**Chapter 6**
Introduction
Forest management past and present
Types of forest in California
Critical Issues Today Regarding Forest Management

@Tom Chambers

**Introduction**

a. forests are tracks of land covered by trees
b. 25% of California (24 million acres) is forest

c. they offer
- beauty
- connection to something greater than ourselves
- exercise and fresh air
- wildlife habitat
- buffer against global warming
- lumber, fuel, paper

d. main types
- Oak Woodlands
- Conifer Forests
  - Redwoods
  - Douglas Fir
  - Pines

Oak Woodlands

a. occur at lower elevations
b. hotter/drier habitat
c. poorer quality lumber, less harvest for lumber
d. more widely spaced
e. vigorous understory of grasses and forbs
f. primary economic product is forage for livestock
g. usually privately owned and managed

Conifer Forests

a. occur at higher elevations
b. colder and wetter habitat
c. denser array of trees, less sunlight penetration
d. few understory plants
e. generally grow faster and often to enormous heights
f. make for more valuable lumber material
g. usually owned and management by government

The effect of disturbance depends on

a. age of forest



b. time since last disturbance
   - recently burned forest will not provide adequate fuel for another fire

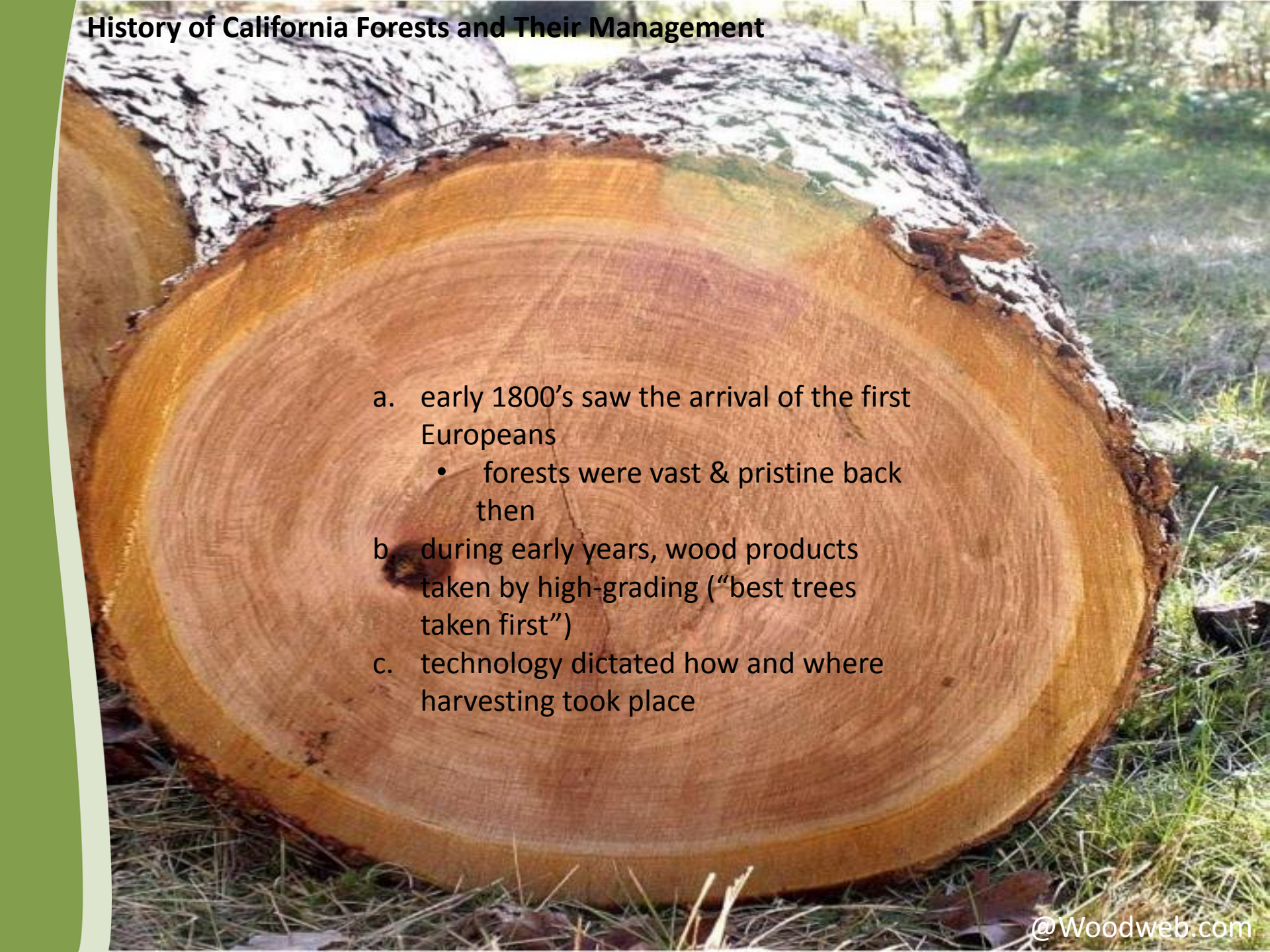
c. duration of the disturbance

