

## Ch. 23 - Sustaining Ecosystems: Land Use, Conservation and Management

### **Frontier Expansion, Native Americans, and Bison**

Native American Tribes depended heavily on Bison

By 1906 the bison population had shrunk nearly to extinction

When settlers moved west they killed more bison (Buffalo Bill Cody): they left their carcasses to rot while commercial hunters took their hides and tongues: farmers shot them (damaged crops), Ranchers killed them (competed with cattle for grass): the army killed 2.5 million between 1870-1875

1892 = 85 bison left so they were protected in Yellowstone in 1893

today = 250,000 (97% on private ranches)

### **Every country has 3 forms of wealth: Material, Cultural, Biological**

Conservation Biologists believe that need to use these forms of capital sustainably by protecting some and helping to heal those that we have degraded

### **Land Use, Conservation, and Public Health in the United States: 1400-1960**

Europeans came to N. America in the 15th and 16th centuries. Settled in 1607

Frontier Worldview: viewing undeveloped land as a hostile wilderness to be conquered and exploited for its resources as quickly as possible

1850: 80% of land = govt. owned

1900: more than ½ country's public land was given away or sold

early conservationists = George Caitlin, Horace Greeley, Ralph Waldo Emerson, Frederick Law Olmsted, Charles W. Eliot, Henry David Thoreau

Between 1870 and 1900 the concern for environmental problems increased:

coal burning, horse manure in the street, contaminated water, inadequate garbage collection, overcrowding, horrible working conditions, disease

Theodore Roosevelt = Conservation president

1901-1909 = Golden Age of Conservation

1st Wildlife Refuge = Pelican Island 1903

T. Roosevelt tripled the size of forest reserves and transferred it to the Department of Agriculture

1905: U.S. Forest Service: Gifford Pinchot: used sustainable yield and multiple use theories

1905: Audubon Society (protects birds)

Preservationists: remaining wilderness areas on public lands should be left untouched

1912 = U.S. National Park System was created by Congress

1916 = National Park System Organic Act: parks were to be maintained so they are unimpaired for future generations: established the National Park Service (1st head = Stephen Mather)

early 1900s = improvements in public health

Jane Adams, Mary McDowell, Alice Hamilton

WWI (economic growth and expansion): Presidents Harding, Coolidge, Hoover (1921-1933) = a lot of resource removal

President Franklin D. Roosevelt (1933-1945) (Great Depression)

Civilian Conservation Corps (CCC) 1933: made jobs for 2 million unemployed people: they planted trees, restored waterways, provided flood control, protected wildlife, etc.

Taylor Grazing Act 1934: required permits + fees to use federal grazing lands + limits on the number of livestock that could be grazed

Migratory Bird Hunting Stamp Act 1934: duck hunting licenses had to be purchased by waterfowl hunters

Soil Conservation Service 1935: part of Department of Agriculture to correct soil erosion problems

Federal Aid in Wildlife Restoration Act 1937: (states have received \$2.2 billion)

Federal Aid in Fish Restoration Act 1950: helps states agencies conserve and restock game fish through tax on fishing equipment

1940 = merger to form the U.S. Fish and Wildlife Service

Writers that dealt with environmental problems = William Voight , Fairfield Osborn, Aldo Leopold, Jane Jacobs, Vance Packard

· 1938: modern version of the Food, Drug and Cosmetic Act (because 100 people died of kidney failure from ingesting lots of a tainted drug)

### **The Environmental Movement in the United States: 1960-1998**

1962 = **Rachel Carson** published Silent Spring which talked about air, water, and wildlife pollution from DDT

Wilderness Act 1964: authorized govt. to protect undeveloped tracts of public land unless Congress decides they are of national good.

