APES CHAPTER 10 NOTES (MRS. BAUCK):
LAND, PUBLIC AND PRIVATE

MODULE 29: Land Use Concepts and Classification

I. Effects of Human Land Use

A. *natural capital*—natural resources

1) *natural goods*

a) what is produced or provided by ecosystems (food, fresh water, fuel wood, fiber, genetic resources)

b) natural goods are easy to be given monetary values (direct-use value)

2) *natural services*

a) regulating services—benefits obtained from regulation of ecosystem processes (climate regulation, disease control, flood control, detoxification)

b) supporting services—services that maintain conditions for life on Earth (soil formation, nutrient cycling, pollination, primary production, O_2 production, provision of habitats)

c) natural services are difficult to have specific monetary value assigned to them (indirect-use value)

3) natural ecosystems are undervalued because some functions they perform are not obvious

4) intellectual and emotional "disconnection" to the natural environment makes it easier to overexploit it

B. Conservation, Preservation, Restoration

1) *conservation*—management and regulation of use

2) *preservation*—protection of ecosystems and species

Two opposing factions had emerged within the environmental movement by the early 20th century: the conservationists and the preservationists. The conservationists (such as Gifford Pinchot, the first Chief of the United States Forest Service 1905–1910 and the Republican Governor of Pennsylvania) focused on the proper use of nature, whereas the preservationists sought the protection of nature from use. Conservation sought to regulate human use while preservation sought to eliminate human impact altogether.

The idea of protecting nature for nature's sake began to gain more recognition in the 1930s with American writers like Aldo Leopold, calling for a "land ethic" and urging wilderness protection. It had become increasingly clear that wild spaces were disappearing rapidly and that decisive action was needed to save them.

Global conservation became an issue at the time of the dissolution of the British Empire in Africa in the late 1940s. The British established great wildlife preserves there. As before, this interest in conservation had an economic motive: in this case, big game hunting. Nevertheless, this led to growing recognition in the 1950s and the early 1960s of the need to protect large spaces for wildlife conservation worldwide. The World Wildlife Fund (WWF), founded in 1961, grew to be one of the largest conservation organizations in the world.

Preservation again came to the forefront in the 1960s with the publication of Rachel Carson's Silent Spring in 1962 which was the genesis of the modern environmental movement. Major environmental groups such as the Sierra Club shifted from protesting to working with politicians to influence environmental policy.

3) consumptive use vs. productive use
    a) *consumptive use*—people utilizing natural resources for food, clothing, tools, fuel, etc. (subsisting from the land)
    b) *productive use*— This sounds like a positive term, but it is not!—exploiting natural resources for monetary gain (timber industry, commercial fishing, hunting wild game, domesticating wild species)

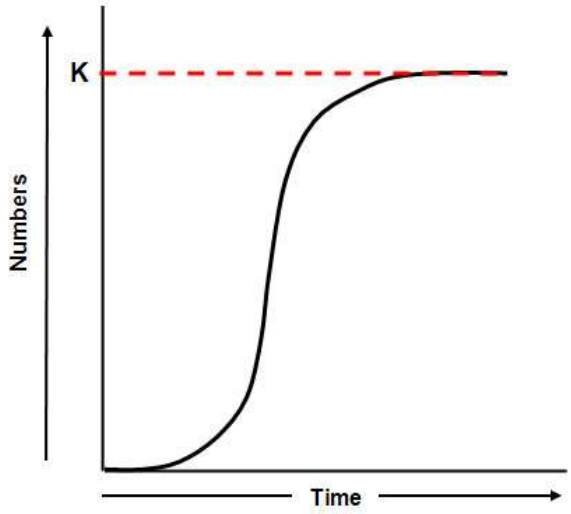
C. Tragedy of the Commons
    1) **commons** = *common pool resource: owned by many people or no one*
    2) **Tragedy of the Commons** (essay by Garrett Hardin in 1968)

The cause of any tragedy of the commons is that when individuals use a public good, they do not bear the entire cost of their actions. If each seeks to maximize individual utility, he or she ignores the costs borne by others. The best (non-cooperative) short-term strategy for an individual is to try to exploit more than his or her share of public resources. Assuming a majority of individuals follow this strategy, the theory goes, the public resource gets overexploited.

