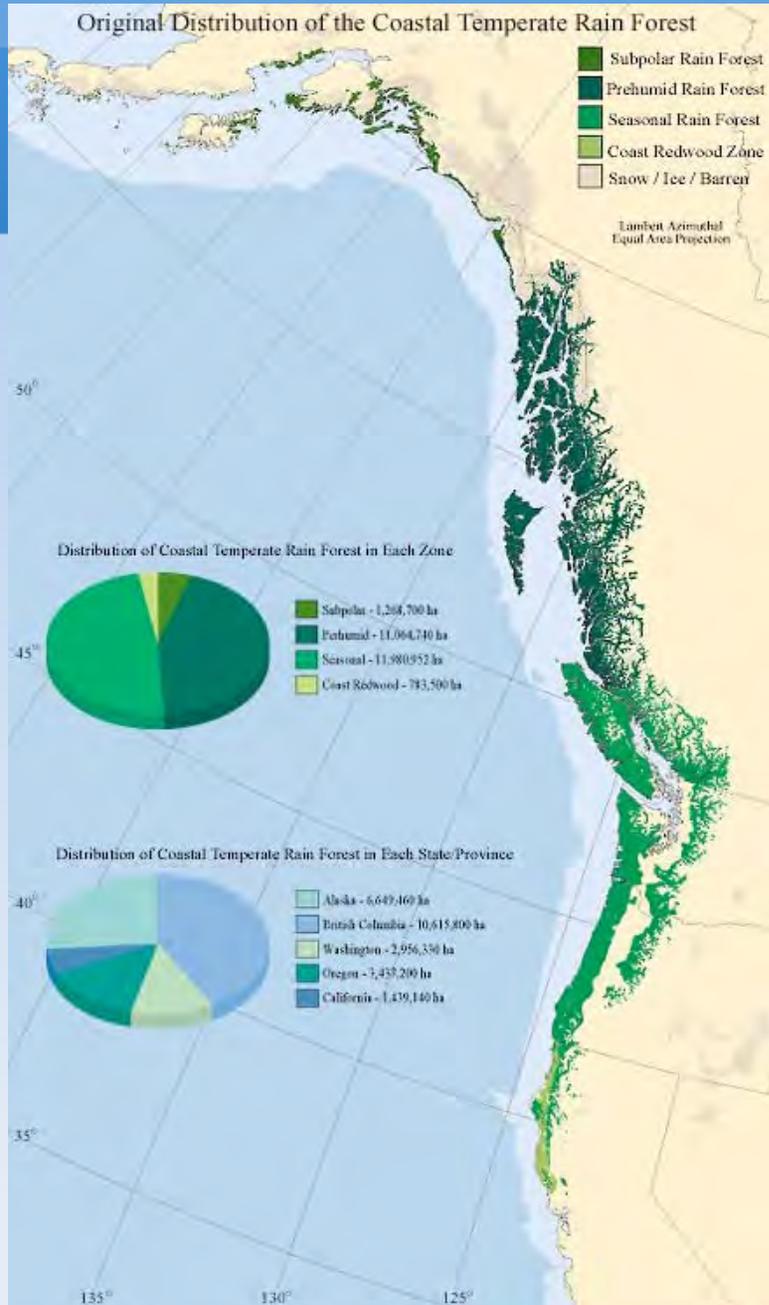


In terms of area covered in the world, the *temperate rainforest* biome is one of the smallest.

# DISTRIBUTION

- Temperate rainforests can be found along the Pacific coast of North America between latitudes  $40^{\circ}\text{N}$  (CA) and  $60^{\circ}\text{N}$  (AK)
- Also in southern Chile, New Zealand, Japan and southern China.
- All areas of temperate rainf

# HUMAN CONTROLS ON DISTRIBUTION



# NATURAL DISTURBANCES



- Natural disturbances include 230-250 year fire regimes, and winds that knock down shallow-rooted trees. (Martinez, 2004)

Photo: Courtesy of Dr. David L. Adams, Professor of Forest Resources, University of Idaho, Moscow, Idaho. (In Martinez, 2004)

# BIODIVERSITY

- Dominated by Evergreen trees
- Contrast w/ Tropical Rainforest:
  - Evergreen *broadleaf* trees are replaced by evergreen *conifers*,
    - better adapted to shed snow
    - can still photosynthesize in cold temperatures.
- Plants like mosses and ferns, which rely on water for reproduction, are also common here.

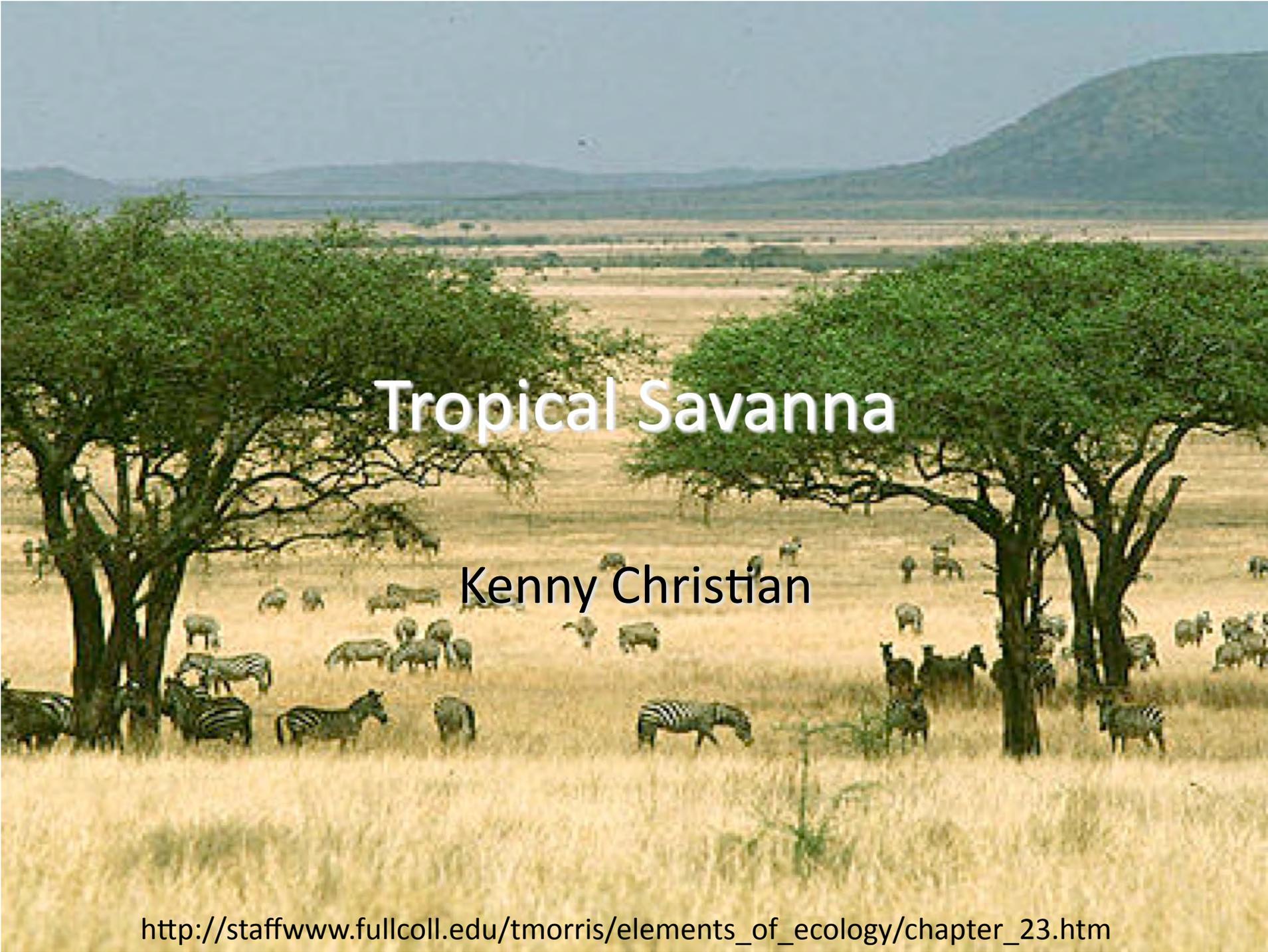


# BIODIVERSITY

- Limited light penetration through canopy + high moisture = cool temperatures.
- Medium in biodiversity
  - Not as great a diversity of species as a tropical rainforest, due to lack of light for photosynthesis under canopy, but because of the cool temperatures, biomass builds up since it takes longer to decompose here than in a tropical rainforest.

