

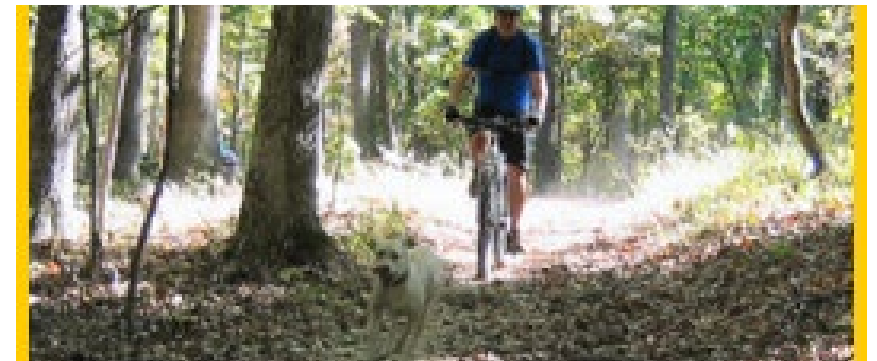
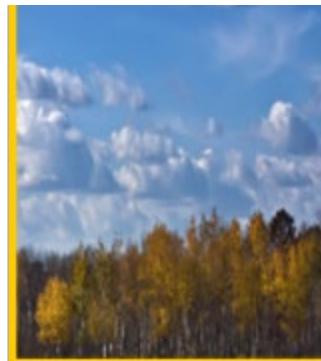
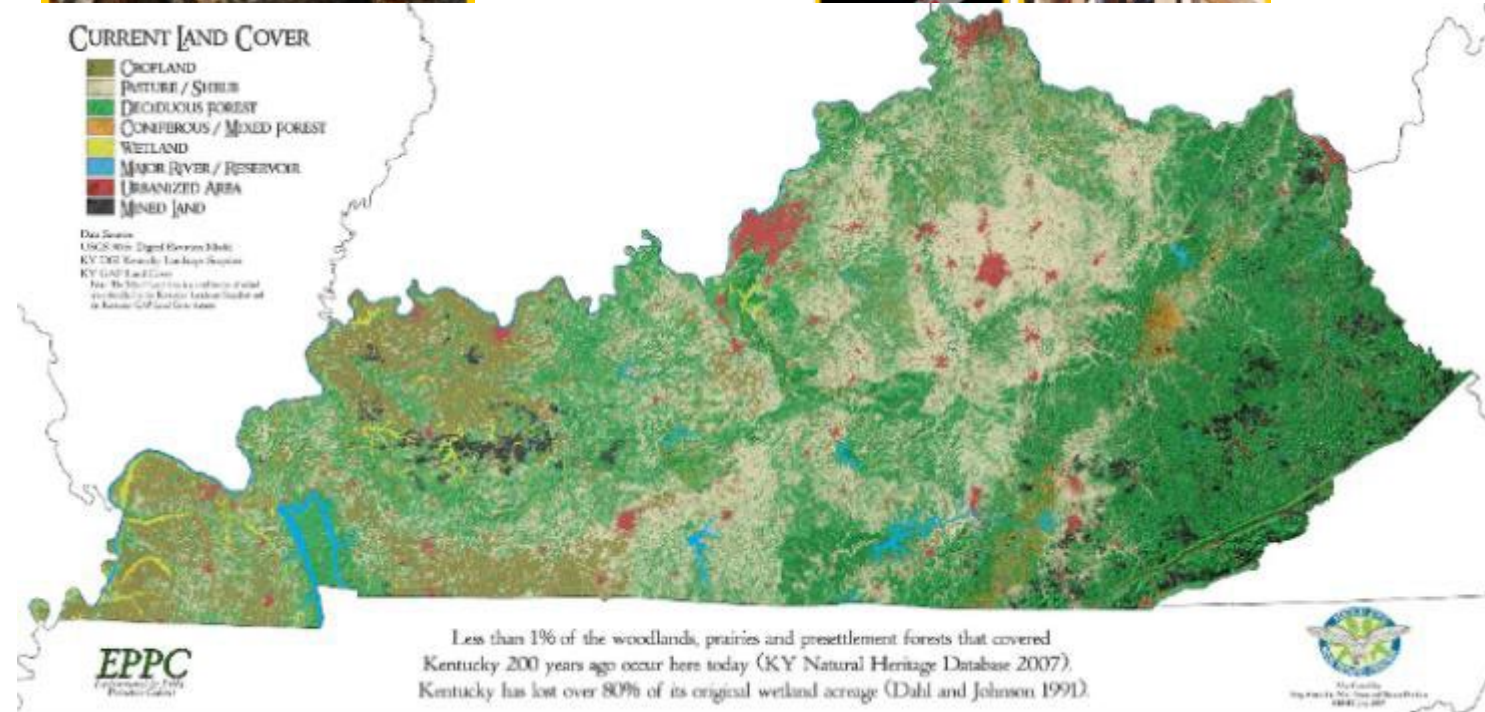
Kentucky Envirothon

