

Lecture 3

Forests of the World (I)

What is a Forest?



A forest is a vegetative community dominated by trees and other woody perennials.



What Is a Tree?

A perennial woody plant characterized by one main stem or trunk bearing a more or less distinct and elevated crown of branches. Trees are generally larger than shrubs (six metres).

The World's Oldest Living Thing

bristle cone pine

(*Pinus longaeva* and *P. aristata*)



May be close to 5,000 years old.

The World's Greatest Living Things



Sequoia sempervirens
(Coast redwood)
(Height 112 m)

www.netstate.com/states/symb/trees/ca_redwood.htm



www.popestrees.com/page3.htm



Eucalyptus regnans
(Mountain ash, Swamp gum)
(Height 96.5 m ?)

Trees Fall Into Two Main Groups

Angiosperms

- Enclosed seeds, flowering plants.

- **Gymnosperms**

- Naked seed plants, or cone bearers (conifers).

Gymnosperms

- **Appeared about 350-370 million years ago**
- **Conifers:**
 - Usually have needles. Exception?
 - The maiden hair tree (*Ginkgo biloba*)
- **Softwoods:**
 - Relatively low specific gravities and longer fibres.
 - Mainly evergreen. Exception?



Larch (*Larix* spp.)



www.bentler.us/eastern-washington/plants/trees/western-larch-tree-fall.jpg

www.nwridgeback.com/uploaded_images/larch-778147.jpg

Angiosperms

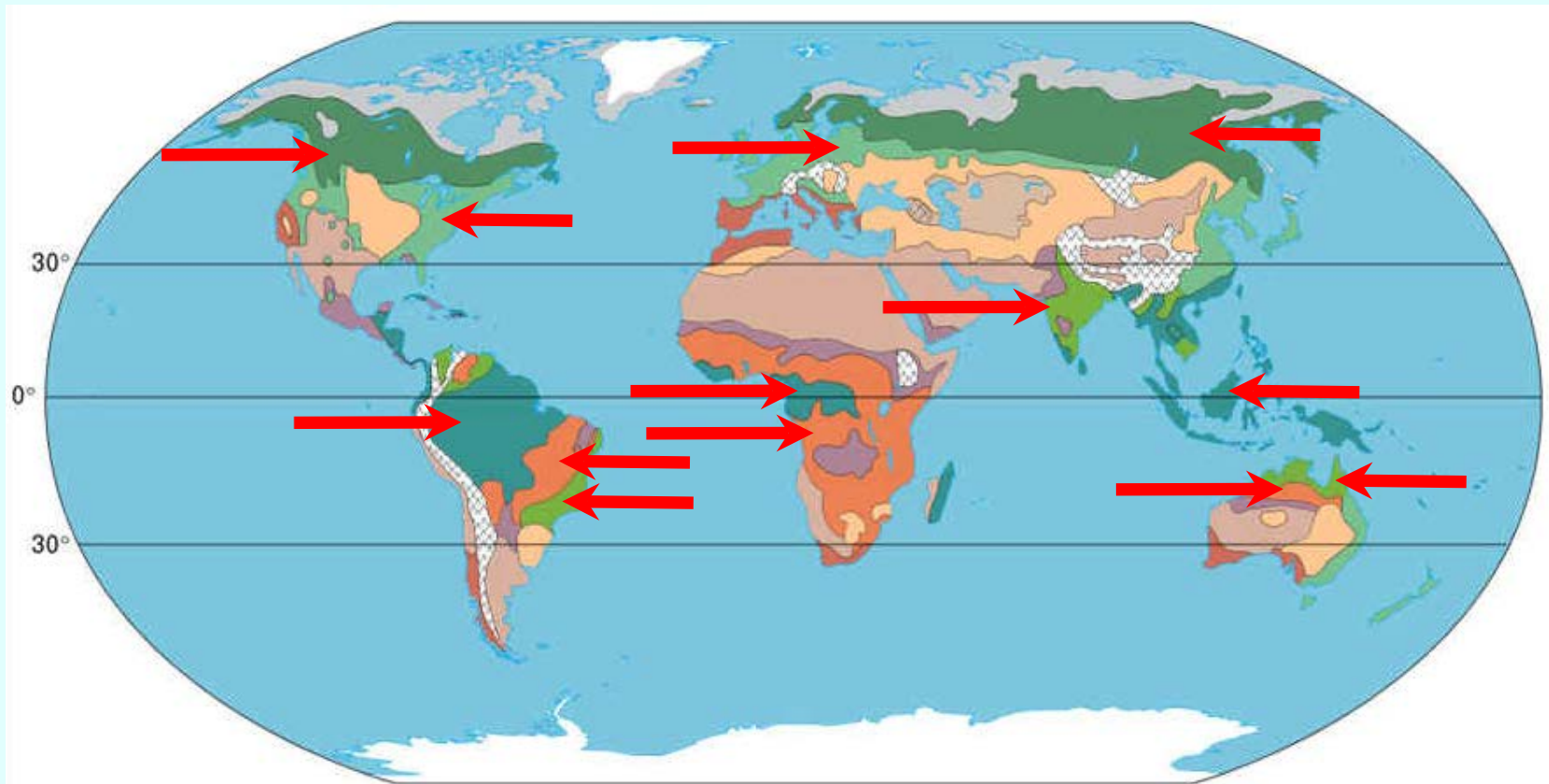
- **Appeared about 125 million years ago.**
- **Broadleaved trees**
- **Relatively harder woods (higher specific gravity) and shorter fibres.**
- **Some deciduous but may exceptions.**