    3) example of a negative externality
    4) limiting freedom: private ownership or regulation of access
    5) public policies: ideas for sustainable policies
        a) Natural resources cannot be treated as commons.
        b) Natural resources should be monitored, evaluated, and have sustainable limits set for use.
        c) Precautionary Principle should be used.
        d) Regulations should be enforced consistently.
        e) Overexploitation and violation of the limits should not provide any financial benefits.
        f) Subsidies supporting overexploitation and violation of the limits should be eliminated.
        g) The environment housing the natural resource should be protected from pollution.
        h) Local consumptive use of the natural resource should be considered.

D. **Externality**—the cost or benefit of a good or service that is not included in the purchase price of the good or service
    1) positive consumption
    2) negative consumption
    3) positive production
    4) negative production

E. Maximum Sustainable Yield
    1) **MSY: Maximum Sustainable Yield—***the highest rate of use which can still maintain ecosystem balance*
    2) optimal population—1/2 the number of a population at the carrying capacity
    3) **carrying capacity** (K)**—**the maximum population size that an ecosystem can support sustainably



II. Public Lands

A. **resource conservation ethic**—*a positive mindset involving the use, allocation, exploitation, and protection of resources*
   1) main focus: forests, fisheries, other habitats, biodiversity
   2) other focus: materials conservation, energy conservation
   3) consumer conservation ethic: "Reduce, Reuse, Recycle, Rethink"

B. **multiple-use lands**—U.S. land designated for recreation, timber harvesting, grazing, and mineral extraction

C. International categories
   1) national parks
   2) managed resource protected areas
   3) habitat/species management areas
   4) strict nature reserves and wilderness areas
   5) protected landscapes and seascapes
   6) national monuments

D. U.S. Public Lands (can be owned by federal, state, or local governments)
   1) **national forests**
      a) USDA US Forest Service blog https://www.fs.fed.us/blogs
      b) From http://www.wilderness.org archives

"*The American people own* **155 national forests** *and* **20 national grasslands**, *totaling more than 191 million acres*. These lands can be found in 40 states plus Puerto Rico, with 87 percent of national forest land having a home in the West. These lands are managed for 'multiple use' by the Forest Service, a branch of the Department of Agriculture.

National Forests contain valuable habitat for fish and wildlife (including many endangered species), watersheds that provide clean water for many communities in the West, and some of the finest recreation areas in the country. Nearly 60 million acres of the most pristine national forest land was protected under the 2001 **Roadless Area Conservation Rule**…"

From https://www.fs.usda.gov/

2) **national parks**
   a) U.S. **National Park Service** (NPS) http://www.nps.gov/faqs.htm
   b) first U.S. national park: Yellowstone National Park, 1872
   c) U.S. National Park System areas:

> "The system includes 417 areas covering more than 84 million acres in every state, the District of Columbia, American Samoa, Guam, Puerto Rico, and the Virgin Islands. These areas include national parks, monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, recreation areas, scenic rivers and trails, and the White House."

   d) largest National Park: Wrangell-St. Elias National Park and Preserve, Alaska (13.2 million acres)
   e) smallest: Thaddeus Kosciuszko National Memorial, PA, at 0.02 acres

3) **national wildlife refuges** (National Wildlife Refuge System, NWR)
   a) https://www.fws.gov/refuges/
   b) specifically designated for wildlife protection
   c) special management areas
      - biosphere reserves
      - research natural areas
      - shorebird reserves
      - wetlands of international importance
      - wilderness

4) **rangelands** … from the EPA:

> "**Rangelands** *are those lands on which the native vegetation (climax or natural potential plant community) is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing*

use. Rangelands include natural grassland, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities."

5) **wilderness areas**

a) general info from www.wilderness.net

"Congress has designated 75 wilderness areas… in 26 states. About 90 per cent — or 18.6 million acres — of Refuge System wilderness is in Alaska. The remaining 2.5 million wilderness acres are in the lower 48 states."

"*The United States was the first country to officially designate land as 'wilderness' through the* **Wilderness Act of 1964**. Wilderness designation helps preserve the natural state of the land and protect flora and fauna by prohibiting development and providing for non-motorized recreation… Wilderness designations are granted by an Act of Congress for Federal land that retains a "primeval character" and that has no human habitation or development. Approximately 100 million acres (400,000 km²) are designated as wilderness in the United States. This accounts for 4.71% of the total land of the country; however, 54% of wilderness is in Alaska, and only 2.58% of the continental United States is designated as wilderness.

