

PART 2: BIODIVERSITY, CONSERVATION BIOLOGY & LAND PROTECTION



OBJECTIVES FOR THIS LECTURE



- By the end of this lecture, you should be able to:
 1. Know what the Endangered Species Act (ESA) is, who oversees it
 2. Know what “critical habitat” is and why it’s important
 3. Understand what an HCP is and what it does
 4. Know the difference between a vulnerable, threatened, and endangered species
 5. Know the following species classifications are: keystone, flagship, umbrella, and indicator species
 6. Know what CITES is and how it differs from the ESA
 7. Know a few different land designations that are used to protect biodiversity

PROTECTING BIODIVERSITY

- In 1900, the egret, a large white wading bird, inspired the first wildlife protection law: The Lacey Act
- The egret was hunted to near extinction because the feathers were valued as fashion décor on ladies hats.
- Protection allowed the egrets to recover and they are no longer in danger.



Snowy egret (above right) and
Common egret (center)

Dyed egret feathers in hat.



ENDANGERED SPECIES ACT

- In 1973, wildlife conservation laws culminated in the passage of the **Endangered Species Act**.
 - ✦ About 500 species in N. America had already gone extinct due to human causes by this time.
- This is the single most effective environmental law in US history. It is mandatory, not voluntary, to comply with it.
- It does not discriminate between species that are “useful” to humans and those that are not. It protects all endangered species, subspecies (races), and distinct population segments as well as their habitats.
 - ✦ Distinct population segments are portions of species that are declining even though the species as a whole may not be declining.
- The **US Fish and Wildlife Service** oversees the Endangered Species Act.

“TAKE”



- According to the Endangered Species Act, it is illegal to “take” any individual organism that is a member of an endangered species.
 - ❖ This means accidentally and intentionally.
- “Take” means: to kill, harm, harass, annoy, disturb, prevent it from being an active and reproductive member of its species.
- Taking a member of an endangered species can result in major fines and even jail time depending on the incident.



CRITICAL HABITAT



- Adding a species to the Endangered Species List is a rigorous legal process.
- Once a species is listed, a **recovery plan** is written by the Fish and Wildlife Service to help the species recover.
- Setting aside habitat for a listed species is a major factor in every recovery plan - this protected habitat is called “critical habitat” because it is critical to the species’ recovery. A species cannot survive without adequate habitat.

CRITICAL HABITAT (cont.)



The ESA is controversial



- Most Americans support protecting endangered species.
- Opponents feel that the ESA values endangered organisms more than the livelihood of people.
 - ❖ Private land use will be restricted if an endangered species is present.
 - ❖ **“Shoot, shovel, and shut up”**: landowners conceal the presence of endangered species on their land
- But the ESA has stopped very few development projects.
 - ❖ **Habitat conservation plans** and **safe harbor agreements**: landowners can “accidentally” harm species if they improve habitat for the species in other places.

Habitat Conservation Plan (HCP)



- ▶ In 1982, an amendment was added to the Endangered Species Act called the Habitat Conservation Plan.
- ▶ In short the HCP Amendment says that a restricted amount of development may occur on land that has been designated as critical habitat as long as the developer provides mitigation.
 - ▶ So basically this made it much easier for private owners of property that fell in designated critical habitat to develop their land
- ▶ **Bottom line: This amendment seeks to find agreement between wildlife managers and private property developers.**

HCP continued...



- Typically when a Habitat Conservation Plan is established for a region, the plan protects one particular species by limiting development on critical habitat.
- The developer must somehow mitigate the damage to the habitat. This is accomplished by any number of tactics: limiting the development, paying extra fees that will be used to purchase habitat elsewhere, providing for the species on the developed site.
- The developer is then given an “Incidental Take Permit” that allows the accidental taking of an endangered organism.

CALIFORNIA GNATCATCHER

(another local example)



- The California gnatcatcher is a small bird that prefers coastal sage scrub habitat.
- There used to be a lot of this habitat in California before it was developed.
- As you might guess, as this bird's preferred habitat disappeared, so did its numbers. . . Now this species is endangered.
- There is one large chunk of coastal sage scrub habitat that still remains out near Corona and is designated as critical habitat.
- CALTRANS wanted to construct a toll-way right through this remaining habitat— so USFWS said “NO,” and CALTRANS could not build their toll-way.



CA GNATCATCHER

continued



- So CALTRANS entered into mitigation with USFWS

- ❖ **Mitigation** means that you try and lessen the impact of your actions

- ❖ So CALTRANS basically sat down with USFWS and came to an agreement of how they could continue forward with the project by making changes to it that helped lessen the impact to the gnatcatcher. Often times the agreement is that the project has to be built a certain way – other times the developing party agrees to purchase/set aside similar property.