1965-1970 = science of ecology: biology writers = Paul Ehrlich, Barry Commoner, Garret Hardin

### **1970s= first decade of the environment**

1st annual Earth Day = April 20, 1970 (proposed by Senator Gaylord Nelson)

1973-1974 = Oil Embargo with Arab members of the Organization of Petroleum Exporting Countries (OPEC)

Federal Land Policy and Management Act 1976: gave the Bureau of Land Management its first real authority to manage public land under its control (85% of which is in 12 western states)

late 1970s = **sagebrush rebellion** ( ranchers, miners, loggers, developers, farmers, politicians): wanted to remove most western lands from federal ownership and turn them over to the states

### **Jimmy Carter**

created Department of Energy

used the Antiquities Act (1906) to triple the amount of land in the National Wilderness System and double the land in the National Park System

### **Ronald Reagan** (sagebrush rebel)

increased private energy, mineral development and timber cutting on public lands

cut federal funding for energy conservation research (70%) and funding for renewable resources (85%)

lowered gas mileage standards

relaxed federal air and water quality pollution standards

**George Bush** (promised to be the “environmentalist president” but didn’t do much)

### **Bill Clinton**

appointed respected environmentalists to key positions

vetoed a lot of bills that would have weakened other key environmental acts

June 1992 = **Rio Earth Summit**: concerned with pollution, deforestation, biodiversity loss and global change

December 1997 = **Kyoto (in Japan) Climate Change Summit**: 160 nations signed protocol aimed at decreasing global emissions of greenhouse gases

## **Biodiversity, Conservation Biology, and Ecological Integrity**

Growth since 1980 =

scientific understanding of biological wealth

ecological processes of matter cycling, energy flow and species interactions that sustain biodiversity

**Conservation Biology** = multidisciplinary science created in the late 1970s to deal with the crisis of maintaining genes, species, communities, and ecosystems that make up the biological diversity on earth

**Ecological Integrity** = the conditions and natural processes that generate and maintain biodiversity and allow evolutionary change as a key mechanism for adapting to changes in environmental conditions

**Ecological Health** = the degree to which an area's biodiversity and ecological integrity remain intact Conservation biology has the following principles

Biodiversity and ecological integrity are necessary to all life on earth and should not be reduced by human actions

Humans should not cause or hasten the premature extinction of populations

The best way to preserve biodiversity and ecological integrity is to preserve habitats, niches, and ecological interactions

Goals and strategies for preserving biodiversity and ecological integrity of an area should be based on a deep understanding of ecological properties and processes

### **Public Lands in the United States**

U.S. Land = 42% for public use (73% of it is in Alaska and another 22% is in western states)

156 Forests and 20 grasslands (managed by National Forest Service)

Principle of sustainable yield = (potentially renewable resources should not be harvested or used faster than they are replenished)

Principle of multiple use = the same land should be managed simultaneously for a variety of uses (i.e., timber harvesting, grazing recreation and wildlife conservation)

**Today national forests are used for:**

logging

mining

livestock grazing

farming

oil and gas extraction

sport and commercial fishing and hunting

conservation of watershed, soil, and wildlife

National resource lands in the western states and Alaska are managed by the Bureau of Land Management.

508 National Wildlife Refuges (managed by the U.S. Fish and Wildlife Service) (24% of it is wilderness)

375 Units of the National Park System (54 major parks: 321 National Recreational areas, monuments, memorials, battlefields, historic sites, parkways, trails, rivers, seashores, and lakeshores: 49% of the park system is wilderness)

630 roadless areas of the National Wilderness Preservation System are managed by the National Park Service (42%) Forest Service (33%) Fish and Wildlife Service (20%) and Bureau of Land Management (5%)

Fifth Amendment of the Constitution gives govt. the power of eminent domain (you can force a citizen to sell property needed for a public good)

## Managing and Sustaining Rangelands

Almost ½ of the earth's ice-free land = rangeland. Rangeland is land that supplies forage or vegetation for grazing and browsing animals and that is not intensively managed

Most rangeland and grasslands are arid and too dry for nonirrigated crops

42% of world's rangeland is used for grazing livestock (34% of the total US land = rangeland)

2% of cattle and 10% of sheep graze on public rangelands in the US

rangeland grass = renewable resource

84% of wild mammal species and 74% of wild bird species are supported by rangeland ecosystems

rangelands are crucial watersheds and they help replenish groundwater and surface water supplies