# Growing forests change the environment

a. production of shade


b. production of nitrogen


# History of California Forests and Their Management



a. early 1800's saw the arrival of the first Europeans
   - forests were vast & pristine back then

b. during early years, wood products taken by high-grading ("best trees taken first")

c. technology dictated how and where harvesting took place

Logging often occurred alongside streams to facilitate transport

a. harvested trees stored in stream areas
b. splash dams constructed to accumulate sufficient water to carry trees downstream in spring

c. this led to
    - removal of boulders, spawning gravel, large woody debris, & nearby trees
    - widens streams
    - increases erosion

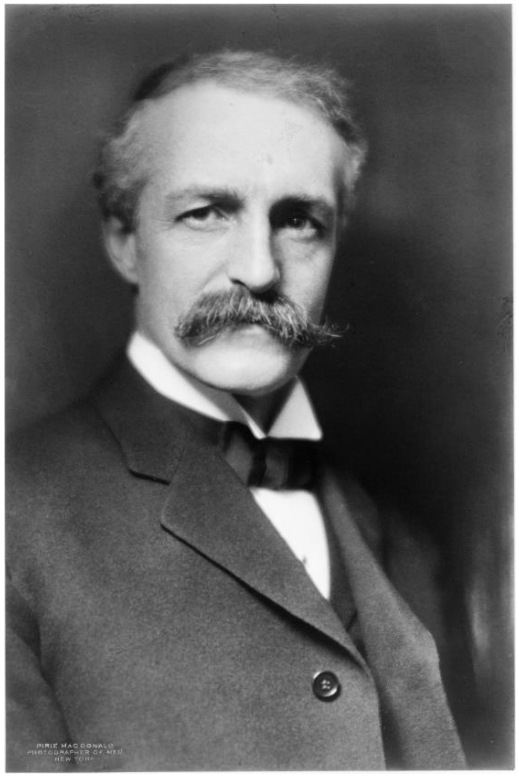
Once railroads became available, harvesting expanded to places where access and transport costs were cheap

a. clear cutting
   - fast & cheap
   - failure to replant exposes soil to erosion and permanent damage
   - adversely affected fisheries and wildlife habitat
   - responsible for increases in erosion and sedimentation
   - such an eyesore!



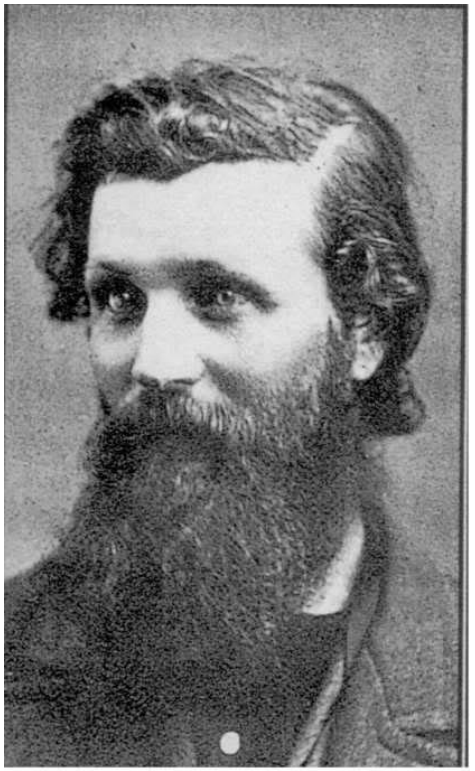
b. by the start of 20th century, forests no longer perceived as inexhaustible
   - increasing belief that government should be involved in forest protection and management