# BIBLIOGRAPHY

- MacDonald, G. (2003). *Biogeography: Introduction to space, time and life*. New York, NY: John Wiley and Sons.
- Martinez, D (2004). Natural and Human Disturbance. Retrieved October 26, 2008, from Exploring the Environment: Temperate Rainforest Web site: <http://www.cotf.edu/ete/modules/temprain/trnatural.html>
- [http://www.inforain.org/rainforestatlas/rainforestatlas\\_page4.html](http://www.inforain.org/rainforestatlas/rainforestatlas_page4.html)
  - Photo: <http://www.inforain.org/rainforestatlas/original.jpg>
  - Photo: <http://www.inforain.org/rainforestatlas/current.jpg>
- <http://www.marietta.edu/~biol/biomes/temprain.htm>
  - Photo: [http://www.marietta.edu/~biol/biomes/images/temprain/temperate\\_rainforest\\_5720.jpg](http://www.marietta.edu/~biol/biomes/images/temprain/temperate_rainforest_5720.jpg)
- Distributed Photo from Wikipedia commons <  
[http://upload.wikimedia.org/wikipedia/commons/5/59/Temperate\\_rainforest\\_map.png](http://upload.wikimedia.org/wikipedia/commons/5/59/Temperate_rainforest_map.png)>

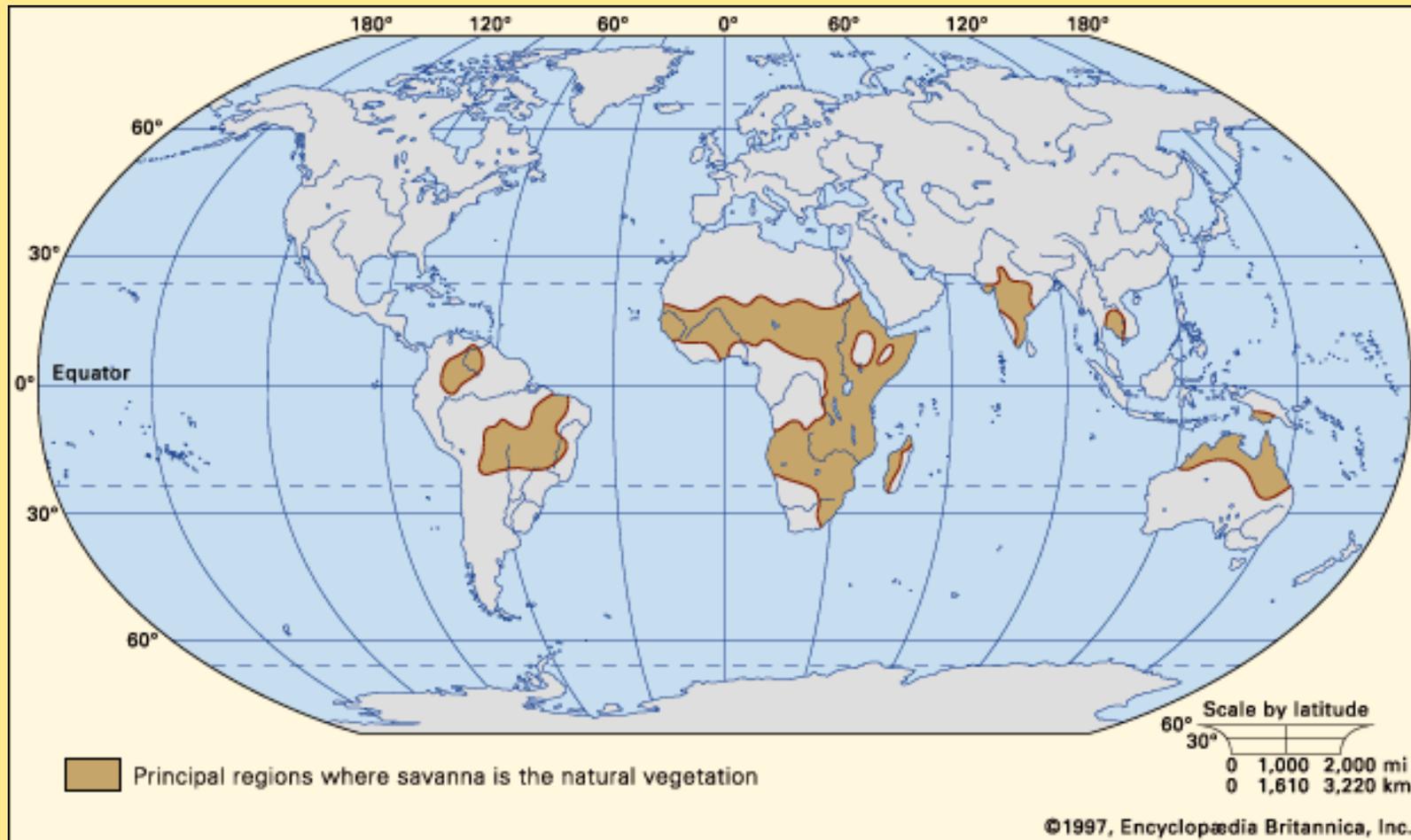


# Tropical Savanna

Kenny Christian

[http://staffwww.fullcoll.edu/tmorris/elements\\_of\\_ecology/chapter\\_23.htm](http://staffwww.fullcoll.edu/tmorris/elements_of_ecology/chapter_23.htm)

# Worldwide Distribution



<http://www.britannica.com/EBchecked/topic-art/525656/46/Worldwide-distribution-of-savannas>

# Savanna Vegetation

- Soil is hard and low in nutrients
- Iron and Aluminum accumulate to form laterite
- Termites decompose the organic matter
- Fires can kill trees and shrubs



[http://www.icrisat.org/Biopower/photo\\_gal/gal3\\_fuelwood/pages/3\\_laterite.htm](http://www.icrisat.org/Biopower/photo_gal/gal3_fuelwood/pages/3_laterite.htm)



<http://www.fire.uni-freiburg.de/photos/za/za.htm>

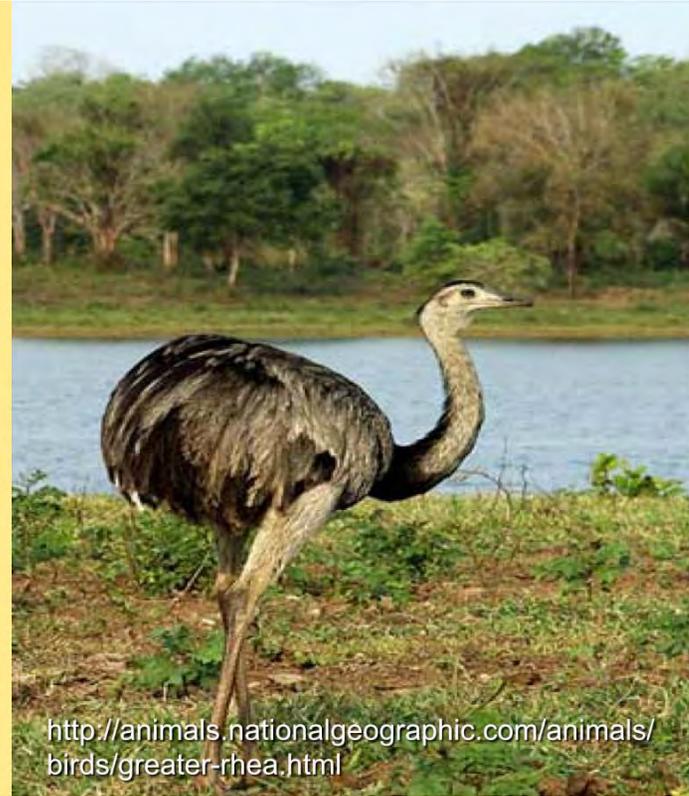
## Plant Adaptations

- Silk Cotton Trees of South America and Baobabs of Africa can store lots of water in their trunks
- Deep taproots
- Thick bark
- Grasses and bushes can die back and regenerate



# Biodiversity and Human Impact

- Trees and grasses are not diverse
- Birds are diverse
- African savanna has many mammals
- Grazing animals
- Poaching
- Burning grasses



# Desert

- 30% and over 40 million km<sup>2</sup>
- Every Continent
- 20-30° N and S or rain shadows
- Sahara - 9 million km<sup>2</sup>
- Antarctica - 14 million km<sup>2</sup>
- Hot & Dry, Semiarid, Coastal, Cold



# Biodiversity



- Low - related to precipitation
- Biomass - 13 billion tons
- Plants
  - Grasses, shrubs, cacti
  - Sparse, specialized vegetation
  - Spines, waxy coatings, CAM
  - Drought & salt tolerant
  - Water storing stems & deciduousness
- Animals
  - Few mammals or predators
  - Few large species
  - Small nocturnal carnivores, insects, arachnids, reptiles & birds

# Climate & Disturbances

- Harsh
- Vary throughout type
- Low precipitation: < 50 cm/yr
- Large diurnal swings: 45°- 0°C
- High PET/precip ratio
- Fires, cold, flash floods, wind



# Human Influences

- Dependent on occupation - Sahara vs. Mojave
- Increased desertification - grazing, wood gathering
- Increased salinity - improper irrigation & agriculture
- Land degradation - development, resource extraction & recreation