Forestry

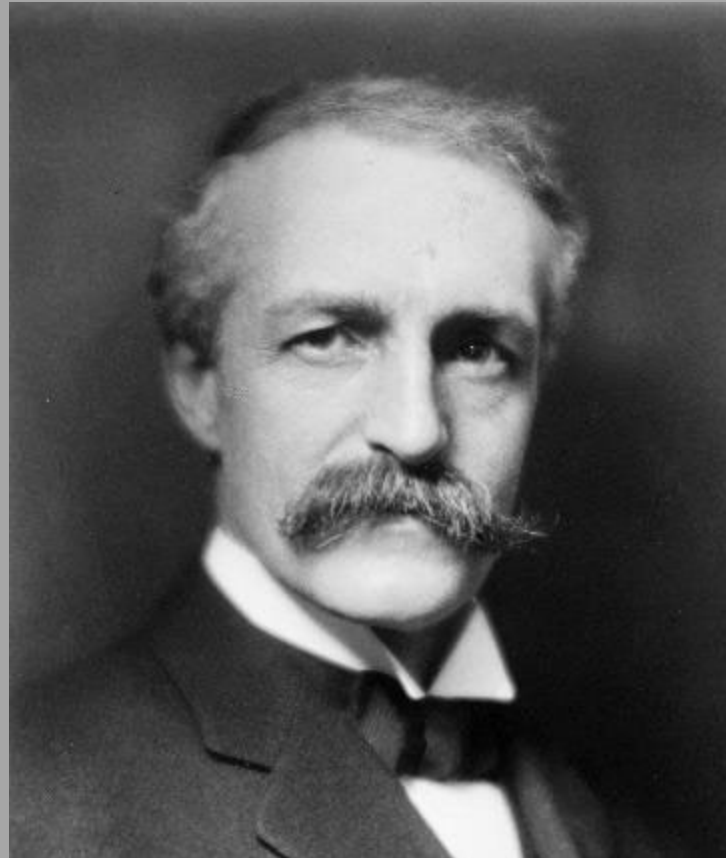
2024

Kentucky's Forests

- Almost 50% of the state is forested
 - 12.4 million acres
 - 80% owned by individuals
- More than 120 different tree species
- Use CO₂ and give us O₂ – clean air
 - Photosynthesis
 - (carbon + water + light energy → sugar + oxygen)
- Clean Water – prevent soil erosion
- Habitat for wildlife
- Recreation
- Products – thousands!



Quick History of Forestry in U.S.



- Germany is where the field of Forestry originated
- Biltmore Estate / Ashville, North Carolina – Cradle of Forestry
- First Forester in U.S. - Gifford Pinchot
- First Head of United States Forest Service – Gifford Pinchot (1895)

A Tree

- What is a tree?
 - A tree is a woody plant that usually has a single stem or trunk and grows at least 20 feet tall.
- What are the parts of a tree?
 - Roots, trunk (bole), crown
- The parts of tree trunk
 - Bark
 - Phloem (inner bark)
 - Cambium
 - Xylem (sapwood)
 - Heartwood
 - Pith
- How the Tree Grows (Meristematic Zones)
 - Apical meristems (branch & root tips)
 - Vascular cambium (trunk)

THE PARTS OF A TREE



Outer bark
Protects inner tissue

ROOTS



Taproot

Phloem
Conducts food down tree to roots

How Trees Regenerate

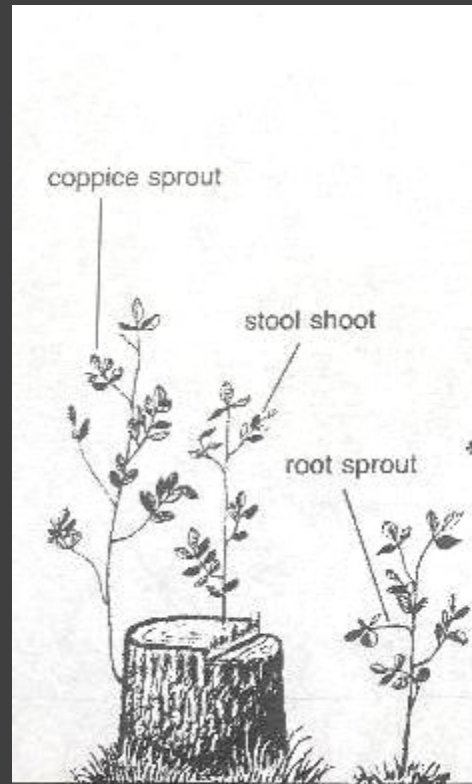
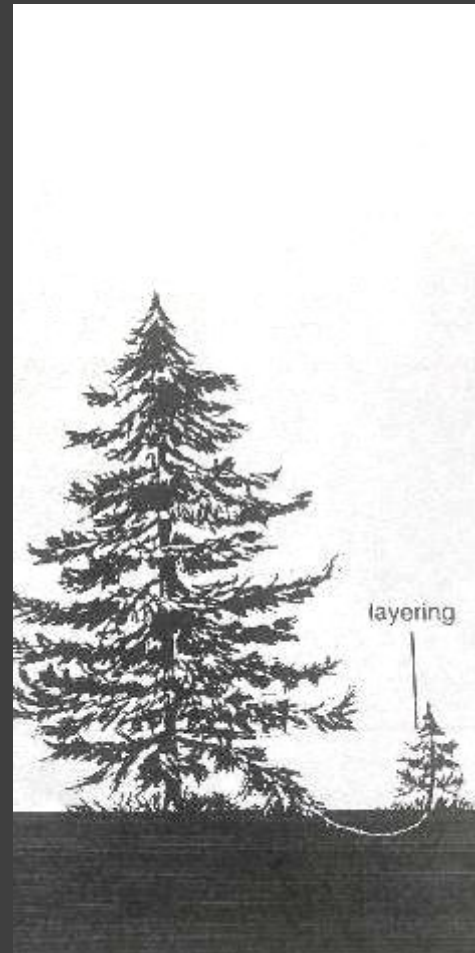


Fig. 9



- **Natural Reproduction**
 - Seeds
 - Sprouting (coppice sprout, stool/stump sprout, root sprout)
 - Layering