Gifford Pinchot



a. father of the US Forest Service
b. created vast network of publically owned forest preserves
c. professionalized management under the principle of “greatest good for the greatest number” and with insistence on science based management

John Muir



a. father of the National Park Service
b. felt that national forests should not be used for resources, but only recreation
c. convinced Teddy Roosevelt to protect Yosemite Valley and other forests
d. led a vigorous but ultimately unsuccessful fight to prevent the damming Hetch Hetchy

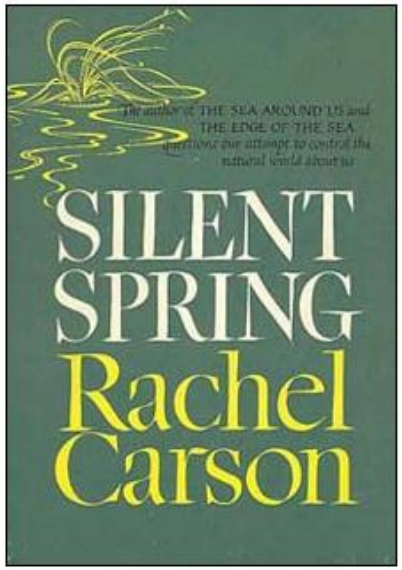
After World War II demand for wood products and lumber harvesting skyrocketed, fueled by increases in home construction

a. both private industry and forest service took up the challenge to ensure successful production of wood products


b. 2 million acres of oak woodlands and chaparrals cleared to improve forage production
   - adverse impacts such as soil erosion, degraded wildlife habitat, barren landscapes remain to this day

1960s saw the birth of the environmental movement

a. especially opposed to clear cutting of conifer forests
b. concern about clearing of old-growth forest
    - Underlying belief that old forests were special, almost magical places