# Sources

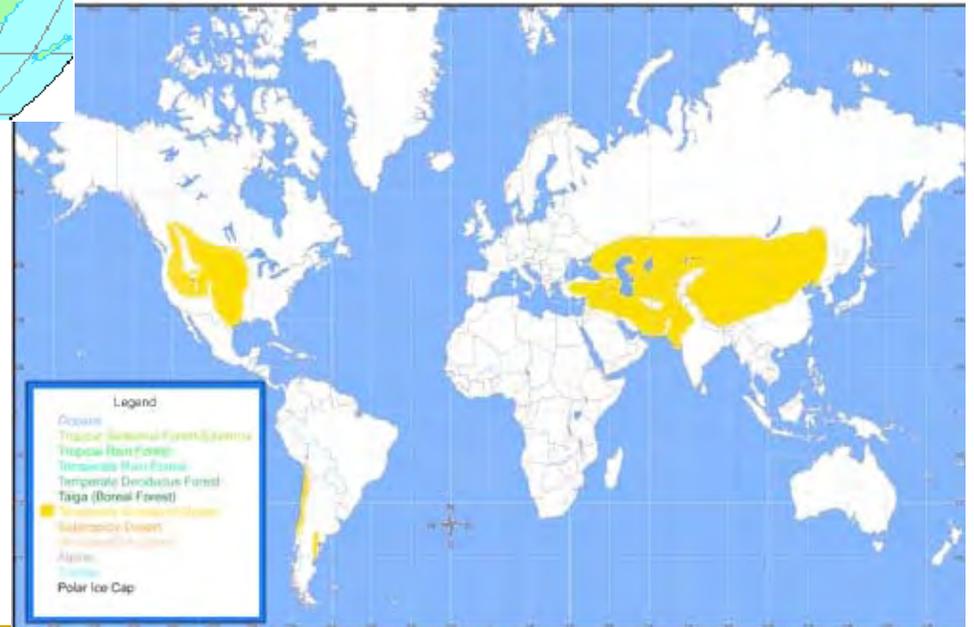
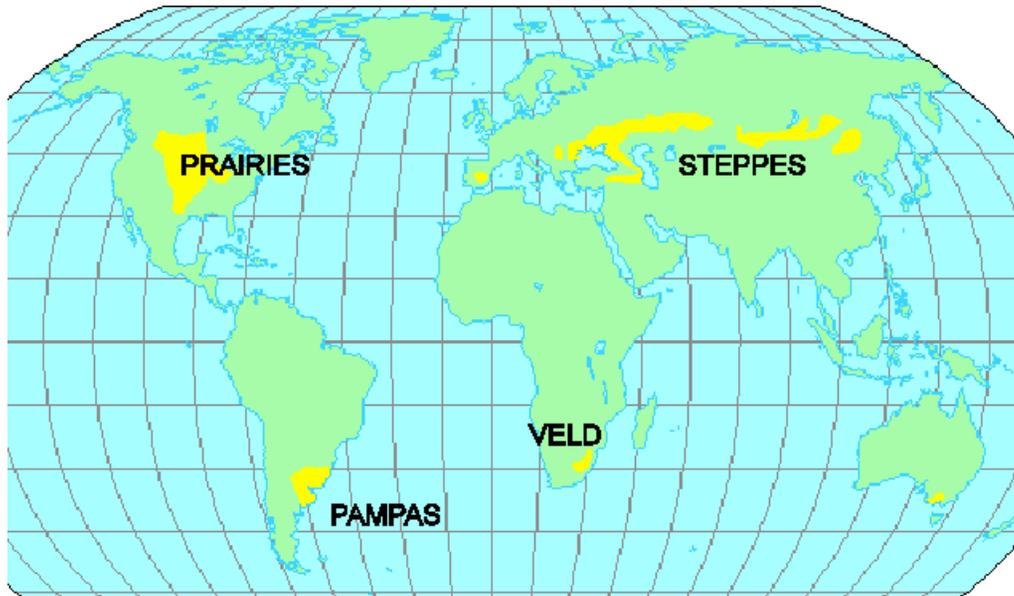
- MacDonald Biogeography
- <http://www.ucmp.berkeley.edu/exhibits/biomes/deserts>
- <http://en.wikipedia.org/wiki/Desert>
- <http://www.unep.org/geo/gdoutlook/035.asp>



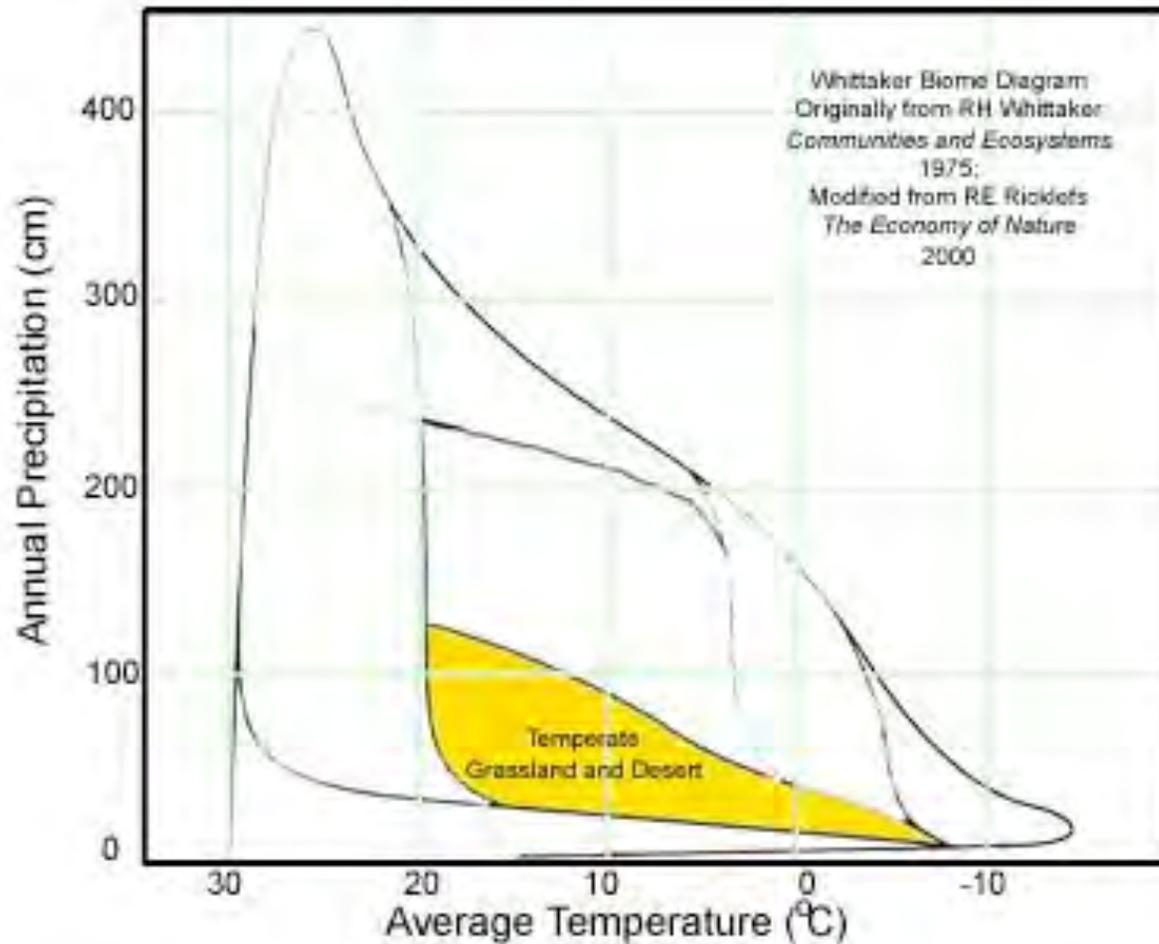
# Temperate Grassland



# Location



# Biome Distinction



- 20-100cm of precipitation per year
- Average Temperature usually 0-20°C

---

# Vegetation

- Grasses usually make up about 90% of biomass
  - Some shrubs and trees
  - 20% of plant species are grasses
  - 80% mainly herbs
-

# Vegetation

- Many different adaptations. Large root systems, very fine near surface roots systems, some perennial and some annual

## Range plant groups



*Study of plant groups will assist you with plant identification.*

---

# Vegetation Examples

- Blue-stem grass- Has very extensive root system that can reach 2m
  - Wheat grass- Its tillers (photosynthetic stems and blades of grass) grow from rhizomes, which are lateral underground stems. They can resprout after fires, and they store carbohydrates to help the grass survive during periods of drought
-

# Milkweeds

- The milkweed contains a thick latex sap that is bad tasting and poisonous, but certain insects like the Monarch Butterfly, the Milkweed Bug, and the Red Milkweed Beetle survive off of them. The consumption of the milkweed also makes the insects taste bad, and are avoided by predators.