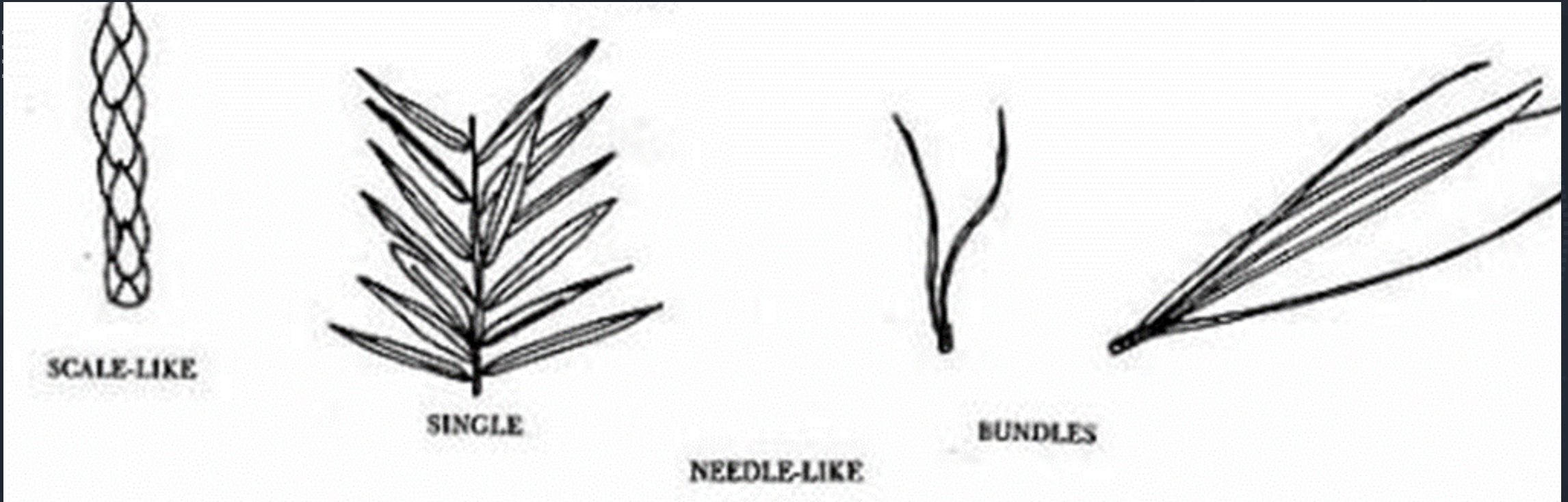


How Trees are Classified

- **Two major divisions**
 - **Conifers – cone bearing, usually evergreen**
 - Typically have needle-like or scale-like leaves
 - Leaves usually stay on tree 2 to 3 years
 - About 10% of Kentucky's trees are conifers
 - **Broadleaved – flower bearing, usually deciduous**
 - About 90% of Kentucky's trees are broadleaved

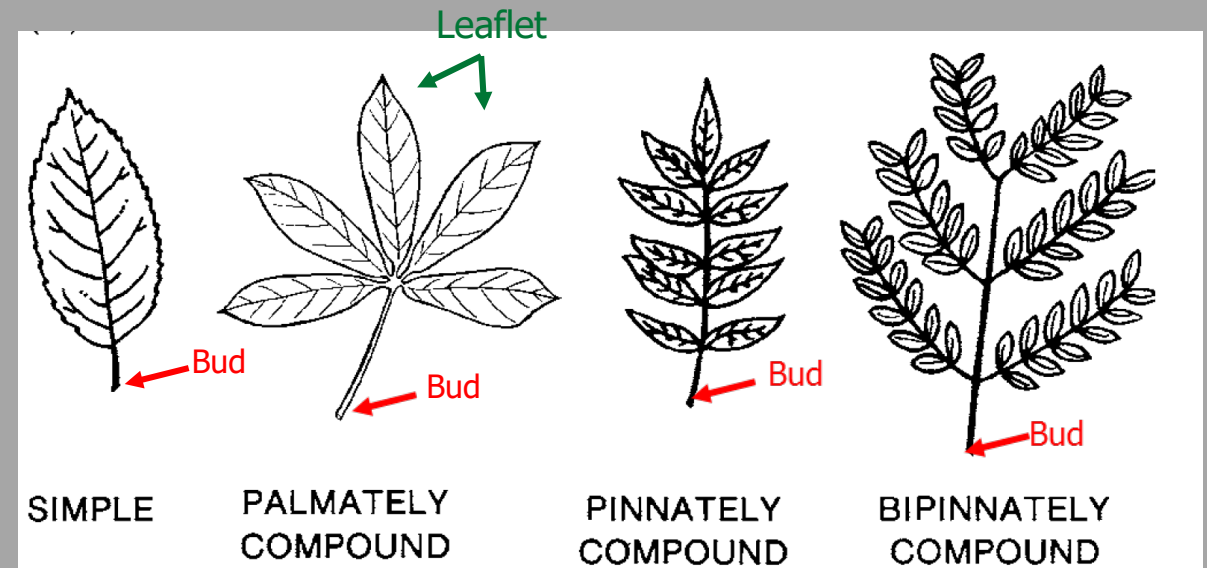
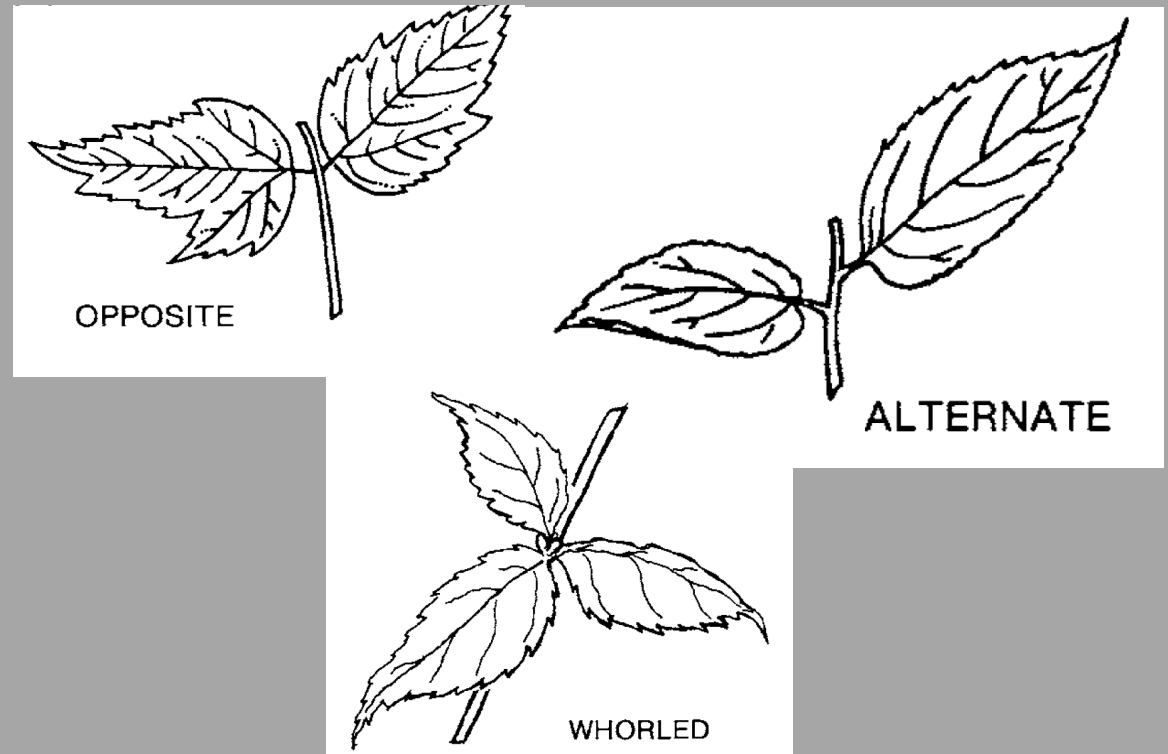
Identifying Conifers