The world has 10 billion domesticated animals and 3 billion of those digest cellulose and convert it into meat and milk

Overgrazing = destruction of vegetation when too many grazing animals feed too long and exceed the carrying capacity of a rangeland area

1st symptom = sharp decline in most palatable herbs and grasses

overgrazing compacts the soil so it can't hold as much water, soil erodes and mesquite and prickly cactus takes over Range Condition is classified as either excellent, good fair or poor

**Feral animals** are domesticated animals that have adopted a wild existence

**Riparian Zones** = thin strips of lush vegetation along streams

- help prevent floods by storing and releasing water slowly
- they are "centers of biodiversity" · provide habitats, food, shelter and water for wildlife
- 65-75% of the wildlife in the west is totally dependent on these zones
- Arizona and New Mexico have lost 90% of these zones due to overgrazing

## **Rangeland Management**

You need to “maximize livestock productivity without overgrazing rangeland vegetation”

Control the “stocking rate” (the number of each kind of animal in a given area)

**Continuous grazing** goes throughout the year; **deferred rotation** grazing involves moving livestock between 2 or more areas

predator control involves the Animal Damage Control agency (ADC)

coyotes are the main target now but the gray wolf and grizzly bears used to be and now they are endangered species

putting cattle and young lambs together and llamas and donkeys together is a good way to fight off predators

29,000 US ranchers have permits to graze about 4 million livestock (3 million of which is cattle)

10% of the permits are held by small livestock operators; the other 90% by large livestock operations (including companies like Union Oil, Vail Ski Corporation and Metropolitan Life Insurance)

permit holders pay the federal govt. a grazing fee

## **Managing and Sustaining National Parks**

There are 1,100 national parks in more than 120 countries that are larger than 1,000 hectares (2500 acres) each

The US national park system = “America’s crown jewels”; Parks are being threatened by:

tourists

poachers / hunters (3,000 elk killed in Eagle Creek Montana each year)

too little money being available



too few personnel

roads, cars, snowmobiles

mining, logging, livestock grazing, coal burning, water diversion, and urban development, and waste

54 major US parks are managed under the principle of natural regulation (the parks will sustain and restore themselves)

The two goals of the US National Park Service:

- 1) preserve nature in parks, and
- 2) make nature more available to the public: they have a \$1.5 billion annual budget

see page 633 (Miller) for a list of suggestions that the Wilderness Society and the National Parks and Conservation Association made for sustaining and expanding the park system

### **Protecting and Managing Wilderness and Other Biodiversity Sanctuaries**

6% of the world's land is either strictly or partially protected in more than 20,000 reserves and parks

North and Central America have set aside the most land (12%) and Oceania (10%) the Soviet Union set aside the least (1.1%)

Conservation biologists say 10% of the earth's land should be set aside.

### **The Biosphere has 3 zones**

- 1) **Core Area**: contains an important ecosystem with little or no disturbance from human activities
- 2) **Buffer Zone**: where activities and uses are managed in ways that help protect the core
- 3) **Second Buffer Zone / Transition Zone**: combines conservation and sustainable forestry, grazing, agriculture and recreation

Conservation Biologists believe in having habitat corridors between reserves

Economists and developers think that protecting even 6% of the earth's land is too much wilderness (areas "where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain"). About 34% of the earth's land is wilderness.

1968 = National Wild and Scenic Rivers Act which allows certain rivers to be kept free of development

1968= National Trails Act: protects scenic trails

### **Land Management, Biodiversity, and Sustainable Ecosystems**

To conservation biologists protecting biodiversity involves a whole ecosystem approach and a species-by-species approach

Gap Analysis - scientific method used to determine how adequately native plant and animal species and natural communities are protected by the existing network of conservation lands. Species and communities not adequately represented in existing conservation lands constitute conservation gaps. The idea is to identify these gaps and then eliminate them through the establishment of new reserves or changing land management practices