---

# Animals

- Bison, horses, pronghorns, deer, prairie dogs
  - Coyotes, badgers, hawks, foxes
-

---

# Biodiversity

- Not very diverse compared to tropical areas, but contains a wide range of plant and animal species, especially grasses and insects.
-

---

# Natural Disturbances

- 3 natural disturbances. Aridity, fire, and grazing. The plants in these areas can survive long droughts and regrow after a fire. Some plants benefit from grazers because they help spread their seeds.
-

---

# Human Effect

- Farming
  - Cattle ranching
  - Urbanization
- 
- Many of these areas have suffered from industrialized farming, and large cattle ranches, which destroys soil quality.
-

---

## Sources

- <http://www.marietta.edu/~biol/biomes/grass.htm>

## Pictures

- <http://www.runet.edu/~swoodwar/CLASSES/GEOG235/biomes/tempgrass/tempgras.html>
  - [http://www.pc.gc.ca/apprendre-learn/prof/sub/edukit/grassland/index\\_1\\_e.asp](http://www.pc.gc.ca/apprendre-learn/prof/sub/edukit/grassland/index_1_e.asp)
-

# Swamps and Marsh

Kedar Koirala

## Swamps



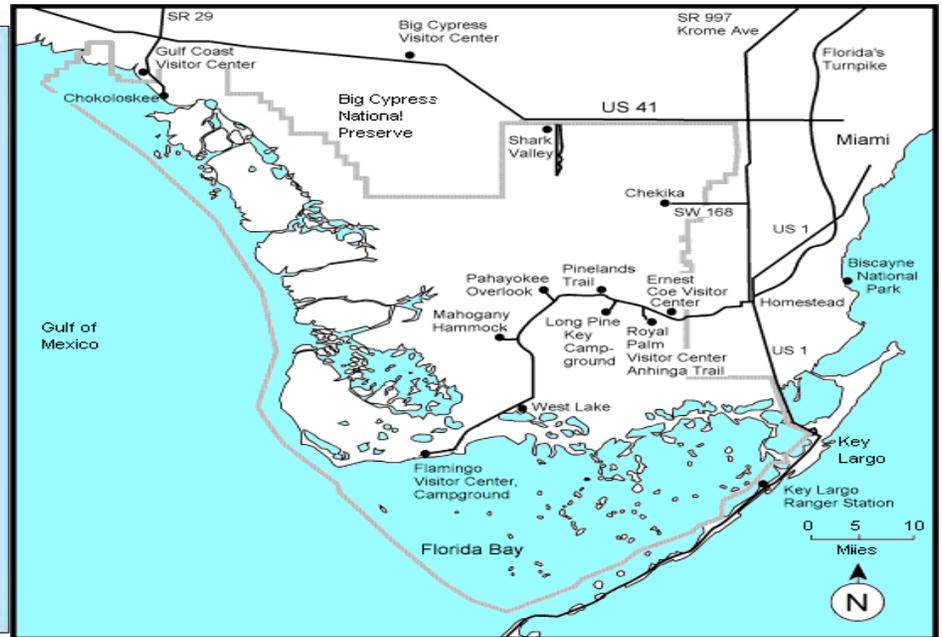
- Similar to a lake but much shallower.
- Covered with water, but is shallow enough to allow plants to grow, reaching the surface.
- Dominated by water tolerant trees.
- Characterized by very slow-moving waters.
- May be fresh water or salt water swamps

Sources: <http://en.wikipedia.org/wiki/Swamp>

# Location of Swamps and Marshes



Swamps



Marshes

## Swamps contd....

**Name:** Okefenokee Swamp

**Location:** Georgia- Florida boarder

**Size:** 438,000 acre (1,770 km<sup>2</sup>)

**Different:** The prairies, the houses and hammocks, the lakes, and the islands.

**Vegetation and animals species:** Plants: pitcher plant, bay tress, water lily. Animals: alligator, black bear, sandhill crane, etc,

**Rank:** Low biodiversity in habitat community

**Climate:** Hot and humid in summer and winters have around 50-60s, rainy in summer, lightening is the most possible and dangerous.

**Natural Disturbances:** Fires from lightening and also flooding  
**Human Influenced:** Grow for human settlement, destruction of vegetation and make infrastructure.

**Sources:** <http://www.wacona.com/okefenokee/okefenokee.html>

# Marshes



Marshes are

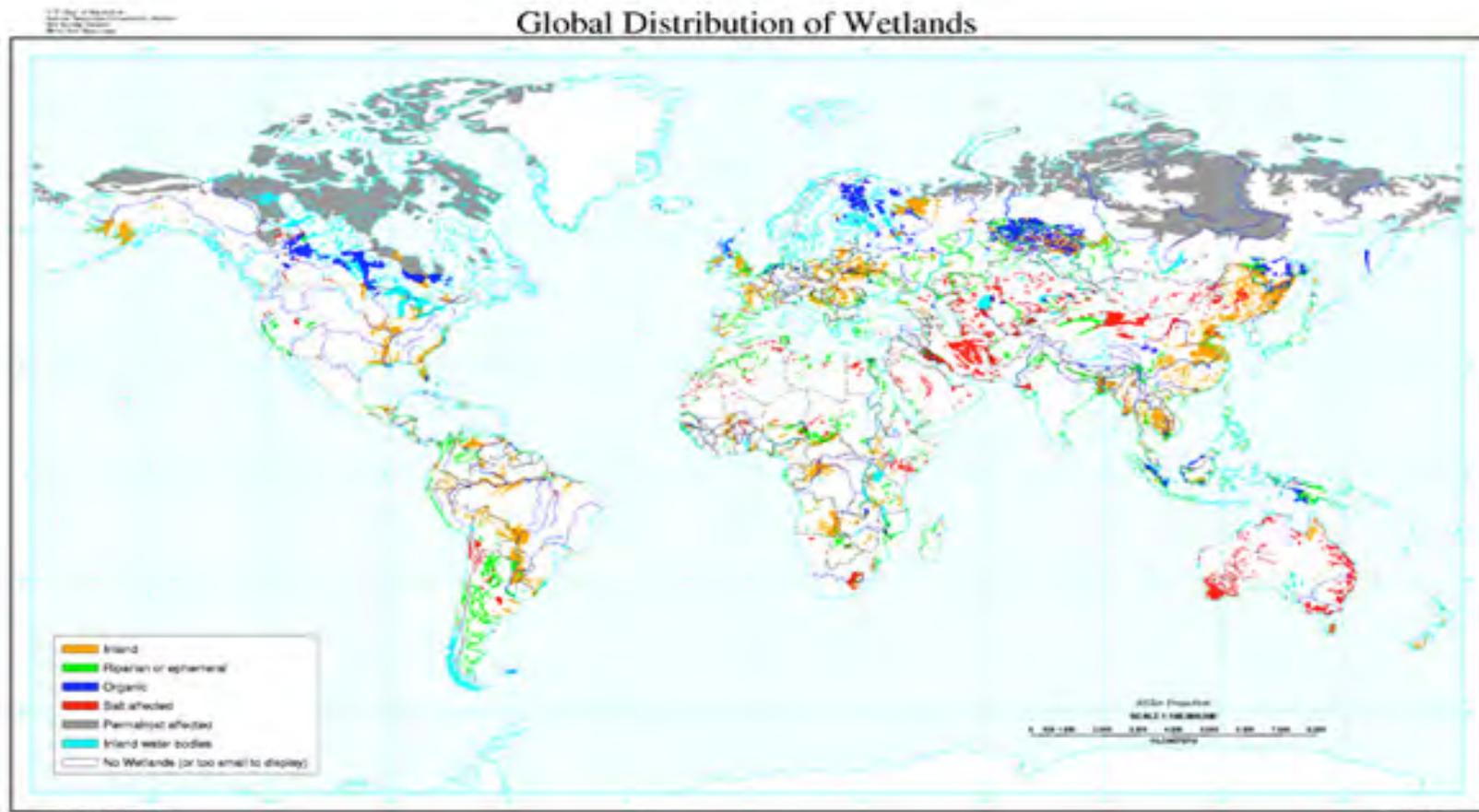
- Similar to swamps but greater proportion of open water surface and may be deeper
- Dominated by grasses and reeds.
- Rich with life, harboring many kinds of frogs, turtles, fish, and bird life.

Source: <http://en.wikipedia.org/wiki/Marsh>

## Marsh contd...

- **Name:** Florida Everglades
- **Location:** Southern Florida
- **Size:** Over 4,500 miles
- **Different:** Flood control, water storage and supply, recreation and unique habitats for native plant and animal species
- **Vegetation and animals species:** Vegetation: Flag marshes pickerelweed fire flag (*Thalia geniculata*), arrowhead (*sagittaria*), maidencane (*panicum hemitomon*), spikerushes bulrushes and other plants that require regular dry seasons. Animals: Cotton Mouse Dolphins, Manatees, Opossums, Raccoons
- **Rank:** low type biodiversity in community habitat.
- **Climate:** Tropical savanna type with hot and humid in summer and dry winters having around below 64 Deg F, Average annual rainfall 50 inch
- **Natural Disturbances:** Extreme weather (hurricane), Fires
- **Human Influenced:** Human inferences like urban growth, human settlement, farming etc.