- Leaf Characteristics
- Conifers
 - Needles – number of needles per fascicle, length
 - Scale-like needles – eastern redcedar or northern white cedar (in Kentucky)



Identifying Broadleaved Trees

- Broadleaved
 - Leaf arrangement (opposite or alternate or whorled)
 - Opposite: leaves occur opposite one another in pairs on twig
 - In KY, 4 groups of trees have opposite leaf arrangement
 - Maples, Ashes, Dogwoods and Buckeyes (MADBuck)
 - Alternate: leaves occur staggered on the twig
 - Whorled: several leaves come out circling the twig (Northern Catalpa)
 - Leaf Form / Composition (simple or compound)
 - Simple – only 1 blade per leaf stem
 - Compound (pinnately compound/palmately compound) – multiple leaflets per leaf stem



Forest Ecology and Ecosystems

Ecology is the study of the interactions between organisms and their environment.

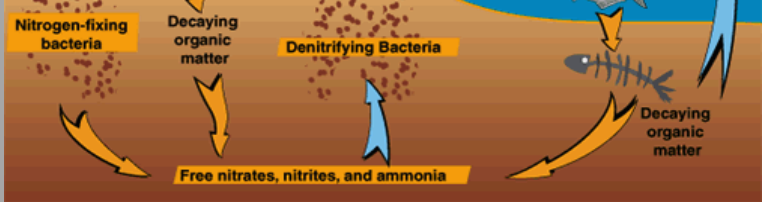
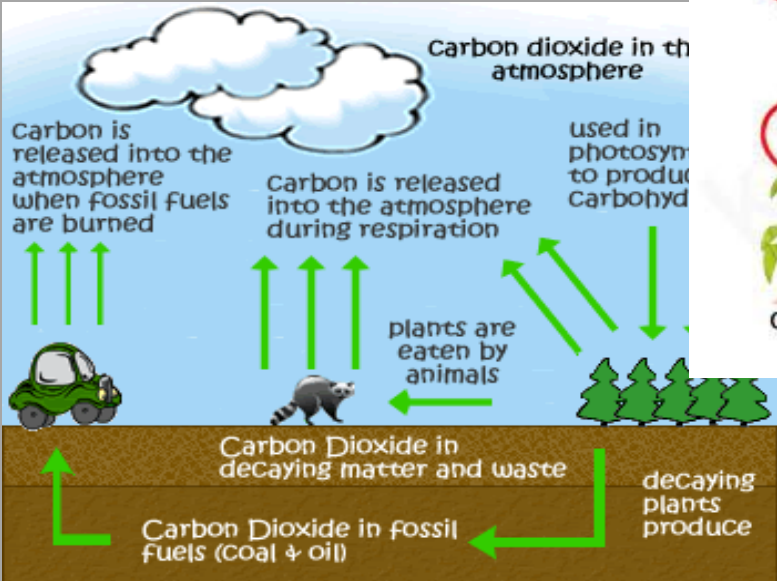
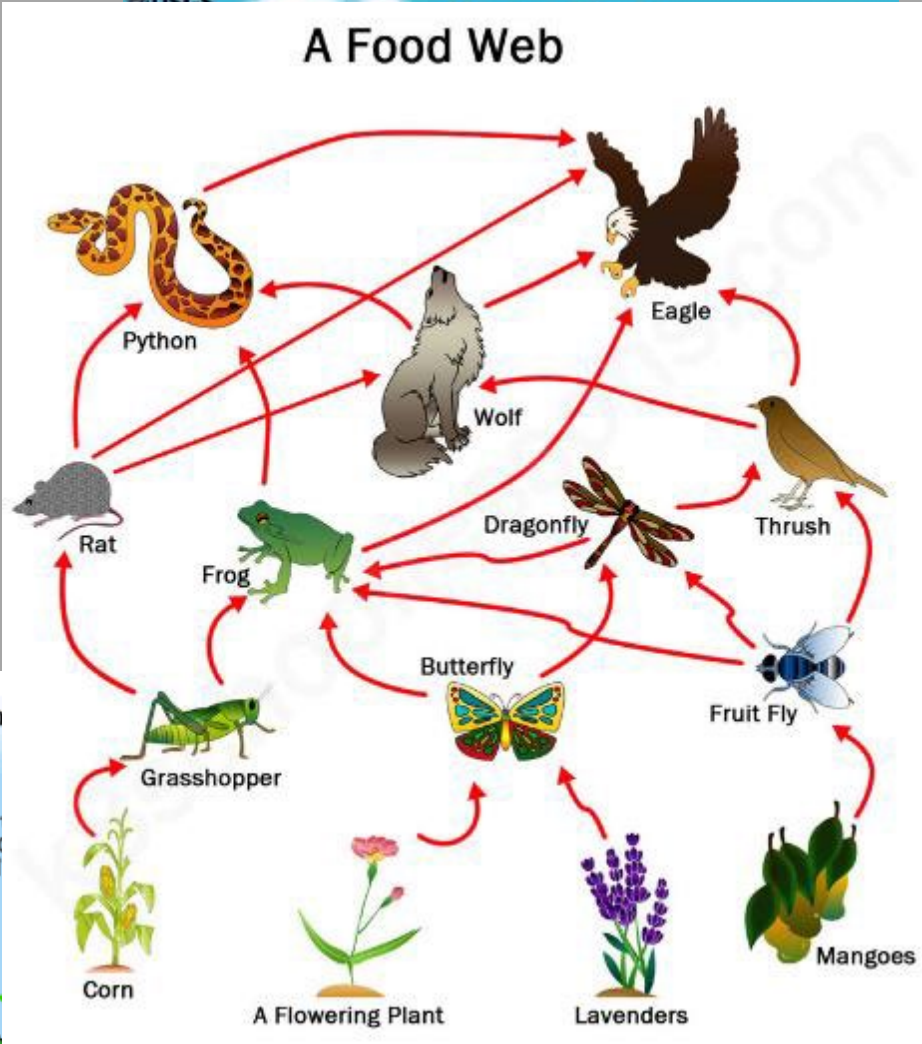
An ecosystem is an environment where different plants and animals interact (biotic) with other and with other parts of nature (abiotic).