- The CA gnatcatcher is a low flying bird – so USFWS decided they would allow the toll-way to be built **IF it was elevated**, because this would still allow for the gnatcatcher to use this habitat

- It costs A LOT of money to elevate a roadway – but CALTRANS had no other choice – they needed the road and the gnatcatcher needed the habitat.



Coastal Sage Scrub

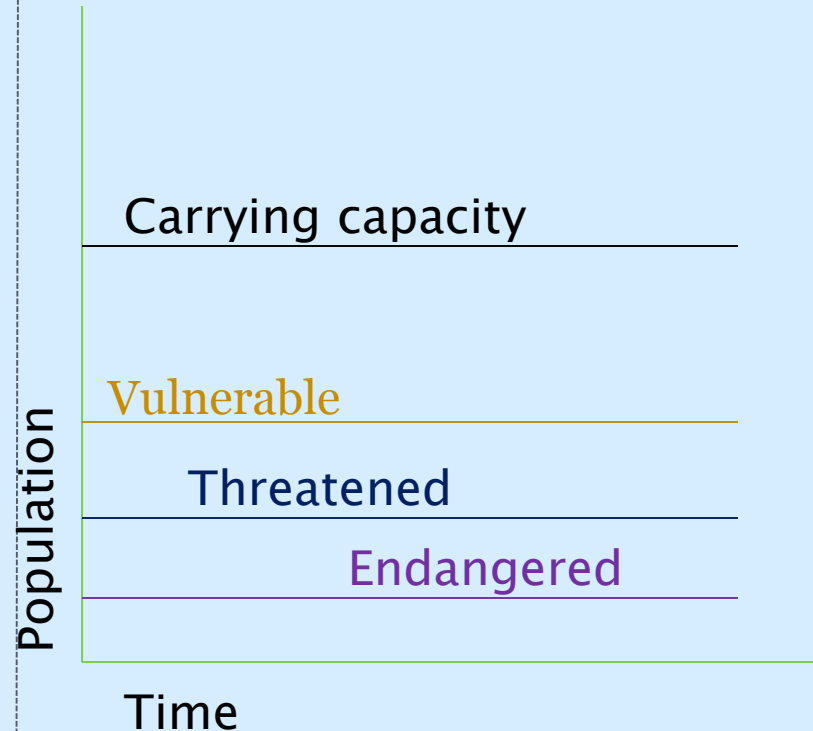
Coachella Valley Multiple Species Habitat Conservation Plan



- This is also known as the CVMSHCP.
- In the Coachella Valley, there are over 30 different endangered species that require protection by the ESA.
- There are also lots of development interests. Therefore, we have a need for an HCP in this area.
- Instead of seeking a separate critical habitat designation for each of the 30 different endangered species in the Coachella Valley, the **CVMSHCP** protects large tracts of land for **several species** at a time while working out agreements with future development.
- This protects habitat and still allows for some development without the hassle and expense of litigating for the right to develop.

3 Classifications of Declining Species

1. **VULNERABLE:** Numbers are naturally low, or are low due to human activity.
2. **THREATENED:** Numbers are low and could drop to “critically low” in the foreseeable future.
3. **ENDANGERED:** Numbers are “critically low.” Species is in imminent danger of extinction.



SPECIES CLASSIFICATIONS



- Getting a species added to the Endangered Species List can be a difficult task.
- Often, when a species is classified as a **keystone**, **indicator**, **umbrella**, or a **flagship species**, it can receive special attention and concern from policymakers. The species is more likely to receive certain protections at a faster rate.

KEYSTONE SPECIES

A species that makes a large beneficial impact on the ecosystem. Removal of the species has a large impact on the ecosystem. Examples include:

Prairie dogs



Starfish



Baobab trees



Sea otters

INDICATOR SPECIES

- These are species who are especially sensitive to environmental changes and stress. They provide early signs, or indications, of an ecosystem affected by pollution, temperature change, overharvesting, over-hunting, etc.
- Many amphibians are often indicator species and some species may be indicators of climate issues.



UMBRELLA SPECIES

- Umbrella species require large tracts of preserved habitat. Preserving their habitat benefits all the other species within the habitat.
- Bighorn sheep and grizzly bears are umbrella species.
- As it turned out – the CA gnatcatcher ended up acting as an umbrella species because the area that was protected for this little bird is also used by many other species.



FLAGSHIP SPECIES

- Flagship species are charismatic and easily attract the attention of the public. The public easily makes an emotional connection.
- Flagship species call attention to environmental concerns.