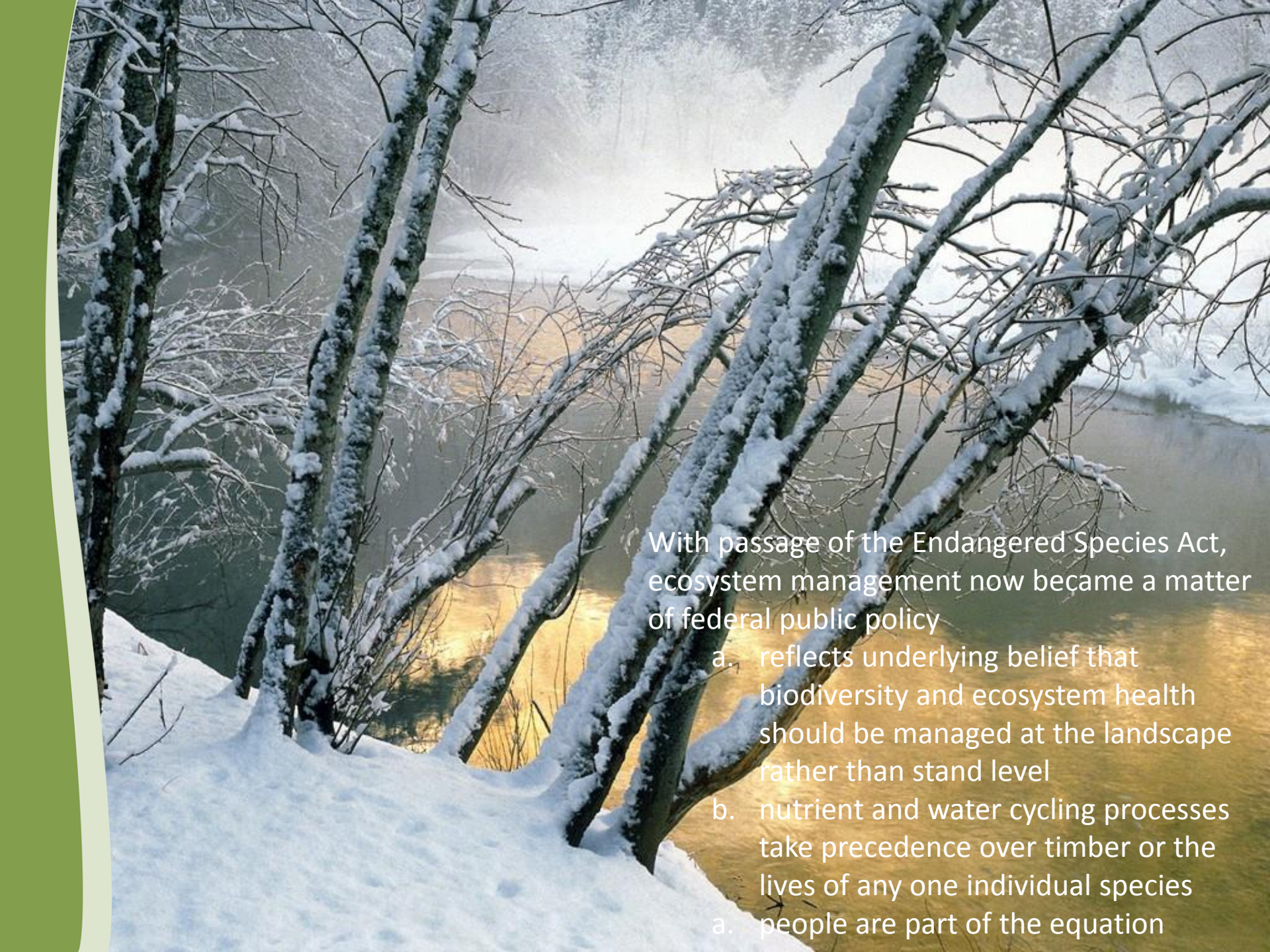




c. Rachel Carson's *Silent Spring* alerted public to dangers of pesticide use

Endangered Species Act

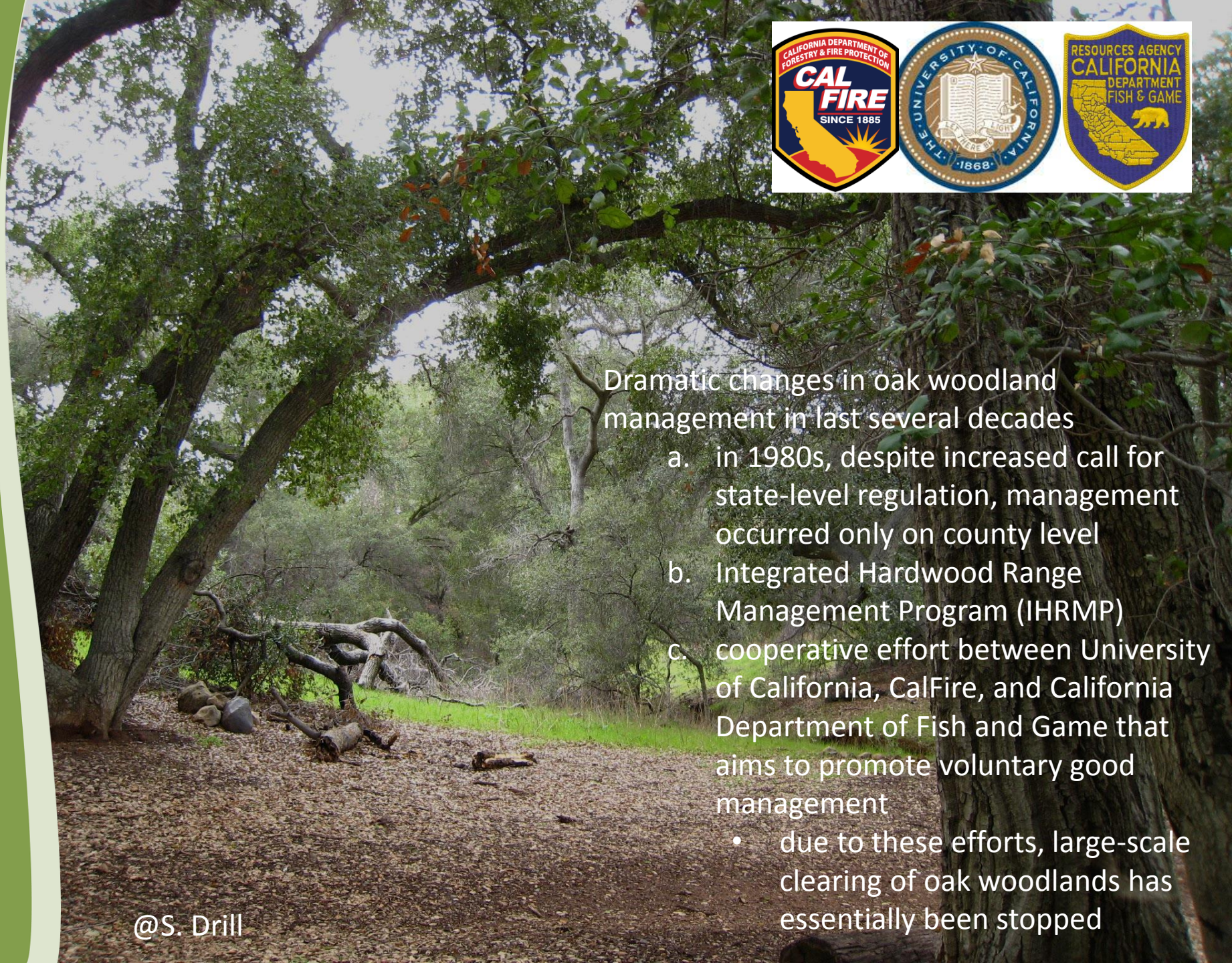
a. signed into law by Richard Nixon in 1973
b. protects species threatened with extinction
c. provides legal vehicle for those who wish to challenge timber industry
    - potential impacts on wildlife is new determining factor
d. results
    - fewer and smaller timber harvest areas
    - greater retention of old-growth trees