Biotic – means living or have lived (ex. tree)

Abiotic – means non-living (ex. rock)

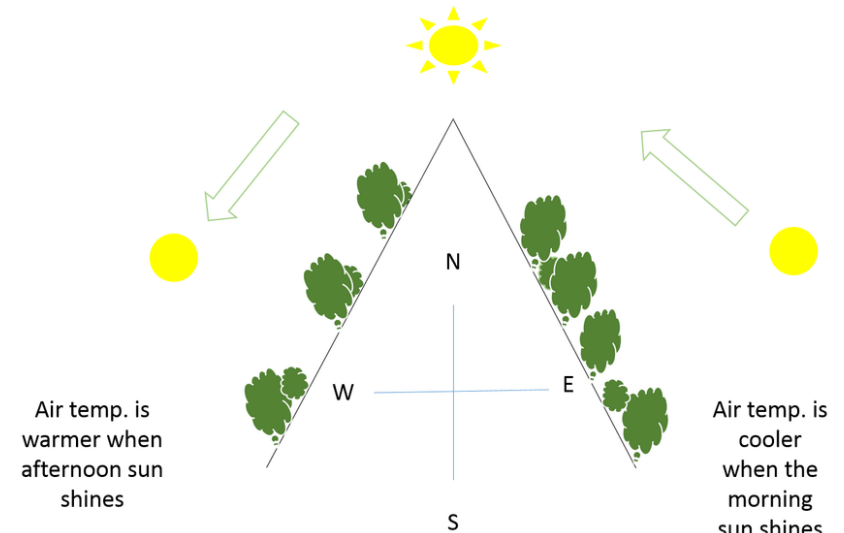
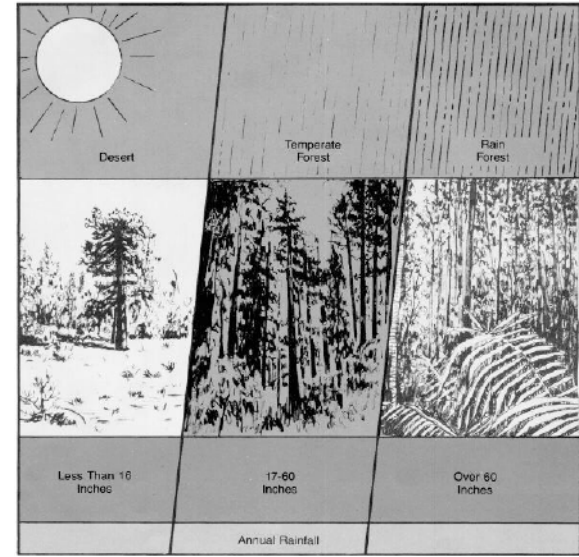
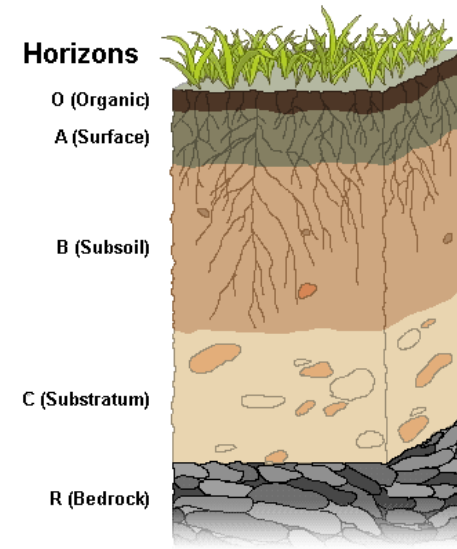
Food Chains/Webs