- Some species fulfill more than one role.
 - ❖ Spotted Owls indicate the health of the forest core (indicator species).
 - ❖ Preserving them means that the whole forest is preserved for other species too (umbrella species).
 - ❖ They control populations of rodent species in the forest (keystone species).
 - ❖ They brought needed attention to the Pacific Northwest forests (flagship species).



WHICH SPECIES ARE MOST IMPORTANT?



- These classifications lead to discussions about which species are more important to protect.
- Plants and invertebrates typically receive little public attention because they do not inspire emotional connections. However, they are as important, if not more important, to ecosystem processes.
- The most important point is that ALL organisms need their natural habitats in which to develop and evolve. They cannot evolve in captivity or in laboratories.
- When we lose habitat, we lose species and genetic data that cannot be replaced.

Species Approach vs. Ecosystem Approach to Conservation



- Biodiversity can be protected by protecting individual species. When a species is so close to extinction, a hands-on approach is needed. Captive breeding and release are often the tools used in this case.
 - ❖ Ex: [California Condor captive breeding](#)
- Another tactic is to protect whole ecosystems. This approach is more useful because many organisms benefit at once. It is more cost effective as well. The habitat maintains itself free of charge.
 - ❖ Ex: [Coachella Valley Preserve](#) (home of the Fringe-Toed Lizard)

C.I.T.E.S.



Convention on International
Trade in Endangered Species

CITES: Convention on International Trade in Endangered Species

- For countries that do not have sufficient wildlife protection laws, CITES (pronounced “site-eez”) is a legal framework that helps protect species.
- In 1975 international governments agreed to regulate the international trade of flora and fauna through the implementation of CITES.
- International trade of wild species is worth billions of dollars.
- CITES helps protect species so that international trade does not threaten their survival.
- Countries adhere to CITES **voluntarily**.

DIFFERENCES BETWEEN CITES AND THE ESA



Some differences between CITES and the US Endangered Species Act (ESA):

1. ESA applies only to the US.
2. ESA protects *the habitat* on which an endangered species lives or uses.
3. CITES is an international agreement among nations to regulate (restrict) the trade of species and/or their parts. For example, the Ivory Ban of 1990 outlawed the trade of ivory (elephant tusks).
4. CITES is voluntary. ESA is mandatory.

PROTECTING BIODIVERSITY



BIODIVERSITY HOTSPOTS



- **Biodiversity hotspots:** an area that supports a high number of species
- A region can get more attention and protection if it is considered to be a hotspot.
- In order to be considered a hotspot, it must have:
 - ❖ **Endemic species:** species found nowhere else in the world
 - ❖ The area must have at least 1,500 endemic plant species (0.5% of the world total).
 - ❖ It must have lost 70% of its habitat due to human impact.



There are 34 global biodiversity hotspots



2.3% of the planet's land surface contains 50% of the world's plant species and 42% of all terrestrial vertebrate species.



ECOSYSTEM SERVICES



- The trend now is that regions can receive more attention and protection if they offer a service such as water filtration, carbon sequestration, food production, etc.
- Rather than relying on the Hotspot strategy, ecologists and land managers are now identifying ecosystem services and arguing for protections based on the value of these services.
 - ❖ This also allows local people in the region to get involved in the conservation – a true long-term conservation strategy.

PARKS AND PRESERVES



- Setting aside wilderness as parcels of land protected from human activity is one way to preserve bits of biodiversity.
- The National Park and State Park systems are funded by our tax dollars. The only uses allowed on these lands consist of tourism.
- In 1872, Yellowstone National Park was designated as the world's first national park (a protected tract of land funded by a government).
- Originally, national parks were created solely for the enjoyment of people. Biodiversity was not important.
- Now, preserving plants, animals, and geologic structures is more central.



FEDERAL AREAS AND ADMINISTRATORS



✕ The **National Park Service** was created in 1916 to administer parks and monuments.

✧ 391 sites totaling 34 million ha (84 million acres)

✧ National historic sites, national recreation areas, national wild and scenic rivers

✧ 276 million visitors in 2007

✕ **National Wildlife Refuge** system was founded in 1903.