With passage of the Endangered Species Act, ecosystem management now became a matter of federal public policy

a. reflects underlying belief that biodiversity and ecosystem health should be managed at the landscape rather than stand level
b. nutrient and water cycling processes take precedence over timber or the lives of any one individual species
a. people are part of the equation



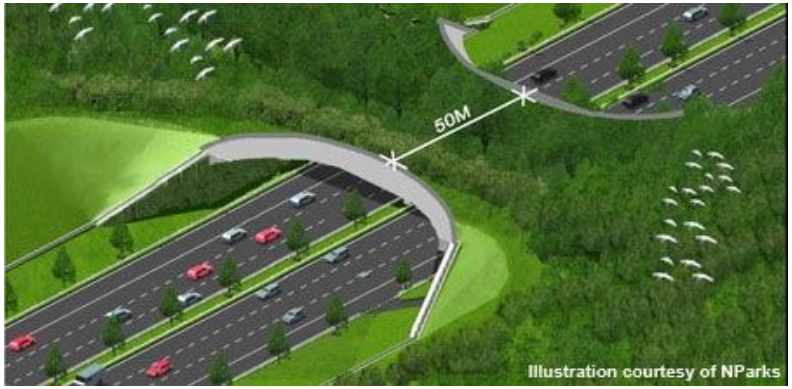
Dramatic changes in oak woodland management in last several decades

a. in 1980s, despite increased call for state-level regulation, management occurred only on county level
b. Integrated Hardwood Range Management Program (IHRMP)
c. cooperative effort between University of California, CalFire, and California Department of Fish and Game that aims to promote voluntary good management
   - due to these efforts, large-scale clearing of oak woodlands has essentially been stopped

@S. Drill

Today's management practices

a. significant reduction of harvesting on public lands
b. protection of old growth forests
c. strict state regulatory laws
d. uneven aged management
e. operation on the landscape level
f. promotion of forest diversity
    - age and size class
    - species composition
    - adequate detritus




f. linking forests with corridors

g. insistence that forest management be flexible rather than rigid/dogmatic

Democratization of management

a. the needs of people, the forest, and wildlife are all considered
b. people should have input into the decisions that affect them
c. joint management between public and private owners


d. The Redwoods Forest Foundation
    - the redwood region along our north coast used to be immersed in conflict between different groups of people, namely local communities and corporate landowners

e. 1997, a non-profit called Redwood Forest Foundation emerged with mission to
    - acquire
    - protect
    - restore
    - manage forest woodlands for benefit of local communities