There are 680 separate wilderness designations in the United States."

b) preserving large areas of intact ecosystems

c) **Wilderness Act of 1964**

"...lands designated for preservation and protection in their natural condition..."
"...an area where the earth and its community of life are untrammeled by man..."
"...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation..."
"...generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable..."
"...has outstanding opportunities for solitude or a primitive and unconfined type of recreation..."
"...shall be devoted to the public purposes of recreation, scenic, scientific, educational, conservation and historic use."

d) wilderness stats

- first designated wilderness: Great Swamp NWR (NJ)—3,660 acres in 1968
- smallest wilderness area: less than two-acre Wisconsin Islands Wilderness, Green Bay NWR
- largest wilderness area: 8 million acres of the Arctic NWR

E. Land use and federal agencies

1) Bureau of Land Management – BLM
2) U.S. Forest Service – USFS
3) National Park Service – NPS
4) Fish and Wildlife Service – FWS

MODULE 30: Land Management Practices

I. **Rangelands** (see MODULE 29, p. 4)

A. primarily used for grazing
B. BLM monitors grazing https://www.blm.gov/programs/natural-resources/rangelands-and-grazing/livestock-grazing/about
C. advantages of use

1) grazing can be done on land too arid for farming

2) uses less energy to maintain

D. disadvantages of use
   1) overgrazing potential
   2) soil degradation

E. Society for Range Management http://rangelands.org/

F. Taylor Grazing Act of 1934 converted federal grazing lands from a "commons" into a permit system

II. **Forests—***land characterized by trees and woody vegetation*

A. forestry = **silviculture**
   1) FAO forestry page http://www.fao.org/forestry/en/
   2) EPA forestry page https://www.epa.gov/agriculture/agriculture-forestry

from Biodiv:

"*In the last 8000 years, about 45% of the Earth's original forest cover has disappeared, cleared mostly during the past century*. According to the Food and Agriculture Organization of the United Nations (FAO), the present area of the world's forests… is the equivalent to North, Central and South America combined.

Forest biodiversity is being lost due to the rapid deforestation, fragmentation, and degradation of all forest types. …The most important factors associated with forest and biological diversity decline are human-induced causes: conversion to agricultural land, overgrazing, unmitigated shifting cultivation, unsustainable forest management, introduction of invasive alien plant and animal species, infrastructure development (road building, hydro-electrical development urban sprawl), mining and oil exploitation, forest fires caused by humans, pollution and climate change."

B. *deforestation*—removal of forest to be replaced by another use of the land
   1) FAO forestry page http://www.fao.org/forestry/en/
   2) forest management
      a) silvicultire and silvics

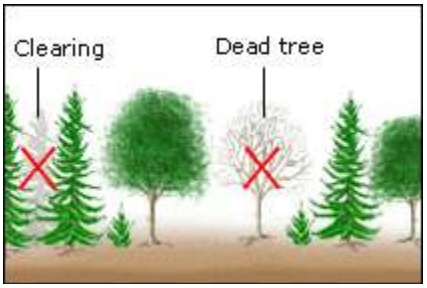
"Forestry is a science. One of the most important of the many disciplines in forestry is silviculture. **Silviculture** *is the agriculture of trees—how to grow them, how to maximize growth and return, and how to manipulate tree species compositions to meet landowner objectives.*

To understand silviculture, one must first understand silvics. **Silvics** involves *understanding how trees grow, reproduce, and respond to environmental changes…* Silvics also is concerned with *seeding requirements, elevation, and location."*

      b) timber harvesting
         - "**Selection systems [selective cutting]** are partial removals of trees based on the silvicultural objectives of the landowner. This method is used when species of shade tolerance or intermediate tolerance are considered desirable.
         - **Seed tree cuts** allow the harvest of all trees except 2 to 10 trees per acre. These remaining trees are chosen for their good form, genetics, species, and ability to produce seed crops. The job for these remaining trees is to rain down genetically good-quality seed on the freshly disturbed areas…
         - **Clearcutting** is also a silvicultural method. This much-embattled method is truly a viable silvicultural practice. It is most often prescribed where sun-loving species are desired for the future timber stand. It is also prescribed in poor-quality or problem stands which have been abused by fires or repeated high-grading…"

From http://ecosys.cfl.scf.rncan.gc.ca archives

- **"Shelterwood cutting** is used in even-aged forests (where the trees are very close in age) and relies on natural regeneration to re-establish the stand."



