

Ecology Topics

- 1) levels of nature
- 2) ecosystem
- 3) chemical cycles
- 4) human pop. growth
- 5) human resources
- 6) biodiversity

1st Level: Biological

Chapter 1-21: chemicals -> organism
Chapter 22: Evolution - dev. of organism over time

- 1) **chemicals - eg protein**
 - > **cells - eg muscle cell**
 - > **tissue - eg muscle**
 - > **organ - eg stomach**
 - > **organ systems - eg digestive system**
 - > **organism - eg human organism**

2nd Level: Social

Chapter 24: Human Population & Ecology

2) organism - eg human organism

-> population eg humans in Bay Area
(group of same species, same area,
interacting with each individual)

-> community eg Bay Area co
(populations of all species, same area
interacting with each population)

3rd Level: Ecological

Chapter 23: Ecosystems

3) community eg bay area

-> ecosystem eg rain forest
(all organisms in given area
plus nonliving matter and energy)

-> biosphere eg earth
(all ecosystems combined)

Consumers & Producers

photosynthesis: $\text{sun} + \text{CO}_2 + \text{HO}_2 \rightarrow \text{food} \& \text{O}_2$
respiration: $\text{food} \& \text{O}_2 \rightarrow \text{CO}_2 \& \text{HO}_2$

	<u>autotroph</u>	<u>heterotroph</u>
1) consume	sun, CO_2 , H_2O	food, O_2
2) produce	food, O_2	CO_2 & HO_2
3) process	photosynthesis	respiration
4) examples	plants	herbivore, carnivore omnivore, decomposer

Chemical Cycles

energy: continuously provided by sun

- until sun goes nova

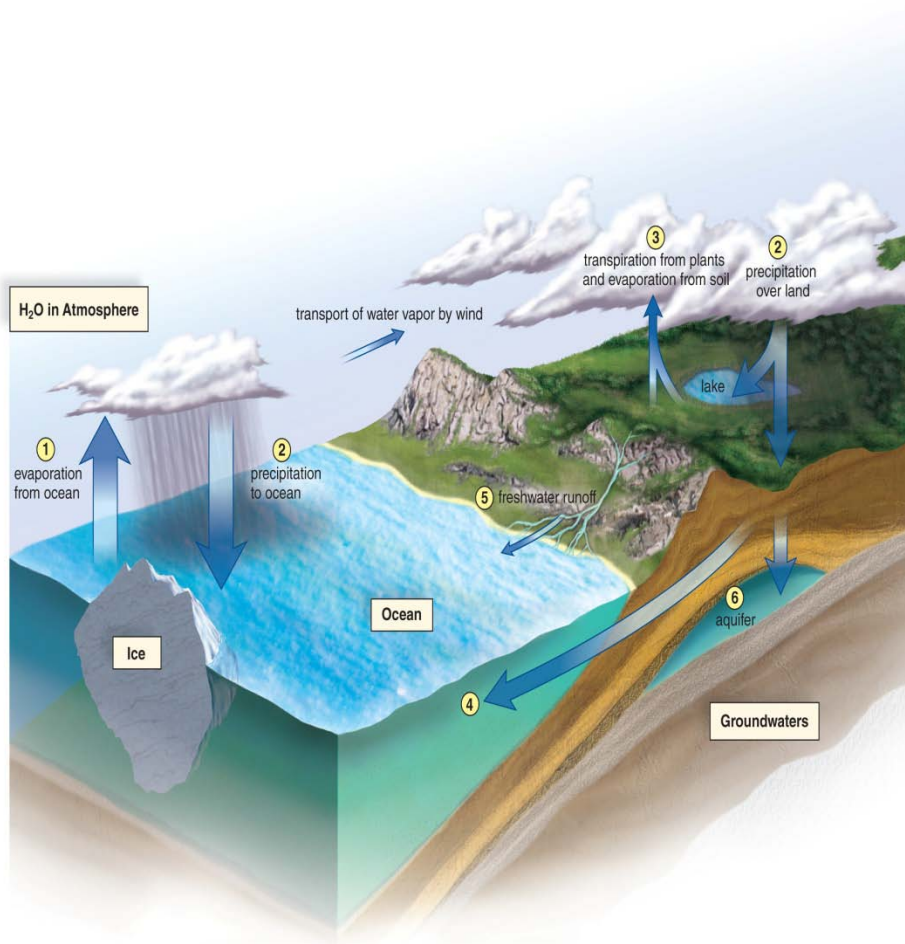
matter: limited chemicals

- cycled between organisms and earth

<u>chemical cycle</u>	<u>biomass component</u>
1) water cycle	water
2) carbon cycle	organic compounds
3) nitrogen cycle	nucleic acids, proteins
4) phosphorous cycle	phosphate ions