Cycles

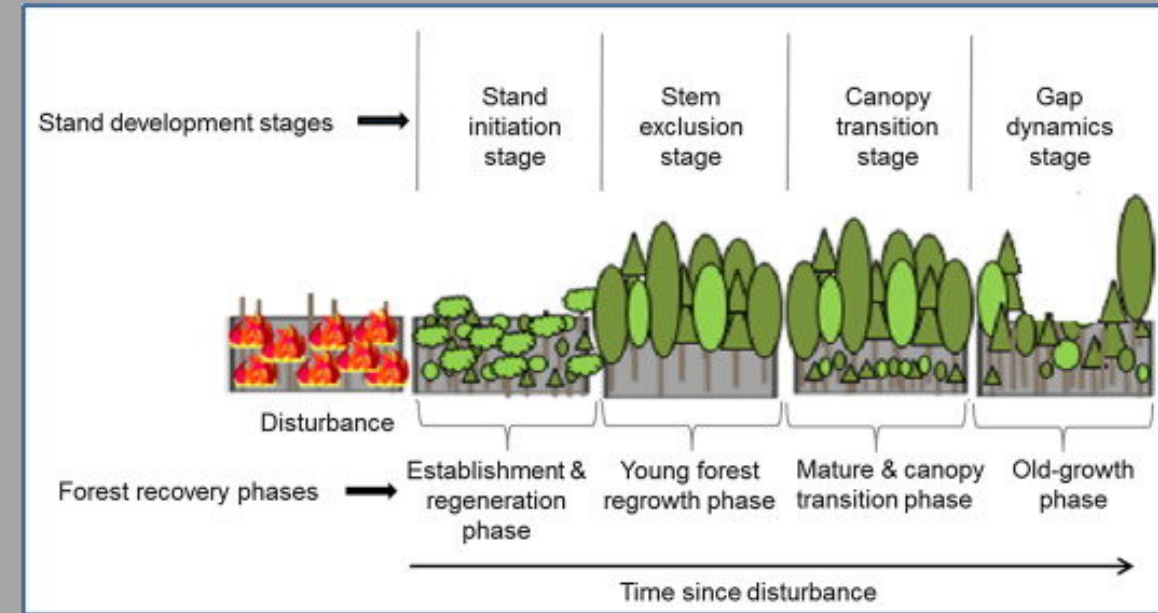
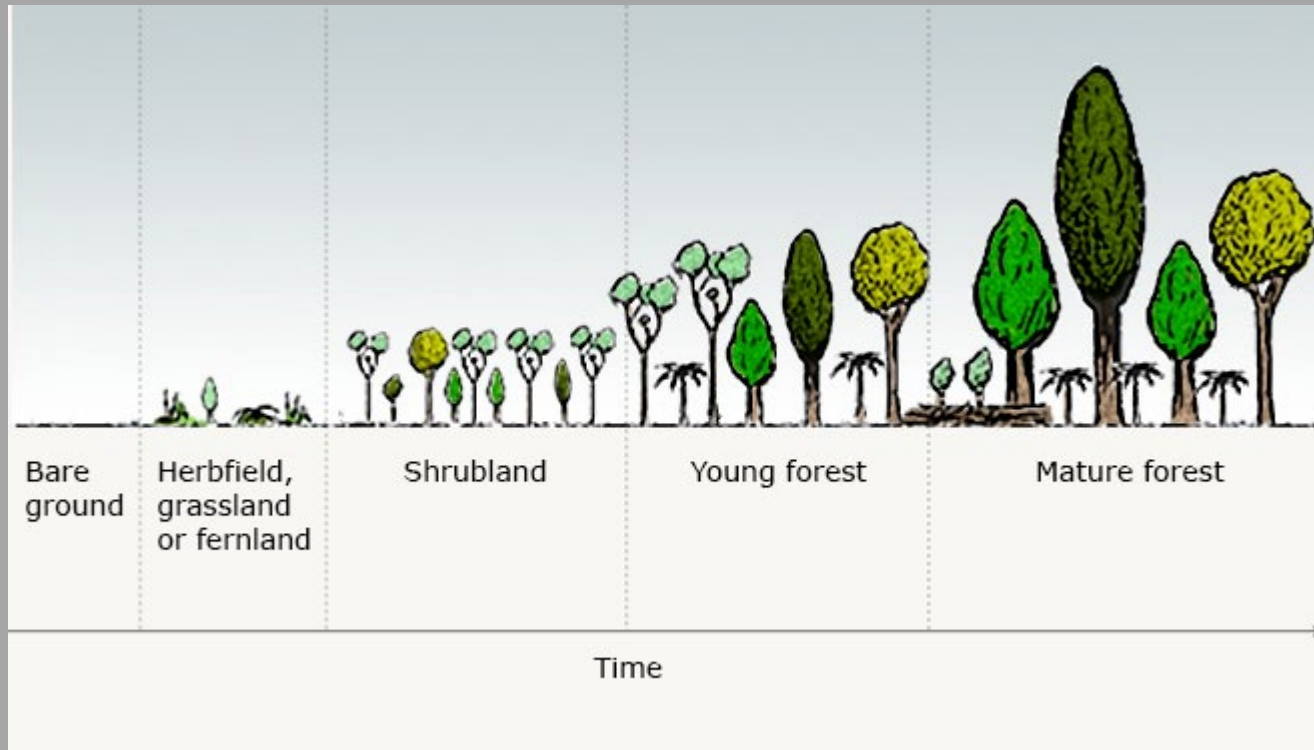


Factors that Affect Forest Growth

- Climate – moisture and warmth
 - Desert – less than 16” rainfall/year
 - Temperate Forest – 17 to 60” rainfall/year
 - Rain Forest – over 60” rainfall/year
- Land – topography (lay of the land)
- Soil