RFFI
environment, economy, equity

timber industry


community activist groups


c. started by assembling diverse board of directors often including former enemies and rivals

banking community

educators (UCCE Mendocino County Forest Advisor)

d. unprecedented restructuring of ownership and patterning
   - established county-based advisory committees who served as “shareholders” in the corporation’s decision making processes

e. 10 years after its formation acquisition of 51,000 acres of coastal redwood lands
   - 65 million in financing from Bank of America, whose enthusiasm was largely due to community-oriented structuring of the board and the credibility of its membership

@Jon Parmentier

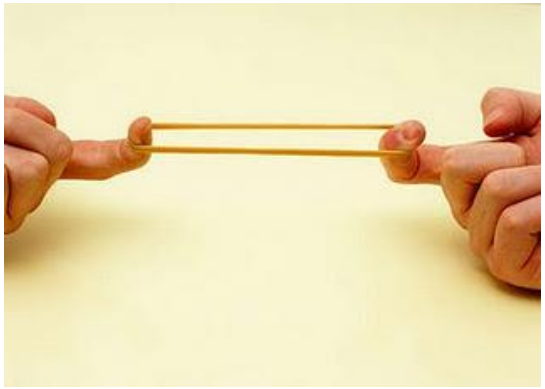
**Forest Dynamics**

Succession follows a disturbance in the forest in either slow or punctuated fashion

a. primary succession
   - occurs in places with little to no soil

b. secondary succession
   - occurs in places where there is soil

c. Resilience Theory
   - developed by Professor Holling and Gunderson
   - resilience is the capacity of a system to resist change
   - disturbed ecosystems can reduce their resilience on purpose



## California Forests and Wildfire

*Grassland fire in Hopland California*

a. despite their bad rep, periodic fires are a natural and healthy aspect of ecosystems



b. prior to European settlement, intentionally set by Native Americans
   - made hunting easier
   - stimulated growth of plants used in basket weaving
   - improve ease of acorn, mushroom and berry collection
   - reduce likelihood of catastrophic fire


c. early ranchers also burned their oak woodland
   - improved forage production


d. by the 1900s, Smokey the Bear dramatically changed traditional fire-management practice

e. this complete suppression of seasonal fire had serious ecological consequences
   - shade tolerant species and shrubs normally held in check by fire exploded in population

- dead material on the floor accumulated to form ladder fuels

- in coastal foothills, lack of fire allowed conifers to explode in numbers, which tend to make for more dangerous and tenacious fires
- unfortunately, prescribed burning is not as common as it should be due to ignorance  as well as to its expensive price