# Global distribution of wetlands



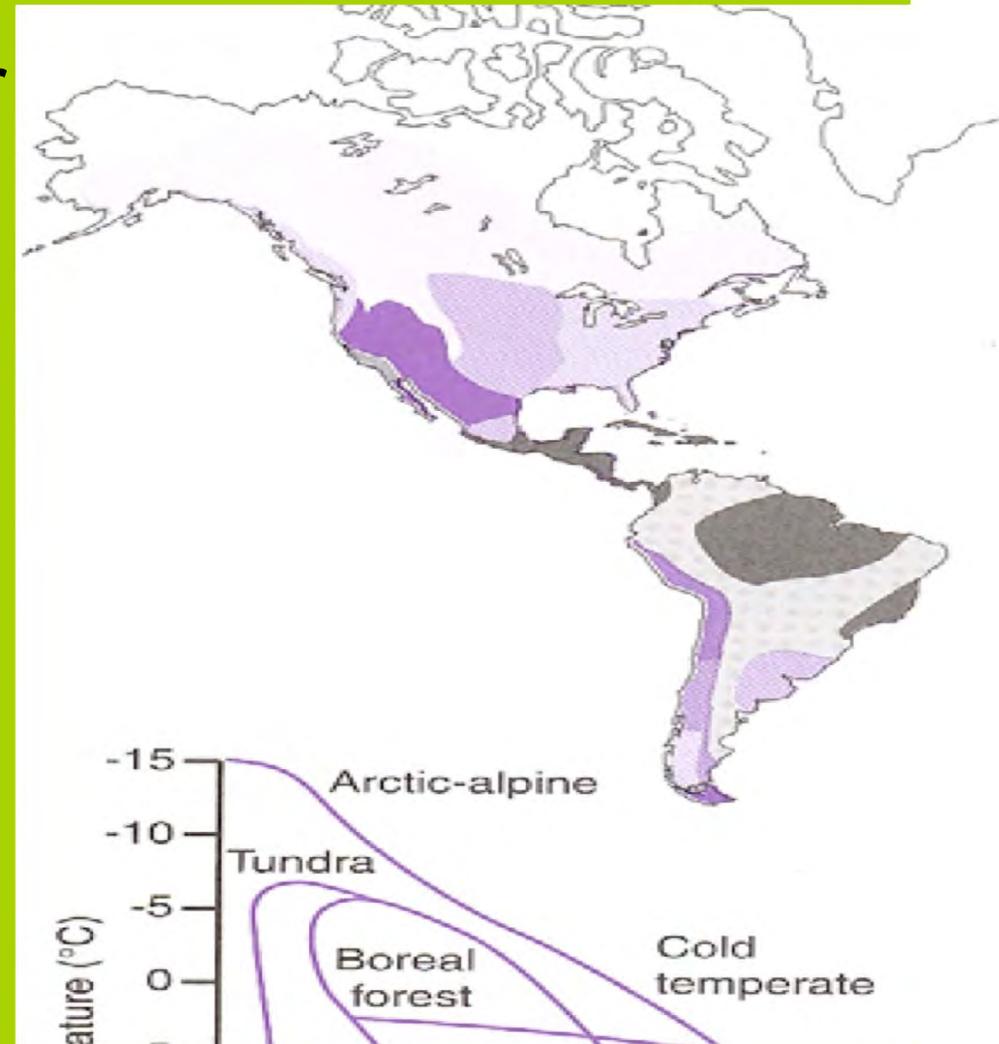
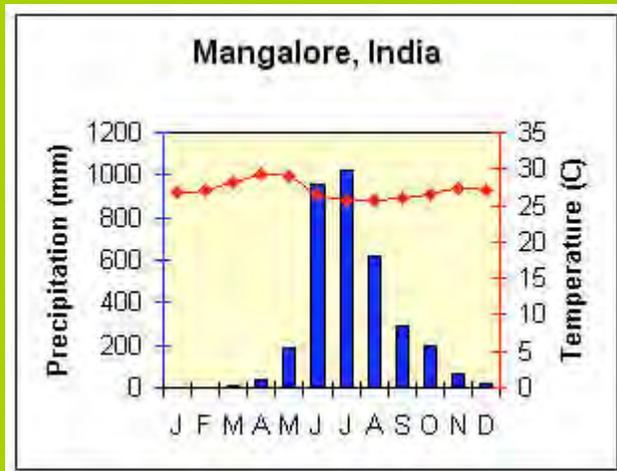
# Sources:

- <http://www.tigerhomes.org/animal/florida-everglades.cfm>
- [http://encarta.msn.com/encyclopedia\\_761574006/everglades.html](http://encarta.msn.com/encyclopedia_761574006/everglades.html)
- <http://aquat1.ifas.ufl.edu/guide/marshes.html>
- <http://aquat1.ifas.ufl.edu/guide/marshes.html>

# Tropical Seasonal/Dry Forest



- Tropics – edges of tropical rainforest  
7.5 million square km's
- 150 – 250 cm rain / year  
Monsoon rainfall pattern  
Wet summer – Dry winter
- Warm temperatures  
Low variability  
20 – 30 degrees C



# Vegetation

- Deciduous – due to long dry season
- Bloom at end of dry season
- Canopy less dense, shorter (20 – 30 m)  
However, sometimes denser underbrush due to light  
3 dominant strata - canopy



- shrub and saplings
- ground cover



# Soils and Biodiversity

- Soils

Weathered, leached oxisols

Long dry season = leaching not as extreme as tropical rainforests

- Biodiversity

Insects and animal species – second to rainforests

Plants – often < 50% compared to rainforests



# Disturbances and Human Impact

- Agriculture

  - Easier to clear than rainforests

  - Once clear, easy to suppress reestablishment

  - Soils often better than in rainforests

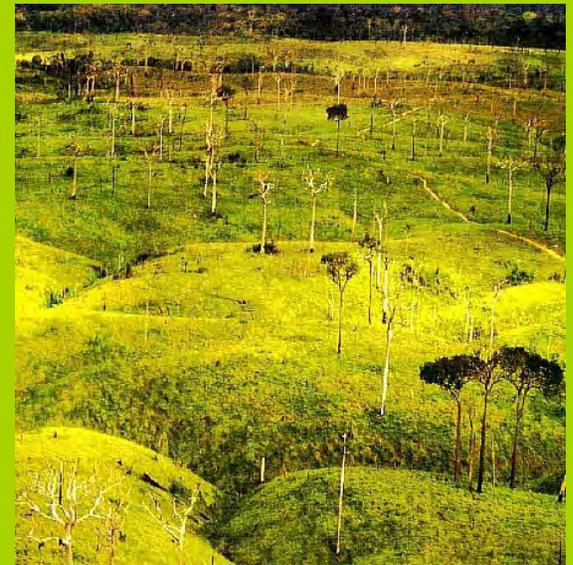
- Located in areas with high poverty and populations

- International rainforest concern

- Central America

  - 2% of original tropical seasonal forest left

  - Only about 1% of this is protected



# Sources

MacDonald, Glen. Biogeography: introduction to space, time and life.  
New York: Lehigh Press, 2003.

Withgott, Jay H. and Scott Brennan. Environment: The science behind  
the stories. San Francisco: Benjamin Cummings, 2007.

# BIOGEOGRAPHY 310

## BIOMES

---

*UI*



## Tundra

**Barren, Desolate, Cold**

*Given: 28 Oct 08*

By: Luke Reardon



# OVERVIEW



Det 905 WSU/UI

- Location
- Climate
- Biome Differences in Biodiversity
- Vegetation and Key Species
- Natural Disturbances
- Human Impact
- Resources
- Summary

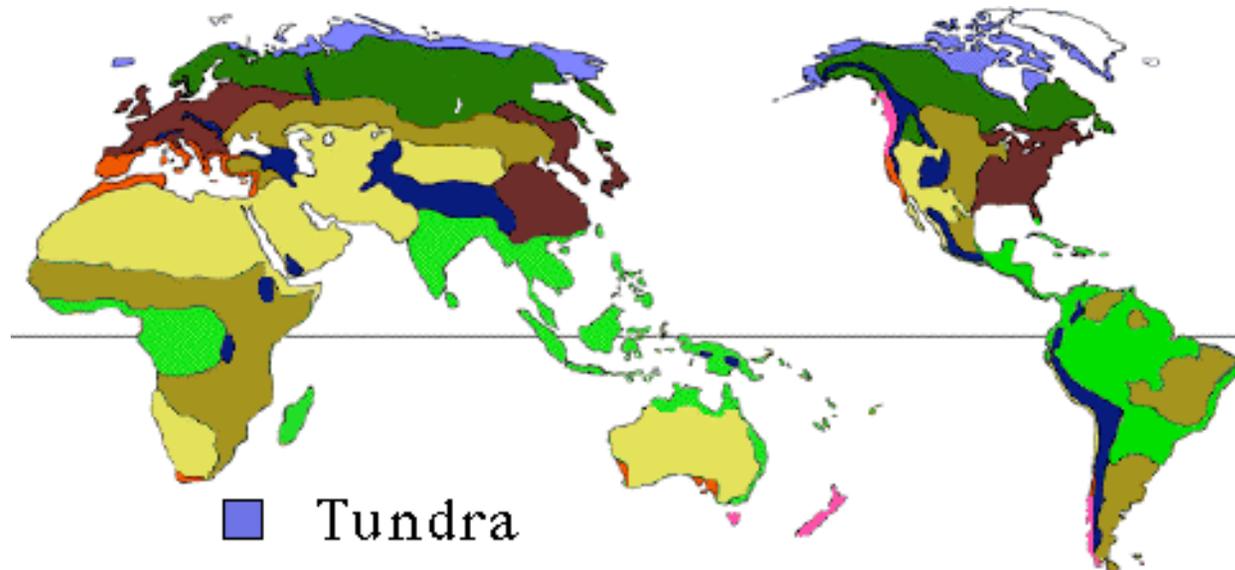


# LOCATION



Det 905 WSU/UI

➤ Where is **Tundra** located?