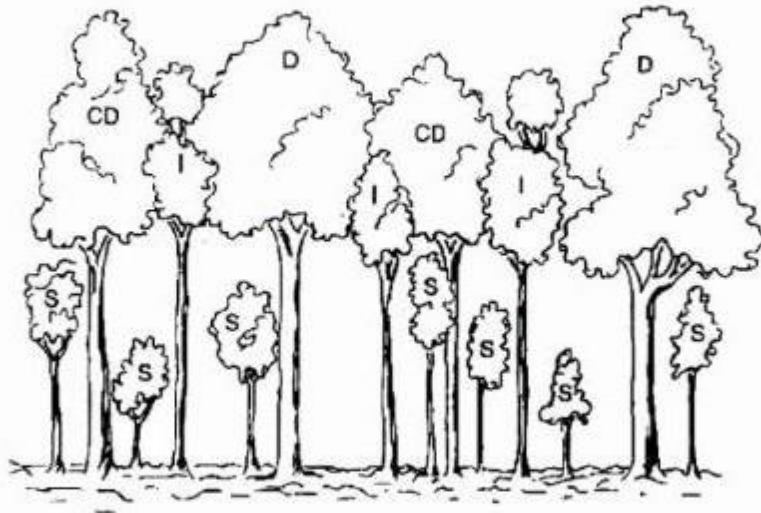
Forest Development



Succession – the process of long-term changes in the forest from pioneer plants as it moves toward climax growth or mature forest

Forest Crown Classes

Crown Class and Shade Tolerance



Tree Crown Classes:

D- Dominant
I-Intermediate

CD- Co-Dominant
S- Suppressed

- **Dominant** – trees that grow the largest in a forest stand and receive full sunlight from above and partial sunlight from the side
- **Co-Dominant** – trees that next in size and receive sunlight from above but little from the sides
- **Intermediate** – trees receive little sunlight from above and none from the sides
- **Suppressed** – trees that receive no direct sunlight



Forest Health / Affects on Forest Growth

- **Insect Pests**
 - Emerald ash borer – ash trees
 - Hemlock woolly adelgid – hemlock trees
 - Yellow-poplar weevil – yellow-poplar
 - Scarlet oak sawfly - oaks
 - Potential Future Pests – Gypsy moth (oaks), Asian longhorned beetle (maples), spotted lanternfly (maples, walnuts)
- **Invasive Diseases**
 - Laurel wilt disease – sassafras and spicebush
 - Thousand cankers disease - walnut



Forest Health / Affects on Forest Growth

Invasive plants are those that have a tendency to take over an area if left unchecked. While we do have some invasive native plants in Kentucky the ones that cause the most trouble in our woodlands are invasive exotic plants.

Why are invasive plants successful?

- Many invasive plant species produce large quantities of seed.
- Many invasives thrive on disturbed soil.
- Invasive plant seeds are often distributed by birds, wind, or unknowingly humans allowing seed to moving great distances.
- Some invasives have aggressive root systems that spread long distances from a single plant.
- These root systems often grow so densely that they smother the root systems of surrounding vegetation.
- Some plant species produce chemicals in their leaves or root systems which inhibit the growth of other plants around them.

*** 26 Major Invasive Plants Listed for Kentucky at
Southeast Exotic Pest Council**

Sustainable Forest Management



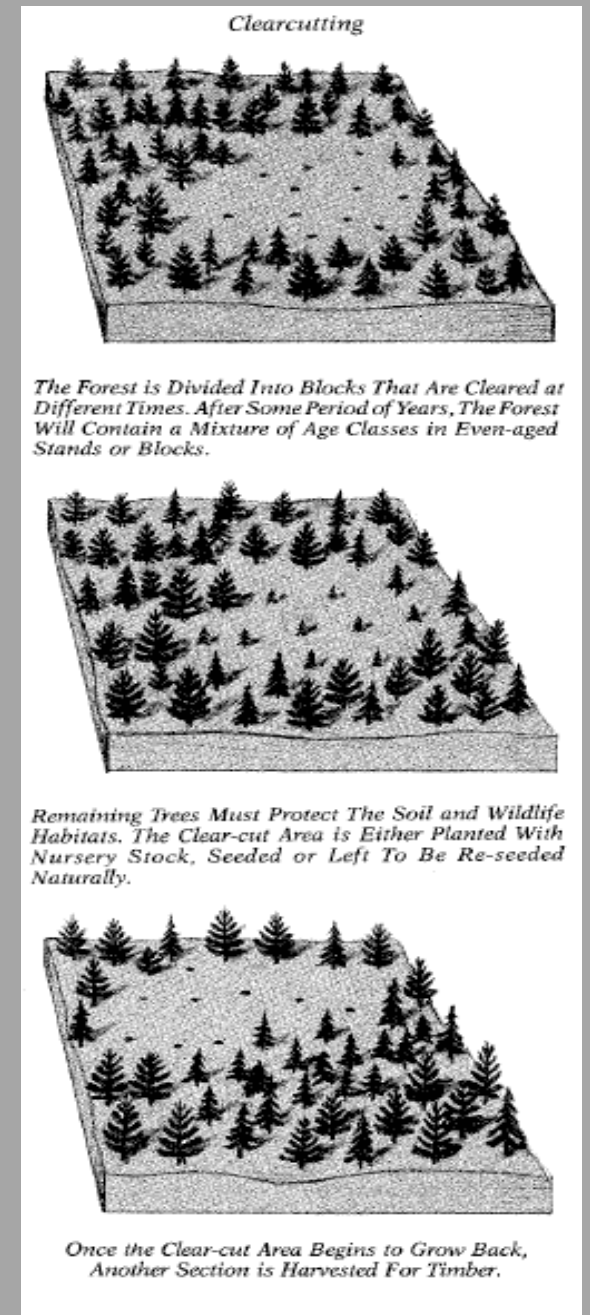
- Why do we want to manage our forests?
- Forest management is planned, orderly ways to reach goals for a particular forest (applies to both public and privately owned forest land)
 - Set goals for the forest (timber, aesthetics/recreation, wildlife habitat, water quality...)
 - Survey the forest – Forest Cruise
 - Soil quality
 - Topography
 - Location
 - Trees (kinds, quality & quantity)
 - Community (recreation, watershed protection, natural beauty)
 - Economics (timber markets, costs & prices)

Forest Management Practices

Silviculture: is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis.