Arbutus (Arbutus menzeissii)



Where are the Forests?

The Worlds Major Forest Biomes



□ Polar ice cap

□ Tundra

■ Boreal forest (taiga)

■ Temperate forest

■ Mediterranean scrub and woodland

■ Grassland

■ Desert

■ Tropical rainforest

■ Tropical seasonal forest

■ Savanna

■ Tropical thorn scrub and woodland

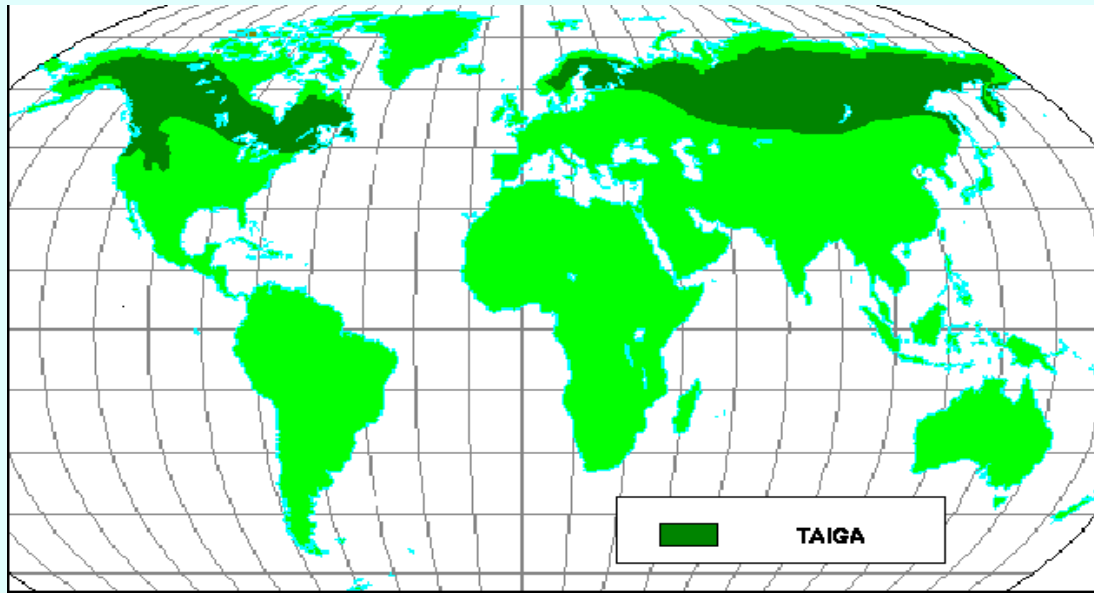
■ Mountain

The World's Major Forest Biomes

Temperate forests account for 44 percent of the world's forest area and tropical and subtropical forests 56%.