# TUNDRA CLIMATE

FINNISH FOR 'TREELESS PLAIN'



Det 905 WSU/UI

## ➤ How **cold** is the tundra?

- Average Temperature: **10 F to 20° F**
- Coldest region of the world
- Even the sea freezes
- Less than 10 inches precip/yr (little moisture)
- Short Summer: 2.5 months (May – July)
- Reaches high of **50° F**

<http://www.ucmp.berkeley.edu/exhibits/biomes/tundra.php>



# BIODIVERSITY DIFFERENCES



Det 905 WSU/UI

## ➤ Permafrost:

- Layer below the shallow soil which may thaw just long enough to support vegetation

- Far northern extent limits intensity of insolation and degree of heating days





# VEGETATION AND KEY SPECIES



Det 905 WSU/UI

## ➤ Vegetation:

- low shrubs, sedges, reindeer mosses, liverworts, and grasses
- 400 varieties of flowers
- lichen
- **Simple structure species** limited by
  - Short growing season
  - Shallow roots
  - Low precipitation/drainage
  - Scarce nutrients





# VEGETATION AND KEY SPECIES



Det 905 WSU/UI

## ➤ Fauna:

- Lemmings, caribou, hares
- Foxes, wolves, polar bears
- Pikas, marmots, sheep



## ➤ Key Species:

- **Lichen**: only plant to Cover rocks
- **Lemmings**: prey for carnivores, study to show how it affects vegetation



# NATURAL/UNNATURAL DISTURBANCES



Det 905 WSU/UI

- Many types of **Natural Disturbance**:
  - fires, beach erosion, wind and ice storms, disease, overgrazing, insect outbreaks, avalanches
- Human Impact on Tundra:
  - Drilling for oil and compaction
  - Mining coal, natural gas, minerals
  - Oil spills



Tundra is VERY fragile and sensitive to Humans



# RESOURCES



Det 905 WSU/UI

- [http://www.google.com/imgres?imgurl=http://www.firstpeople.us/pictures/bear/Polar\\_Bears/1600x12](http://www.google.com/imgres?imgurl=http://www.firstpeople.us/pictures/bear/Polar_Bears/1600x12)
- [http://www.windows.ucar.edu/tour/link=/earth/Life/images/biomes\\_lg\\_jpg\\_image.html](http://www.windows.ucar.edu/tour/link=/earth/Life/images/biomes_lg_jpg_image.html)
- <http://en.wikipedia.org/wiki/Tundra>
- <http://www.ucmp.berkeley.edu/exhibits/biomes/tundra.php>
- <http://science.jrank.org/pages/874/Biological-Community.html>
- <http://oncampus.richmond.edu/academics/education/projects/webunits/biomes/tundra.html>
- [http://209.85.173.104/search?q=cache:c0RtXwKYa\\_wJ:www.innovationsreport.de/html/berichte/umwelt\\_naturschutz/bericht-84808.html+key+species+in+tundra&hl=en&ct=clnk&cd=2&gl=us](http://209.85.173.104/search?q=cache:c0RtXwKYa_wJ:www.innovationsreport.de/html/berichte/umwelt_naturschutz/bericht-84808.html+key+species+in+tundra&hl=en&ct=clnk&cd=2&gl=us)
- [http://209.85.173.104/search?q=cache:kooNf17f\\_hoJ:www.tarleton.edu/~range/Tundra/tundra.htm+natural+disturbances+in+tundra&hl=en&ct=clnk&cd=1&gl=us](http://209.85.173.104/search?q=cache:kooNf17f_hoJ:www.tarleton.edu/~range/Tundra/tundra.htm+natural+disturbances+in+tundra&hl=en&ct=clnk&cd=1&gl=us)
- [http://farm1.static.flickr.com/29/99731420\\_9a8bdab18d.jpg?v=0](http://farm1.static.flickr.com/29/99731420_9a8bdab18d.jpg?v=0)



# SUMMARY



Det 905 WSU/UI

- Location
- Climate
- Biome Differences in Biodiversity
- Vegetation and Key Species
- Natural Disturbances
- Human Impact
- Resources



# WANT TO KNOW MORE...



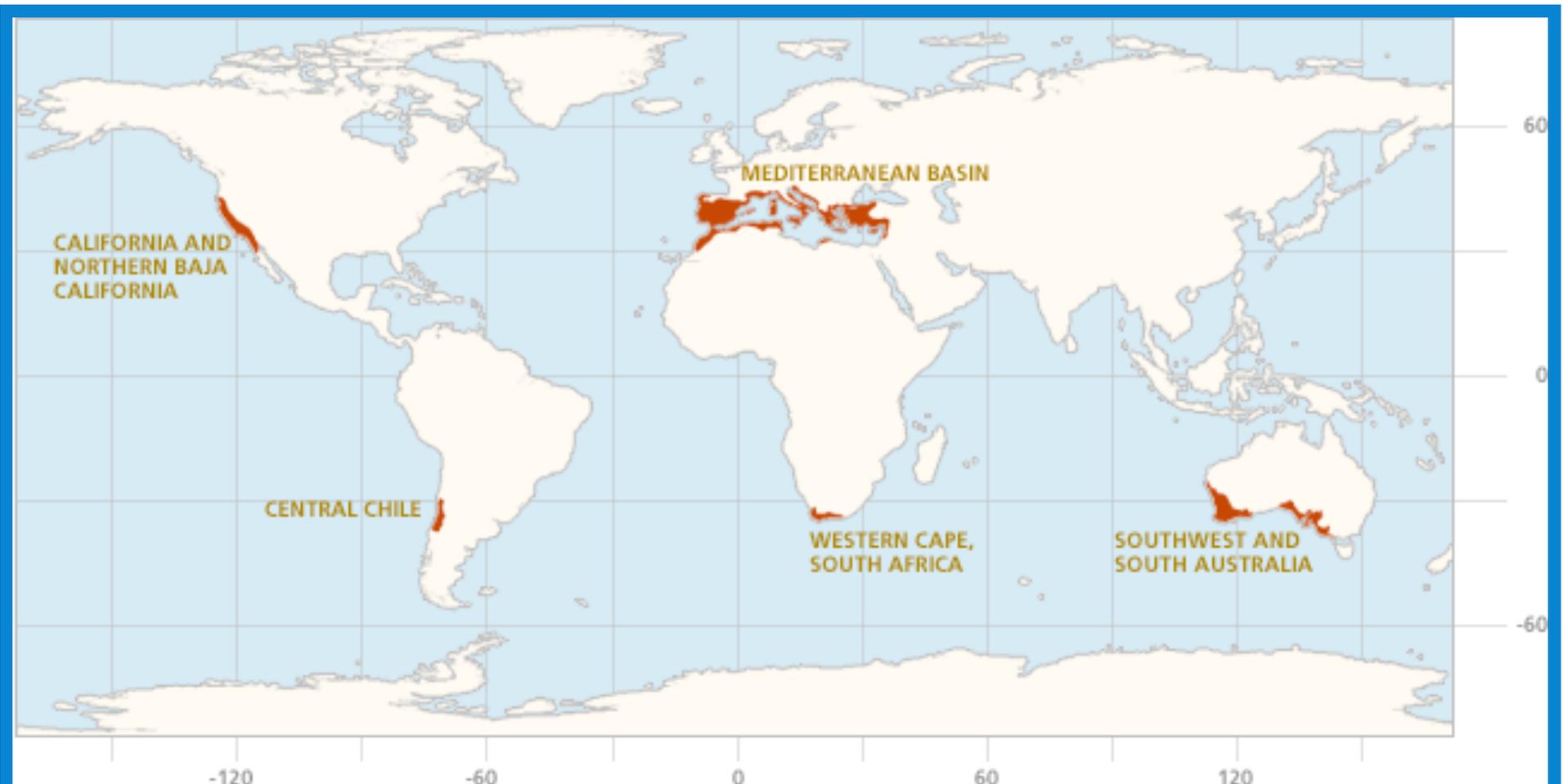
Det 905 WSU/UI



Visit: <http://www.ucmp.berkeley.edu/exhibits/biomes/tundra.php>

# Mediterranean

AKA the “Woodland” or “Chaparral” Biome



- Located roughly between  $30^{\circ}$  and  $40^{\circ}$  latitude usually on the west coasts of continents and
- Covers about 1.8 million  $\text{km}^2$  of land (less than 5% of earth's surface)
  - Found along the Mediterranean Sea, Southeast coast of Africa, Australia, and South America, and the coast of California

# Vegetation

- Most are Sclerophyllous (hard leaf) evergreens
- Leaf shape, size, and texture is strikingly similar among all the Mediterranean regions
  - Leathery leaf texture and shape seen in many unrelated families
  - Many of the plants will contain numerous volatile chemicals such as turpentine
    - chemicals deter herbivores
- Adapted to summer drought and cool moist winter
- Favored time of vegetation growth is spring
  - Moist soil and rising temperature
  - Bulbs (perennials)
  - Annuals
- Broken down into 5 floristic biomes subtypes
  - Mediterranean, Californian, Chilean, Capensis, and Australian

# Vegetation

- Mediterranean Flora
  - Mediterranean Basin
  - Most of the original woodland is gone
  - Comprised of 2 types
    - Marquis – Dense shrub formations
      - Evergreen shrubs
      - Small trees over 2m in height
    - Garrigue – more open healthy and aromatic shrubs
      - Shrubs between 2 and .6m in height

*Quercus ilex* (Holm's Oak)



