14 nov
EXAM:
-more memorization, less concept
-good notes
-understand every thing

Conservation Biology
-flying fox : extremely important in mariana ecosystem because they are main pollinator on the island. Island has many trees that are unique to the island, KEY SPECIES. Although they aren't most abundant, if they disappear, the whole ecosystem is endangered

3 levels of biodiversity
-one is included in the other
-human activity threatens biodiversity

1. genetic diversity
   Importance of intra and inter -population genetic

Ex: cheetah, 10-15 000 in the wild, but they are low genetic variability, so they dont have resilience to mutation or environmental change, so theyre considered endangered
-northern elephant seal : lived on coast on cali, & florida, not much genetic variability

2. Specific diversity
-99% species are now extinct
-humans wiped out ?0% of mammals, birds and other animals since 1970
-50% of animal & plants might be disappeared by end of 21st century
Graphs*
- Extirpation : Local dissapearance of species
- Paddle fish : found in Canada, but now its gone, exterpated. Feed on plancton, very healthy populations in USA

3. Ecosystemic diversity
- Hot spots of bio diversity : small areas containing a lot of endemic species and a large number of endangered species (1.5% of the land area, but 33 % of animal & plants)

-endemic = unique to that region

Zoned reserves of Costa Rica : protected areas bordered by buffer zones
-only country that has seen area of forest increase because it has been protected to maintain integrity of forest
-will also add 10km around the park and protect the trees
-intermiddiate zone would be affected by development outside the park, not the case in costa rica, protected outside too

Ecosystem biodiversity

-role of keystone species in the ecosystem: species which are trophic interaction are important
Ex: seastar : zone occupied intertitle by several species of mussels, if you eliminate seastar, the one species of mussels will take over and be very abundant. Seastars control the area.
-so seastar is keystone species, eliminating it would impact structure of ecosystem
-ecosystem engineers
Species will modify habitat where they live: could be quite drastic. Like humans, we modify our environment (not in a good way)
Ex: tree, growing ecosystem, attracts birds,
Ex2: beaver : enters new area, builds a dam, reorganization of a habitat
-disruption of interaction networks

Trophic structure : food chains
-bottom up vs top down control
-primary producer are important, base of food chain…
-possible that it goes bottom up or top down , final carnivore may be most important

Food web: antarctic marine food web, links between all species involved
-an impact on one species would impact several other species ; major impact of whole chain

-case of the lemming : not one species that has more links than the lemming

-case of sea otter: top down model
-keystone species in this ecosystem
-abundance has an impact on other level of food web
-main food source is sea urcents
-algea is affected by presence of urcents or not, urcents eat algea
** graph slide 11

Deconstruction of habitats

-responsible for 73% of species in danger of extinction
-construction of infrastructure, deforestation, oil industry
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Introduction of species:
-predator or species who are successful in obtaining resources
-ex: common starling bird: introduced
    - strong competitor for nesting sites, starling take place of native species
    - more species have become less abundant because of new species

Taking measures to stop species introduction resources
    -flushing takes with sea water before entering the St - Lawrence seaway in 2005
Ex: species introduced in a new environment : zebra mussel
-each mussel filters 1L of water every day

-each female lays 100000 eggs a year, big impact on ecosystem, wiped out lots of other mussel species
-taking measures
-zebra mussels love establishing populations in pipes, caused billions of dollars to clean the pipes
-they reorganized ecosystem

Brown snake tree introduction:
-island of Guam
-12 species of birds and 6 species of snakes extinct because of it

Over exploitation:
-atlantic cod
-red tuna
-elephants, whales & rhinos ; predicted only place we'll see them is in zoos
-less than 20% of fish stocks remain healthy, probably wont stay healthy long
-almost all fish are agricultural, not from the wild. Wild fish are more nutritious

Global climat change : (greenhouse effect)
Greenhouse effect: without it the earths temperature would be -18C
-climate change = very simple problem.
-humans are emitting a lot of carbon which increases greenhouse effect
-rise in temperature linked with human activity (hockey stick graph)
-increase in CO_2 linked with increase of temperature
-decrease in albedo (reflective of a surface)
    - faster warming of oceans
    - loss arctic ecosystem, coral reefs, acidification of sea, rising sea levels
-to limit global warming we must first avoid emitting large amounts of carbon in the atmosphere. Objective is incompatible with a global economy dependant on fossil fuels (60% of the greenhouse gas effect is anthropic)
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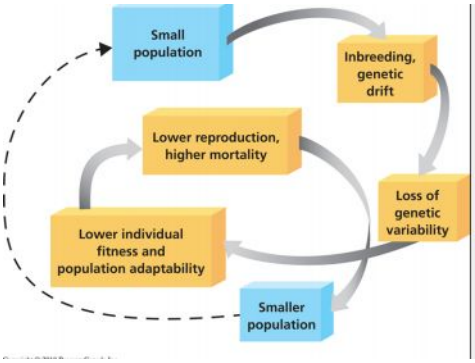
Conservation of populations
<u>Small populations:</u>
- The extinction vortex



- In reality it's really hard to rebuild a pop from few individuals
- The ones that are doomed with few individuals, we shouldn't spend a lot of time on them
- When you have a species in this vortex it becomes really difficult to rebuild this species
- *Consequences of a bottleneck effect on a populations:*
    - *Example of Greater prairie chicken:*
        - Widdly distributed with less than 50 individuals and lost a great deal a GV
        - 1993, they were stuck in extinction vortex
        - What did they do?
        - They went to other states and brought individuals to the population of illinois 2 things occurs
        - 1. Genetic drift becomes less of a factor
        - 2. You bring in new alleles, GV, instead of having + assortative mating you have negative assortative mating, this created a lot of heterozygosity
        - In 1995 the population was much higher!
        - Reproductive success augmented
    - *Example Population of cougar:*
        - They introduced cougars from texas to florida and the population went up
        - They released the sighting of cougars went up because they had no habitat
        - So it's important to have a habitat for the new pop
- *Case of extinction vortex:*
- *The effective population size of a pop:*
    - Genetic drift is powerful if population size is reduced
    - Effective population size represents the breeding potential of a population at a given time
    - If the sex ratio is unbalanced, the effective population size will be small and the impact of genetic drift will be felt
    - **Ne = 4(NmNf) / (Nm + Nf)**
        - Nm = number of reproductive males
        - Nf = number of reproductive females
        - Ne = effective size of population
        - Example of seal:
            - 50 individuals on island

        - The ones that reproduce are 2 males and 8 females
        - 4 (2 x 8) / (2+8) = 64 / 10 = 6.4
- *Minimum viable population size:*
- *Example of grizzlies:*
    - 6 populations, 1000 individuals; 5 million hectares
    - <u>Yellowstone park:</u>
        - Actual pop: 500
        - <u>Viable population:</u>
            - 70 - 90 individuals in a favoured habitat has 95% chances to survive 100 years
            - 100 individuals in a favourable habitat has 95% chances to survive
            - This pushed conservationists to push habitat beyond Yellowstone park, the thought that if they expand the zone they could accommodate a larger pop of grizzly bears
        - <u>Genetic variability:</u> yellowstone pop is lower than other pop
            - Ne = 125 bears
            - Introduction of 2 unrelated individuals every 10 years would reduce the lost of GV by half