Clearcutting – removes all of the trees at the same time (size of clearcuts can vary) – creates even-aged forest stands

Selective Cutting – individual trees (single tree selection) or small groups (group selection) of trees are harvested – creates or maintains uneven-aged forest stands

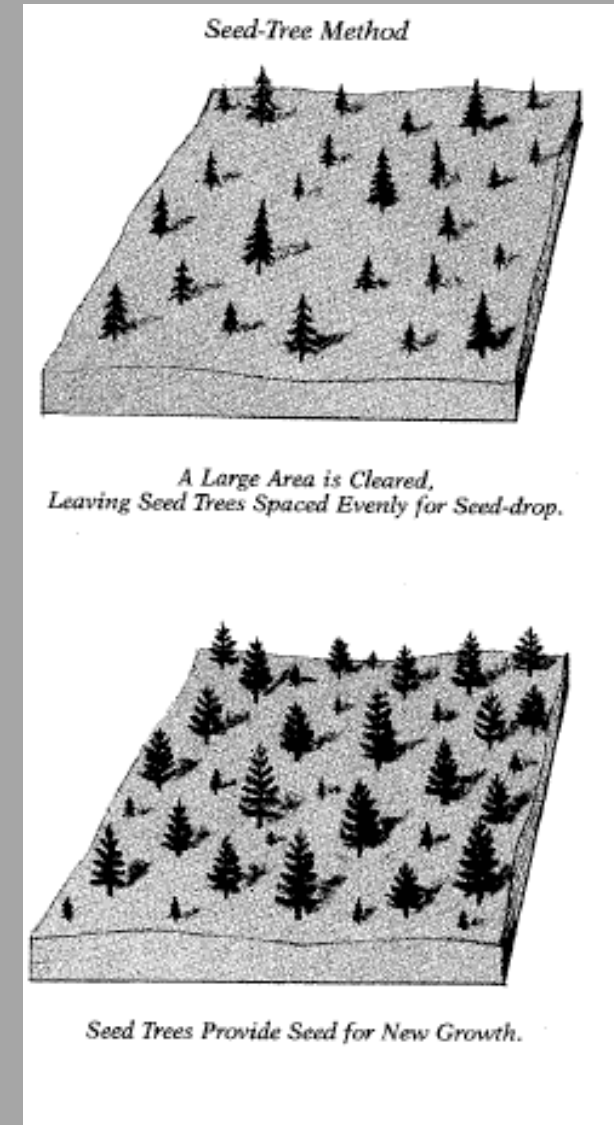


Forest Management Practices

Seedtree Regeneration – leave just behind enough mature, healthy trees to re-seed the harvested area

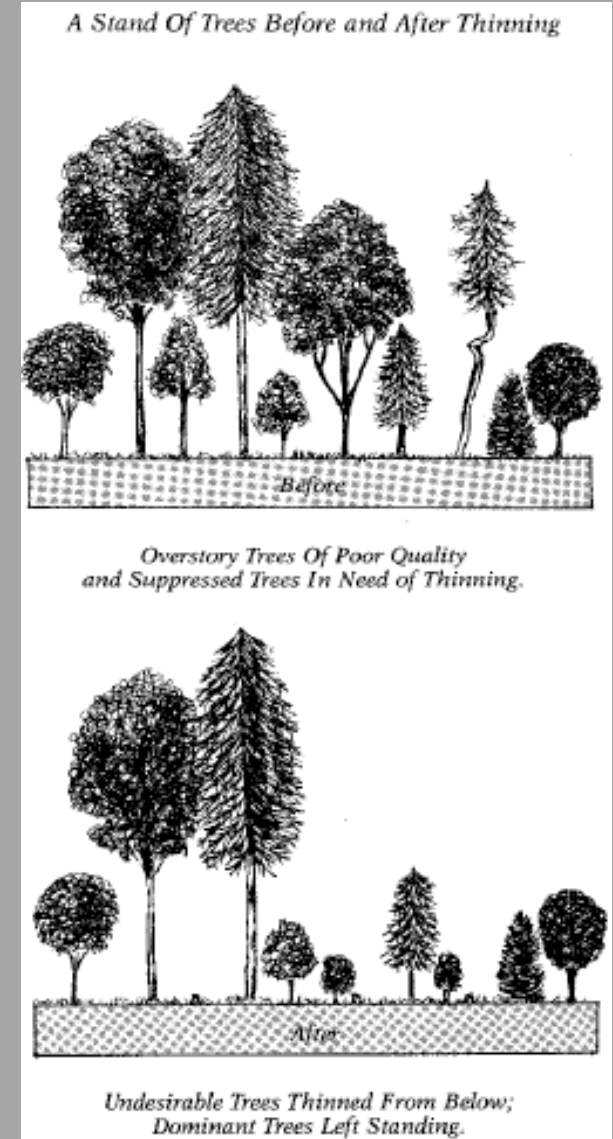
Shelterwood Regeneration – leave more trees behind after a harvest for shelter and seed for new forest

Planting & Seeding – in Kentucky we only do this if we want to establish a forest in an area that is currently not forested (ie. Pastureland)



Forest Management Practices

Thinning – usually an intermediate forest management practice – poor quality or undesirable species are removed to reduced crowding/competition and enhance the growth of the desired trees in the forest



Forest Products and Our Economy



Trees supply thousands of products for our daily lives as well as jobs.



In Kentucky, the Forest and Wood Industry contributed more than \$13 billion to the State's economy and employed more than 28,000 people directly in 2019

<https://forestry.ca.uky.edu/economic-report>



Products Made From Trees:

<https://forestry.ca.uky.edu/sites/forestry.ca.uky.edu/files/forfs15-02.pdf>