[http://content.answers.com/main/content/wp/en-commons/thumb/5/54/250px-Quercus\\_ilex\\_rotundifolia.jpg](http://content.answers.com/main/content/wp/en-commons/thumb/5/54/250px-Quercus_ilex_rotundifolia.jpg)



# Vegetation

- Californian Flora - Chaparral
  - California coast
  - Geophytes – herbaceous plant with an underground storage organ
    - Bulbs, corms, tuberous roots
    - Capable of perennial life cycles
- Chilean Flora – Matorral
  - Chilean central coast
  - Woody Vegetation

*Escholtzia* (California poppy)



# Vegetation

- Caspian Flora - (AKA the South African Flora)
  - Fynbos – Healthy vegetation, few trees
    - Over 7,000 plant species
  - Veld – more shrubby vegetation
    - Tends to be more like an open field
- Australian Flora - Mallee
  - Australian Coast
  - Woody Vegetation



# Fauna

- Most animals are small
- Tend to be nocturnal
- Examples include
  - Jackrabbits, foxes, rattle snakes, kangaroo rats, and woodpeckers

Mediterranean Gecko - *Hemidactylus turcicus*



# Natural Disturbances

- Fire is a regular part of the ecology
  - 40 year cycle in South Africa
  - 10-25 year cycle in Mediterranean area
  - 10-13 year cycle in Australia
- Bark protection
  - Thick heavy bark
    - Like the cork tree
- New shoots from base roots or burls or lignotubers
- Serotinous cones
  - A case that requires heat from fire to open and release seed
- Heat stimulates geophytes to flower

# Human Influence

- The biggest threat to this biome is human development
  - Since this biome is located near coastal regions, where it tends to be warm, it's a prime living spot for people
    - Los Angeles and San Francisco As cities spread, all too often native plant and animal communities are replaced.
    - Exotic Invasive Species
  - Agricultural Development
    - Cork Oak (*Quercus suber*)
  - Fire control
    - Trying to control fires have lead to larger fires that burn over 100,000 ha



<http://www.marietta.edu/~biol/biomes/shrub.htm>



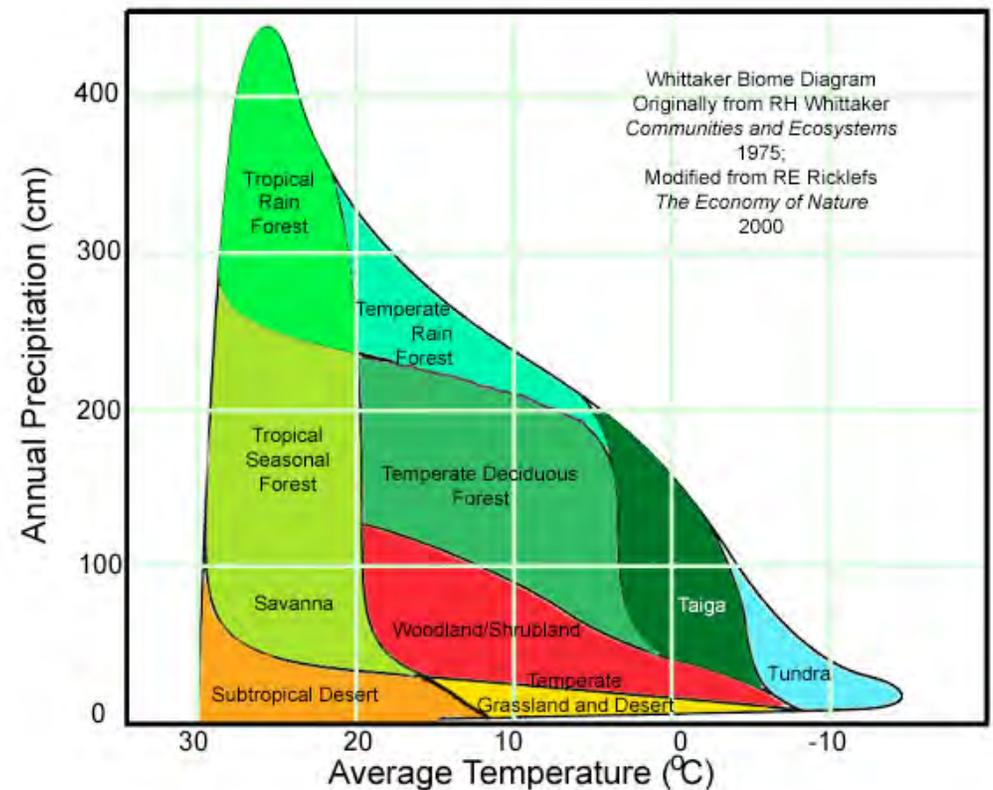
# Overview

- Considering how small of an area this biome covers on earth it is very high in diversity
- Soil Types
  - Mollisols and Alfisols
- Climate
  - Warm summers/Cool winters
  - Annual precipitation of 30-100cm
  - Temperature range of 15-20°C
- Vegetation
  - Fire Tolerant
  - Sclerophyllous (hard leaf) evergreens
  - Draught Tolerant
- Fauna
  - Small in size
  - Adapted to nocturnal life
  - Ground Squirrels

# Climate

- Climate

- Characterized as a Csa or Csb by the Köppen system
- Warm summers/Cool winters
- Annual precipitation of 30-100cm
- Average temperature range of 15-20°C



# Natural Disturbances

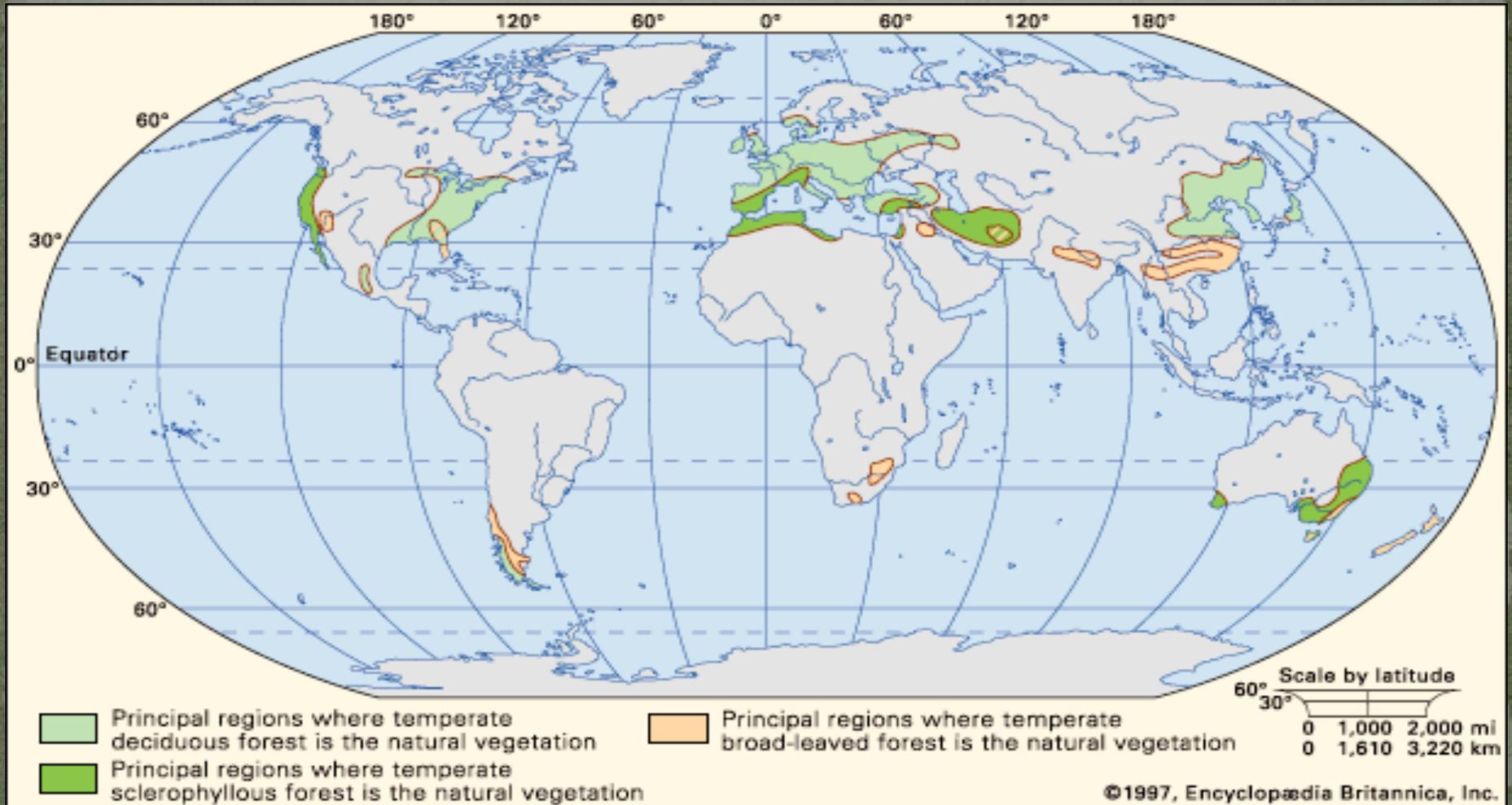
- Fire is a regular part of the ecology
  - 40 year cycle in South Africa
  - 10-25 year cycle in Mediterranean area
  - 10-13 year cycle in Australia
- Bark protection
  - Thick heavy bark
    - Like the cork tree
- New shoots from base roots or burls or lignotubers
- Serotinous cones
  - A case that requires heat from fire to open and release seed
- Heat stimulates geophytes to flower