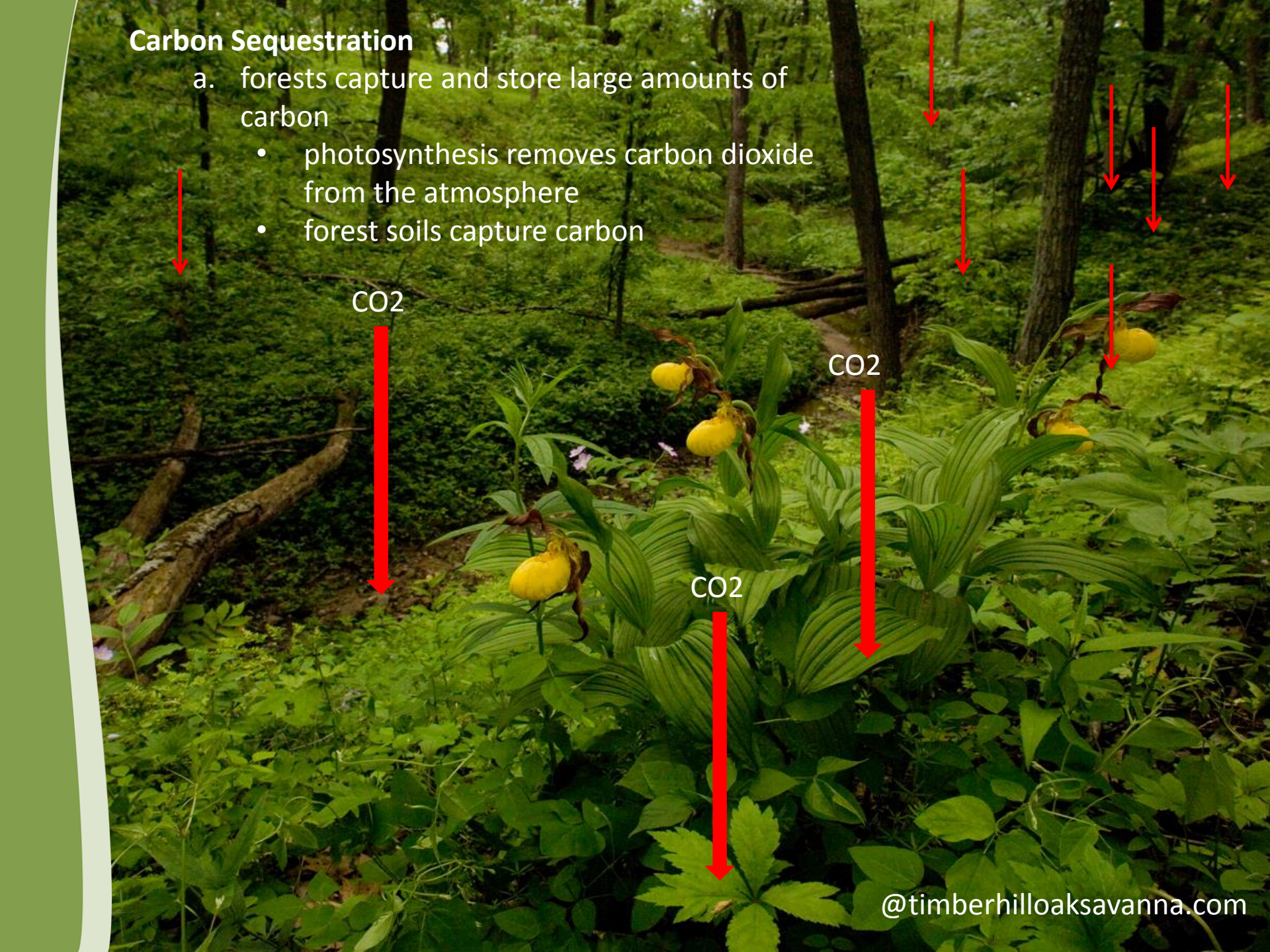
## Fragmentation of Forests

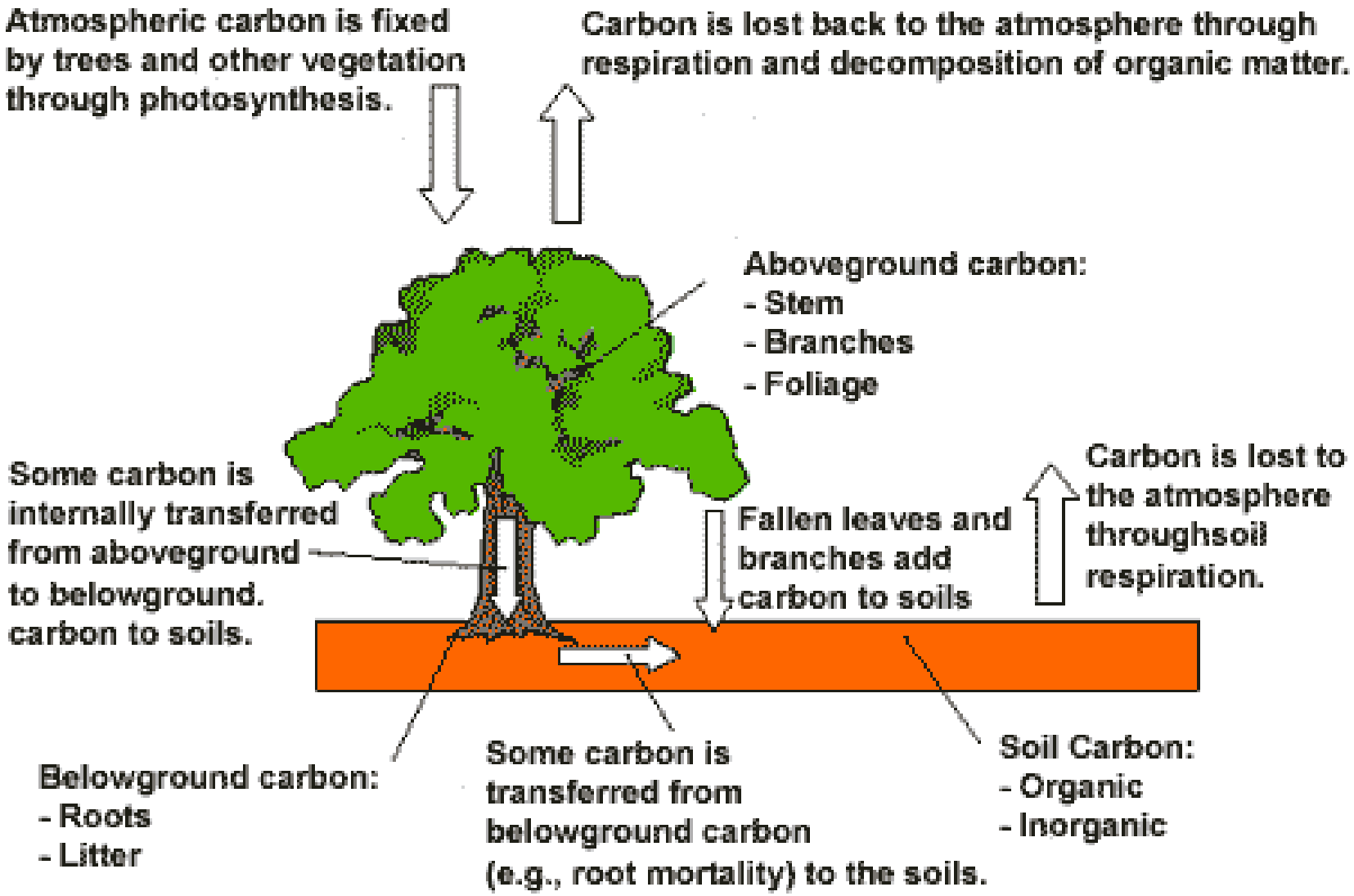
a. driven by people moving away from densely populated areas to more secluded woodlands

b. habitat fragmentation leads to an abundance of edges
   - occurs at the boundary between two different habitat types
   - edge effects
     - increase in species adapted to edges
     - decrease in interior species (due to lack of food or restricted range)
     - invasion of exotic pest plants and animals
     - introduction of domestic cats and dogs

c. possible solutions
   - conservation easements: privately negotiated land use agreements where a private, nonprofit, or public agency landowner agrees to attenuate his land use in exchange for tax reductions
   - compensate forest landowners for goods and services they currently provide for free as an incentive for them to keep their land unfragmented
   - zoning laws that set large minimum forest parcel sizes

@north elba land conservancy


Carbon Sequestration
a. forests capture and store large amounts of carbon
• photosynthesis removes carbon dioxide from the atmosphere
• forest soils capture carbon
CO2
CO2
CO2
@timberhilloaksavanna.com


Atmospheric carbon is fixed by trees and other vegetation through photosynthesis.
Carbon is lost back to the atmosphere through respiration and decomposition of organic matter.
Aboveground carbon:
- Stem
- Branches
- Foliage
Some carbon is internally transferred from aboveground to belowground. carbon to soils.
Fallen leaves and branches add carbon to soils
Carbon is lost to the atmosphere throughsoil respiration.
Belowground carbon:
- Roots
- Litter
Some carbon is transferred from belowground carbon (e.g., root mortality) to the soils.
Soil Carbon:
- Organic
- Inorganic

b. cap-and-trade system is a possible solution for maintaining forests
   - those generating emissions must purchase carbon offsets equal to the amount of carbon they emit
   - those owning forestland can sell carbon credits to emitters

c. still novel, and hard to predict, but possible outcomes include
   - increasing the number acres of forest put into conservation easements
   - protection of properties that normally would have gone to simply the highest bidder