**Plantations – both temperate and tropical –
comprise about 7 percent of all forests
-produce about 35% of world roundwood**

Boreal Forest Biome



The boreal forest biome, which is also known as the “taiga”, occupies a broad belt around the globe in the northern hemisphere south of the arctic tundra

Boreal Forest Biome



Images courtesy of
Bart van der Kamp

Boreal Forest Biome



Boreal Forest Biome

- Boreal forests are characterized by long severe winters and short cool summers with only 50-100 frost free days. Precipitation is low (400-500 mm.) falling largely as snow. however, available soil moisture is high.
- How much rainfall does Vancouver get?
 - About 1100 mm

Boreal Forest Biome

- Bogs (muskeg) are common in poorly drained glacial depressions typified by sphagnum moss and ericaceous shrubs.
- Why are bogs poorly drained?
 - Flat
 - Impervious bedrock

Boreal Forest Biome

- Breakdown of organic matter and nutrient release is slow and the forest floor is covered by deep organic litter.
 - Over 80% of above ground nitrogen is found in forest floor forest floor litter.

Boreal Forest Biome

Stands in the boreal are also fairly uniform in terms of age (large areas of even-aged forest), height and diameter distribution.



Catastrophic Disturbances



Photo - John McColgan BLM Alaska Fire Service

(Source: McColgan, 2005)

Boreal Forest Biome

A number of features make boreal forests important from a commercial perspective.

- **mainly coniferous species**
- **few genera and species.**

Boreal Forest Biome

- spruce (*Picea*), pine (*Pinus*) and fir (*Abies*) and larch (*Larix*). Species vary with geographical location.
- The European boreal has fewer species than the N. American.
- In the extreme continental climate of Siberia larch dominates.

Boreal Forest Biome

Disadvantages of the boreal from a commercial perspective include:

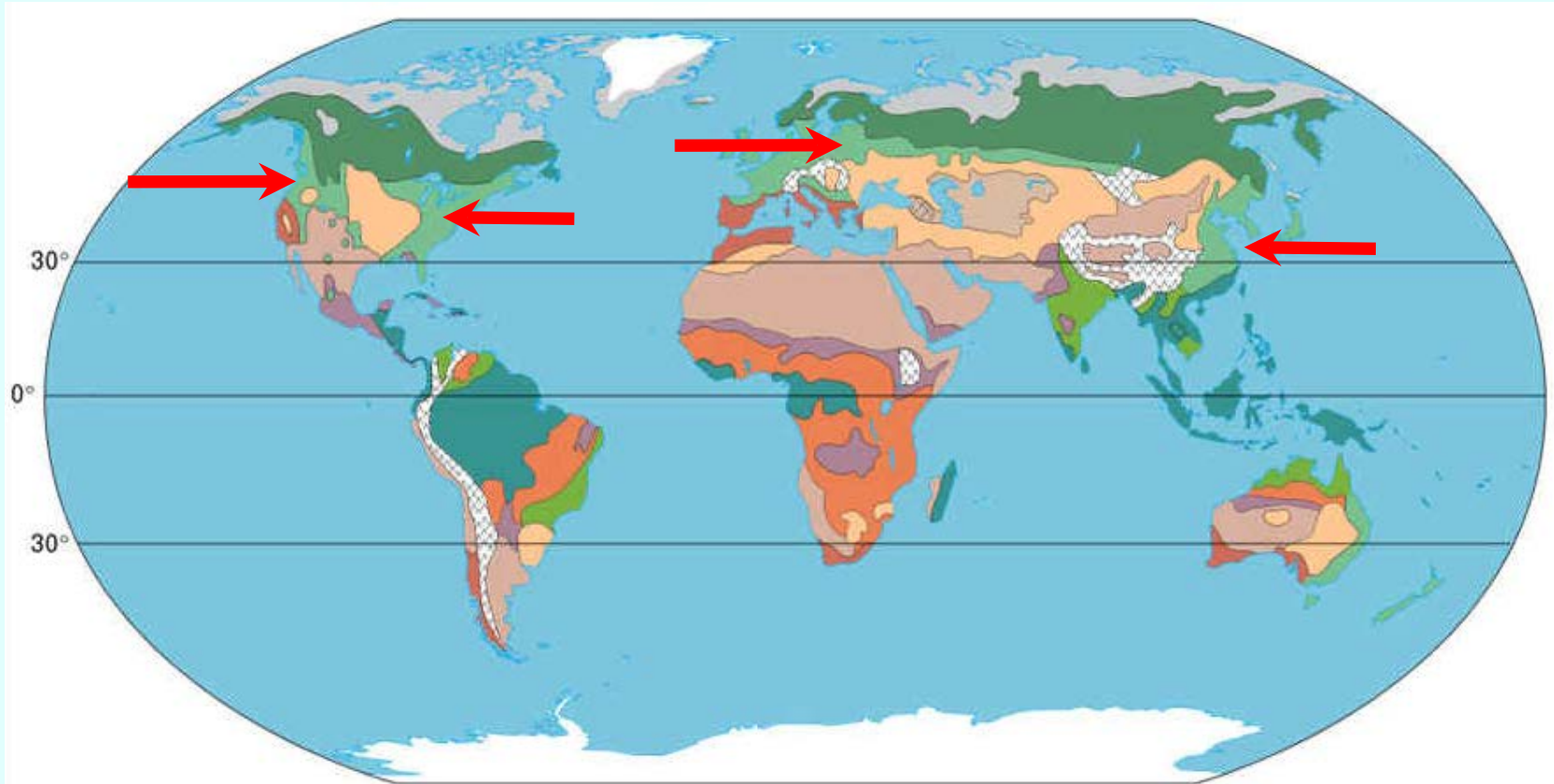
- **relatively low merchantable volumes per hectare;**
- **low growth rates (1-1.5 m³/ha/annum) resulting in very long rotations;**
- **inhospitable climate;**
-