# Overview

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# TEMPERATE FORESTS

By Taylor Smith



### Sources:

- MacDonald Text, pages: 171 - 176
- <http://www.ucmp.berkeley.edu/exhibits/biomes/forests.php>

Size: 7 Million sq km

### Distinguishing characteristics:

- Moderate climate
- Long growing season (140-200 days during 4-6 frost free months)
- Fertile soils
- Well defined seasons



- Very high biodiversity
  - Large number of different plant and animal species across the world.
- Climate:
  - Temp: from  $-30^{\circ}\text{C}$  to  $30^{\circ}\text{C}$
  - Precip: 50 cm – 250 cm

# Important plants and animals:

- Plants:

- Deciduous Trees (birch, maple, basswood, ash, elm, hickory)
- Conifers (pine, hemlock)
- Flowering shrubs, ferns, moss/lichens

- Animals:

- Herbivores (deer, elk, moose)
- Carnivores (wolves, mountain lion, fox)
- Omnivores (raccoons, bears)
- Birds (eagles, songbirds)



<http://www.vicrainforest.org/images/tyres3.jpg>

## Natural Disturbances:

- Fires
- Slides (avalanches and mud)

## Human Influence:

- Logging and reforestation
- Clearing for agriculture and settlement
- Roads

# Coniferous Boreal and Montane Forests



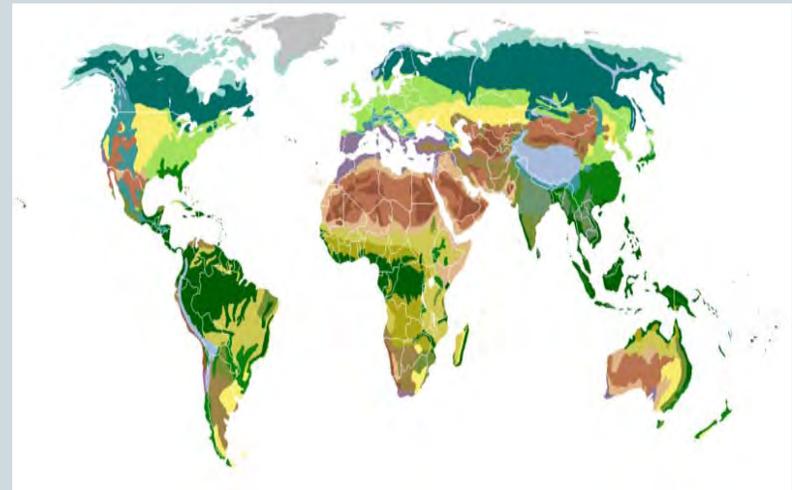
A REPORT BY DYLAN WELLNER

# Location, Size, Distinguishing features

- Occurs only in northern hemisphere due to lack of land at 60 degrees south latitude.
- Boreal Forest Centered on 60 degrees north latitude band extending from Norway to pacific coast of Russia in Eurasia , in North America from coastal Alaska to the island of Newfoundland.
- Montane forest extends down from the Rocky Mtns. into the highlands of Mexico, also found at the higher portions of the Appalachian Mtns. In the east and in the Himalayas and alps in Eurasia.
- The Total area of this biome is 12 to 15 million square kilometers.
- The largest conterminous forest in the western hemisphere, constituting 25-33% of all forest cover on the planet.



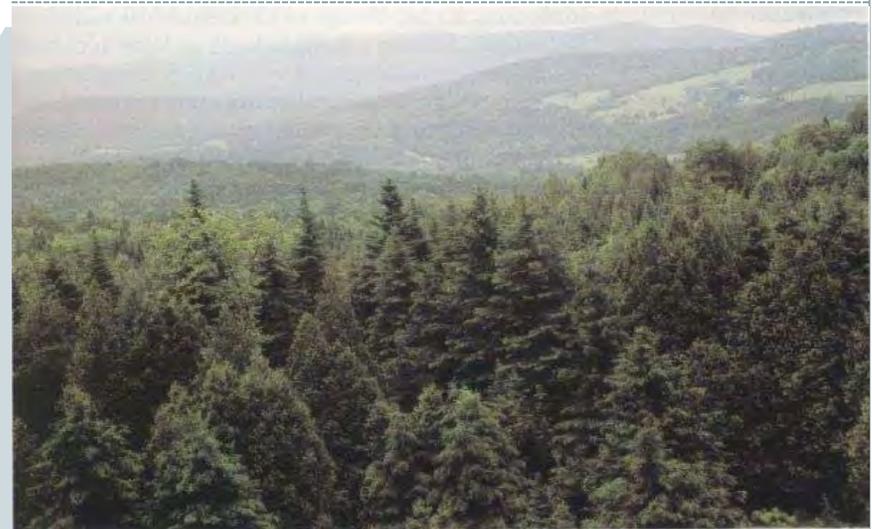
[http://www.marietta.edu/~biol/biomes/images/taiga/taiga\\_500.jpg](http://www.marietta.edu/~biol/biomes/images/taiga/taiga_500.jpg)



<http://upload.wikimedia.org/wikipedia/commons/7/7b/Vegetation-no-legend.PNG>

# Vegetation appearance and plant species

- In North America and Europe evergreen tree species of the genera pine, spruce and fir are dominant because the shedding of leaves is not always needed in regions for this temperature, but it varies, in Siberia there are deciduous (conifer) trees that shed their leaves in the winter.
- There is acidic needle cover and dense shade there is little understory and there are no herb species.
- It is interesting to note that not all the understory of this forest is not of the dominant tree species, but it does consist of shrub types such as Junipers, Deciduous willow shrubs as well as alder and birch shrub.



[www.paulnoll.com/Oregon/Birds/ecology-northern-coniferous.jpg](http://www.paulnoll.com/Oregon/Birds/ecology-northern-coniferous.jpg)&imgrefurl=<http://www.paulnoll.com/Oregon/Birds/ecology-northern-coniferous.html>



[www.borealforest.org/world/trees/siberian\\_larch.jpg](http://www.borealforest.org/world/trees/siberian_larch.jpg)&imgrefurl=[http://www.borealforest.org/world/trees/siberian\\_larch.htm&h=250&w=160&sz=17&hl=en&start=6&um=1&usg=\\_\\_ksH4HdRyVoYrT0NPg6CPMy7PD2c=&tbnid=OfgJxgPoERAjxM:&tbnh=111&tbnw=71&prev=/images%3Fq%3Dsiberian%2Blarch%26um%3D1%26hl%3Den%26safe%3Doff%26rlz%3D1B3DVFC\\_enUS240US242%26sa%3DG](http://www.borealforest.org/world/trees/siberian_larch.htm&h=250&w=160&sz=17&hl=en&start=6&um=1&usg=__ksH4HdRyVoYrT0NPg6CPMy7PD2c=&tbnid=OfgJxgPoERAjxM:&tbnh=111&tbnw=71&prev=/images%3Fq%3Dsiberian%2Blarch%26um%3D1%26hl%3Den%26safe%3Doff%26rlz%3D1B3DVFC_enUS240US242%26sa%3DG)

# Biodiversity and Climate



- When I researched the biodiversity of the boreal forest I came across an article that stated there was over 20,000 species living in the Boreal Forests in Finland alone so I Imagine/assume that the biodiversity of the Boreal and Montane Forests is high. (  
<http://www.environment.fi/default.asp?contentid=27235&lan=en>)
- The climate for this biome consists of a mean annual temperature between 5 degrees celcius and -5 degrees celcius with a mean annual precipitation of 20 to 200 cm.
- Precip lowest in boreal portions of this biome, mild summers with July temps of 10 to 20 degrees celsius with winters as cold as -50 degrees celsius with regionally variable distribution of seasonal precip, greatest in Alaska during summer while Scandinavia highest in winter.

# Natural disturbance and human influence

- Fire is most common type of disturbance for biome along with wind insects and permafrost. 90% of area in Boreal and Montane forest burned by fires are started by lightning storms.
- Average fire frequency depends on location: Low elevation pines in South west US have dry summers and frequent lightning storms with ground fires occurring every few years, In northern treeline of the Boreal Forest have cool temperatures and retains moisture fire occurs in thousands of years, In central Boreal Forest with bodies of water and sharp topography might not burn for 400 years.
- Human influence varies from region to region, but in Canada particularly there are logging concerns because 0.7 to 0.8 million hectares of land are harvested each year for timber. Nepal has increased rates of deforestation due to increased demand for fuel wood. Fire management in Canada and US has led to build up of fuels and thus an increase in larger fires.



[www.nwri.ca/threats2full/images/ch8-forestfire.jpg](http://www.nwri.ca/threats2full/images/ch8-forestfire.jpg)



[www.greenpeace.org/raw/image\\_big\\_teaser/canada/en/photos-and-video/latest/this-forest-has-been-clearcut.jpg](http://www.greenpeace.org/raw/image_big_teaser/canada/en/photos-and-video/latest/this-forest-has-been-clearcut.jpg)