SELECTION CUTTING

SHELTERWOOD CUTTING

c) **multiple-use** forestry—"managing a forested area to simultaneously provide more than one of the following resource objectives: *fish and wildlife, wood products, recreation, aesthetics, grazing, watershed protection, and historic or scientific values*" (From http://www.sfrc.ufl.edu/Extension/)

C . Sustainable forestry

1) **ecologically sustainable forestry**
   a) *removal of trees in ways which do not affect noncommercial tree species*
   b) involves ecologically sustainable landscape management, commodity production landscapes, conservation management, and land sparing
2) *sustained yield*—wood production is maintained at levels which do not destroy the forest
3) *sustainable forest management*—forests are treated as functioning ecosystems, with stability and biodiversity in mind
4) *Sustainable Forestry Initiative* principles of action:
   a) stewardship ethic forest health and productivity
   b) importance of sites of special significance
   c) continuous improvement

SUSTAINABLE FORESTRY INITIATIVE

5) tropical forests – reasons for deforestation http://earthobservatory.nasa.gov/
   a) main sources of deforestation: conversion to cropland and pasture ("slash-and-burn")
   b) Amazon: industrial-scale cattle ranching
   c) Amazon: soybean, sugarcane, corn farming
   d) Indonesia: palm tree plantations for biofuel export
   e) debt: developing countries need revenue, so they sell the lumber, etc.
   f) population growth
   g) building of roads to transport goods to newly inhabited areas
   h) railway expansion projects
   i) logging, both legal and illegal, from previously inaccessible areas
6) tropical forests – what can be done
   a) sustainable forest management
   b) forest plantations
   c) forests as "extractive reserves" (nuts, fruit, rubber, etc.)
   d) forests as tourism sites

e) more control given to the indigenous people
f) World Bank loans and grants

D. Logging issues https://globalforestatlas.yale.edu/forest-use-logging/logging
1) affects ecosystem balance
2) affects hydrologic cycle
3) affects soil dynamic
4) decreased biodiversity due to habitat loss
5) *deforestation*
6) decreased *carbon sequestration capacity*
7) monoculture = **tree plantations** of fast-growing stands

E. Fires - National Interagency Fire Center
1) **prescribed burn**—*deliberate fires set in a controlled setting to clear debris*
2) National Interagency Fire Center (NIFC) https://www.nifc.gov

"The National Interagency Fire Center (NIFC), located in Boise, Idaho, is the nation's support center for wildland firefighting. Eight different agencies and organizations are part of NIFC. Decisions are made using the interagency cooperation concept because NIFC has no single director or manager…. The Boise Interagency Fire Center (BIFC) was created in 1965 because the US Forest Service, Bureau of Land Management (BLM), and National Weather Service saw the need to work together to reduce the duplication of services, cut costs, and coordinate national fire planning and operations. The National Park Service and Bureau of Indian Affairs joined BIFC in in the mid 1970s. The US Fish and Wildlife Service later joined in 1979. The Center's name was changed in 1993 from the Boise Interagency Fire Center to the National Interagency Fire Center to more accurately reflect its national mission. The US Fire Administration-FEMA joined NIFC in 2003."

F. **Roadless Area Conservation Rule (Roadless Rule)**
From https://www.fs.usda.gov/roadmain/roadless/2001roadlessrule

"The 2001 Roadless Rule establishes *prohibitions on road construction, road reconstruction, and timber harvesting on 58.5 million acres of inventoried roadless areas on National Forest System lands.* The intent of the 2001 Roadless Rule is to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management."

III. Federal Regulation of Land Use

A. **National Environmental Policy Act (NEPA) of 1969**
1) https://www.epa.gov/laws-regulations/summary-national-environmental-policy-act

"The **National Environmental Policy Act (NEPA)** was one of the first laws ever written that establishes the broad national framework for protecting our environment. NEPA's basic policy is to assure that *all branches of government give proper consideration to the environment prior to undertaking any major federal action* that significantly affects the environment.

NEPA requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other federal activities are proposed. Environmental Assessments (EAs) and **Environmental Impact Statements (EIS),** *which are assessments of the likelihood of impacts from alternative courses of action,* are required from all Federal agencies and are the most visible NEPA requirements."

2) three possible levels of analysis
   a) Categorical Exclusion determination (CATEX)
   b) Environmental Assessment/Finding of No Significant Impact (EA/FONSI)
   c) **Environmental Impact Statement (EIS)**
3) **environmental mitigation plan—** *projects or programs intended to offset known impacts to an existing historic or natural resource*

B. **Lacey Act of 1900** (amended since)—*prohibits trade in wildlife, fish, and plants that have been illegally taken, possessed, transported or sold*

C. Other related legislation
   1) Endangered Species Preservation Act of 1966—allowed listing of only native animal species as endangered and provided limited means for their protection
   2) Endangered Species Conservation Act of 1969—provided additional protection to species in danger of worldwide extinction

D. **Endangered Species Act (ESA) of 1973** (amended many times since)
   1) From the EPA

Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Anyone can petition FWS to include a species on this list. *The law prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. Likewise, import, export, interstate, and foreign commerce of listed species are all prohibited*.