Boreal Forest Biome

More disadvantages:

- **difficult access in many parts of the zone, remote and poor infrastructure;**
- **ground conditions that limit access and harvesting over long periods of the year.**

The Worlds Major Forest Biomes



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■ Mountain

Near Vancouver



Temperate Forest Biome

- These forests mainly occupy the temperate latitudes of the northern hemisphere. They comprise a broad band around the globe south of the boreal.
- Three major regions are western and central Europe, east Asia and eastern N. America.
- ALSO a smaller area in western N. America (including BC)
- There is small representation in the southern hemisphere – S. Chile and Argentina for example.



Argentina

Temperate Forest Biome

- **Precipitation is higher than the boreal (700-1500mm)**
The growing season is longer than in the boreal (200 days or more)

The Temperate Biome

- The dominant plant species are broadleaved deciduous trees but species composition varies from pure hardwoods through mixed forests to pure conifer.
- Where coniferous components exist they can be very valuable commercially (for example coastal BC and the US Pacific Northwest and the eastern white pine (*Pinus strobus*) associations of eastern Canada and the United States.

Pinus strobus



Temperate Mixed Biome

- Forests are more complex than boreal forests in terms of species composition and structure - uneven aged in many cases with multiple canopy and vegetation layers.
- Nutrient cycling is more rapid than in the boreal and more nutrients are stored in biomass.
- Why?
 - warmer

Temperate Forest Biome

- Forests are more complex than boreal forests in terms of species composition and structure - uneven aged in many cases with multiple canopy and vegetation layers.
- Nutrient cycling is more rapid than in the boreal and more nutrients are stored in biomass.
- European forests are less species diverse than their N.American counterparts
 - Species include a broad spectrum of temperate hardwoods: oaks (*Quercus* spp.); elm (*Ulmus* spp.); ash (*Fraxinus* species); beech (*Fagus* spp.) lime or basswood (*Tilia* species), maples (*Acer* spp.)

Temperate Forest Biome

- **Commercial productivity is higher than the boreal averaging 4-5m³/ha/annum but has been increased considerably in many areas through forest management.**
- **This is the area occupied by the world's industrialized nations. In Asia and Europe most of the forest has been cleared for agriculture and urban infrastructure.**
- **In all areas there is a long history of exploitation for commercial timber.**

Temperate Forest Biome

There is virtually no primary forests remaining in the temperate mixed forest zone.

- China's forests have been cleared for intensive agriculture for over 4000 years.**
- Europe's forests have 2000 year history of exploitation are confined to relatively small areas of secondary forest.**
- Japan's forests are largely second-growth or plantations. In the mountains of Korea some intact forests remain.**

Temperate Forest Biome

- **This is the zone in which the practice of forest management developed and where forestry as a profession had its roots.**
- **In the industrialized countries of the zone the consumption of industrial forest products is very high.**
- **Although in western Europe all forests are secondary and total areas are low, the forests are intensively managed and production of roundwood is high.**
- **Plantations, both exotic and indigenous, are of growing importance in the temperate mixed forest zone particularly in Europe.**