✧ 37 million ha (91 million acres) in 541 sites

✧ Administered by the U.S. Fish and Wildlife Service

✧ Wildlife havens

✧ Allows hunting, fishing, wildlife observation, photography, education



NEARBY NATIONAL PARKS AND REFUGES



[Joshua Tree National Park](#)



[Channel Islands National Park](#)



[Death Valley National Park](#)



[Sonny Bono Wildlife Refuge](#)

Other Wildlife Refuges Nearby in:

San Diego: <http://www.fws.gov/sandiegorefuges/>

Los Angeles: [Seal Beach](#)

WILDERNESS AREAS



- **Wilderness areas:** are off-limits to development of any kind and some tourism uses too.
 - ❖ U.S. Congress passed the 1964 Wilderness Act based upon Aldo Leopold's vision of preserving wilderness for the sake of wilderness.
 - ❖ Open for hiking, nature study, etc.
 - ❖ Must have minimal impact on the land.
 - ❖ Necessary to ensure that humans don't occupy and modify all natural areas.
- Established inside federal lands such as National Parks.
- Wilderness Areas receive the highest level of protection.

Parks and reserves are on the rise internationally



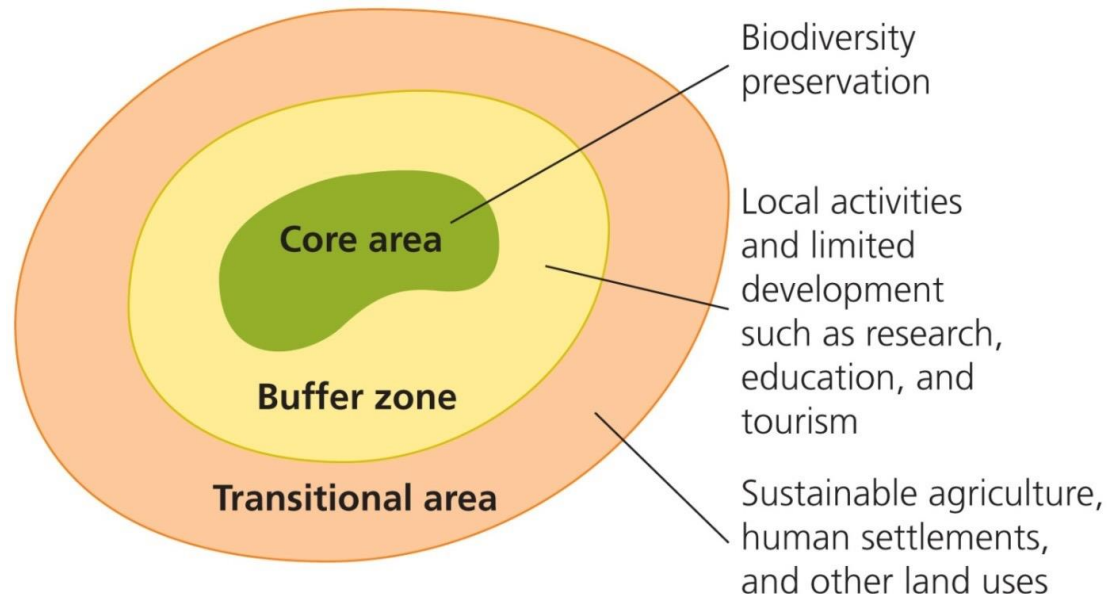
- Many nations have established national parks.
 - ❖ Benefit from ecotourism
 - ❖ Protected areas now cover 9.6% of the world's land area
- Parks do not always receive necessary funding
 - ❖ **Paper parks:** areas protected on paper but not in reality
 - ❖ **World heritage sites:** protected areas designated or managed by the United Nations
 - ✦ 851 sites across 141 countries



Map of World Heritage Sites

MAN AND BIOSPHERE PROGRAM

- Program run by UNESCO (part of the United Nations) – started in the 1970's
- Biosphere reserves are divided into 3 zones: core, buffer and transition zones. This program allows a certain restricted amount of human activity around a protected area. It helps balance the livelihood of people and ecosystem health. It also helps educate people and garners greater local support for the preserve instead of resentment.



Extractive Reserves



- An extractive reserve allows traditional inhabitants of a region to continue to live there and harvest products sustainably for income.
- This concept is used extensively in the Amazonian regions of Brazil.
- See this [Environmental Defense Fund](#) link for more information.



CONCLUSION



- Loss of biodiversity threatens to result in a mass extinction event equivalent to mass extinctions of the past.
- The primary reasons to protect biodiversity are:
 - ❖ Agriculture/food, Pharmaceuticals/medicines, Recreational/eco-tourism, Research, Ecological services, and Intrinsic value
- Primary causes of biodiversity loss are:
 - ❖ HIPPO (habitat alteration, invasive species, population, pollution, overharvesting of biotic resources) and climate change
- Human society cannot function without biodiversity's benefits.
- Science can help save species, preserve habitats, restore populations, and keep natural ecosystems intact.
- Public support for land preservation resulted in parks, wilderness areas, and other reserves.

CONCLUSION (cont.)



- You should now be able to:
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