   2) More info on "take prohibitions" from NOAA

" 'Take' of a threatened or endangered species means to 'harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.' Depending if the species is endangered or threatened, different take prohibitions may apply. When a species is listed as **endangered**, 'take' prohibitions are automatically extended to it… When a species is listed as **threatened**, we must issue protective regulations in order to extend any 'take' prohibitions to the species …"

   3) From the NOAA (National Oceanic and Atmospheric Administration)

"Approximately 2,270 species are listed as endangered or threatened under the ESA. Of these species, about 650 are foreign species, found only in areas outside of the U.S. and our waters." (~1620 are domestic).

The NOAA has "jurisdiction over 151 endangered and threatened marine species, including 57 foreign species. We work with U.S. Fish and Wildlife Service (USFWS) to manage ESA-listed species. Generally, we manage marine species, while USFWS manages land and freshwater species."

"A 'species' is considered **endangered** *if it is in danger of extinction throughout all or a significant portion of its range*, and **threatened** *if it is likely to become an endangered species within the foreseeable future."*

   a) general ESA provisions
      - listing of endangered and threatened species
      - development and implementation of recovery plans
      - regular reviews of species' status
   b) *critical habitat* info from NOAA

"When listing a species as threatened or endangered, we also designate critical habitat for the species. This designation occurs about one year after the final listing, as long as it is prudent to do so and critical habitat is determinable. Unlike the listing determination, economic impacts must be considered when designating critical habitat. Critical habitat is:

- specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection
- specific areas outside the geographical area occupied by the species if we determine that the area itself is essential for conservation"

c) categories in the process
   - petitioned species (awaiting 90-day findings)
   - candidate species (status review completed, action not warranted now)
   - proposed for ESA listing
   - listed
   - under review for delisting
   - delisted

d) More details on the process https://www.fws.gov/endangered/esa-library/pdf/listing.pdf

e) conflicting parties
   - "property rights advocates" are ESA critics: developers, timber industry, mining industry, etc.
   - "recovery advocates" support reauthorization and enforcement of ESA

f) FWS Endangered Species search https://www.fws.gov/endangered/?ref=topbar

g) *IUCN Red List* of Threatened Species http://www.iucnredlist.org/

IV. Residential Land Use

A. **suburban**
   1) *areas surrounding urban centers*
   2) *lower population density vs. urban areas*
   3) "suburbs"

B. **exurban**
   1) *areas not connected to urban centers with lower population densities than urban areas*
   2) "exurbs"

C. **urban**
   1) *area surrounding a city*
   2) *high population density vs. surrounding areas*

D. **urban sprawl**
   1) *rapid expansion of cities into rural areas*
   2) Why do people leave urban areas?
      a) cars—commuting is possible
      b) cost of living—cheaper in suburbs
      c) **urban blight**—*physical and sociological degradation of cities*
   3) governmental policy
      a) **Highway Trust Fund**—*U.S. fund for road/highway repair and maintenance*
      (**induced demand** in this case—*people need roads, so they are maintained)*

b) **zoning**—*partitioning specific areas for business vs. residential*
c) **multi-use zoning**—*mixed-use properties in the same area*

E. **Smart growth**

1) https://www.epa.gov/smartgrowth

> " 'Smart growth' covers a range of development and conservation strategies that help protect our health and natural environment and make our communities more attractive, economically stronger, and more socially diverse."

2) https://smartgrowthamerica.org/

> "Smart Growth is a way to build cities, towns, and neighborhoods that are economically prosperous, socially equitable, and environmentally sustainable."

3) basic principles (EPA)
   a) mixed land use
   b) varied housing opportunities
   c) pedestrian-friendly neighborhoods
   d) community collaboration in development (**stakeholders**)
   e) compact and efficient building design—multi-story
   f) foster a **sense of place**—distinct character
   g) preserve open spaces, farmland, and critical ecosystems
   h) **Transit-Oriented Development (TOD)**
   i) reinvigorate existing communities (**infill**); use **urban growth boundaries**
   j) fair and cost-effective development decisions