Water Cycle

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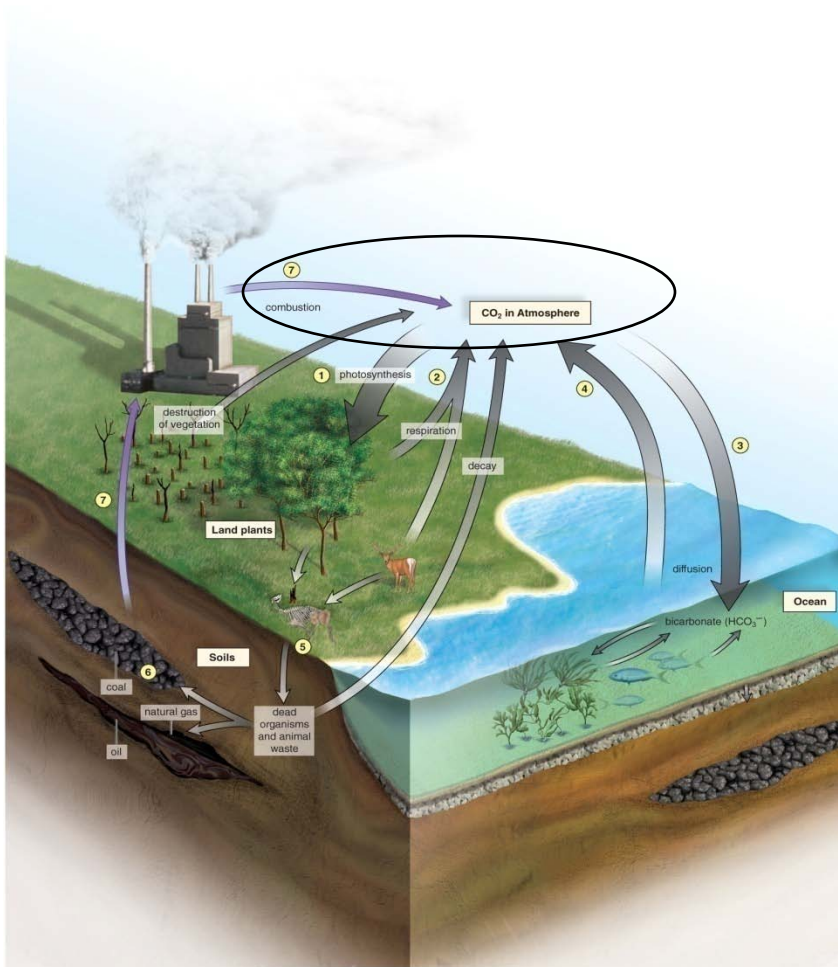


- 1) ocean evaporation
- 2) ocean & land precipitation
- 3) land evaporation
- 4) land runoff
- 5) freshwater runoff
- 6) aquifer

- fresh water (3%);
salt water (97%)
- drought: no rain

Carbon Cycle

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Trace carbon:

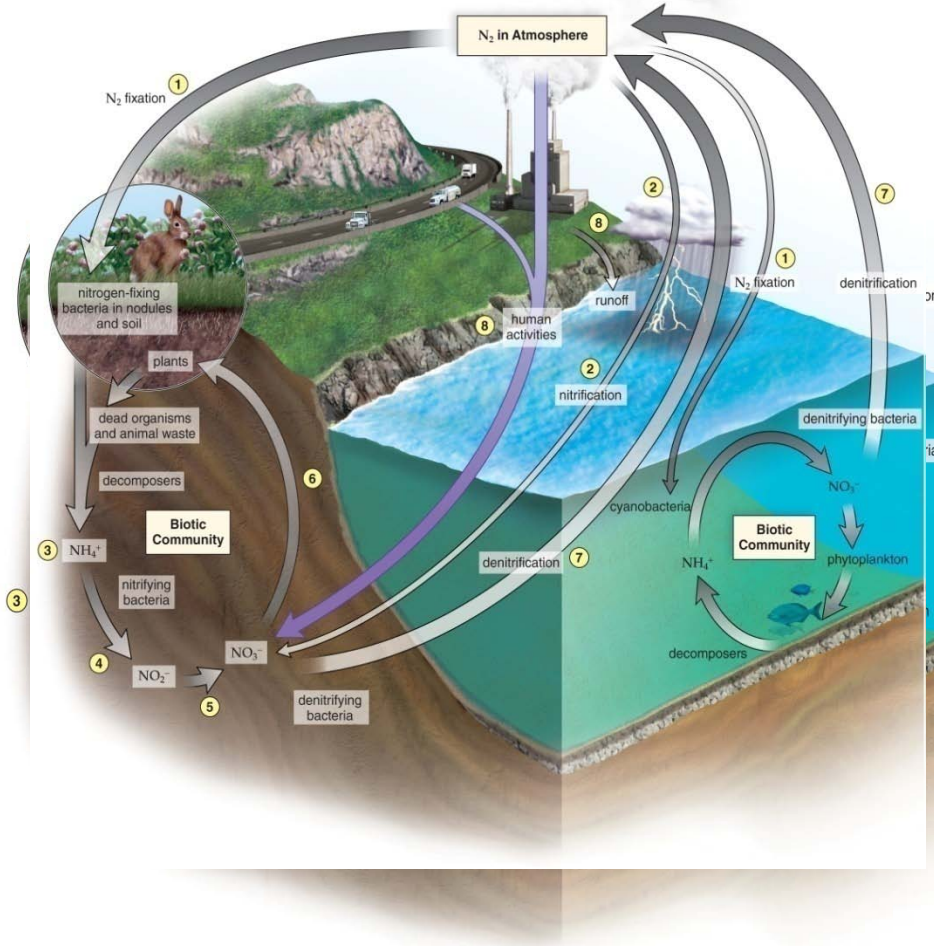
- 1) photosynthesis use CO₂
- 2) respiration gives CO₂
- 3) bicarbonate uses CO₂
- 4) respiration gives CO₂
- 5) dead organism store C
- 6) fossil fuel store C
- 7) combustion gives CO₂
(air pollution)

- in past: C in air balanced
by respiration & photosyn.

Nitrogen Cycle

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Trace 8 steps:

N_2 fixation

-> runoff

- 78% N_2 in air

- acid deposits?

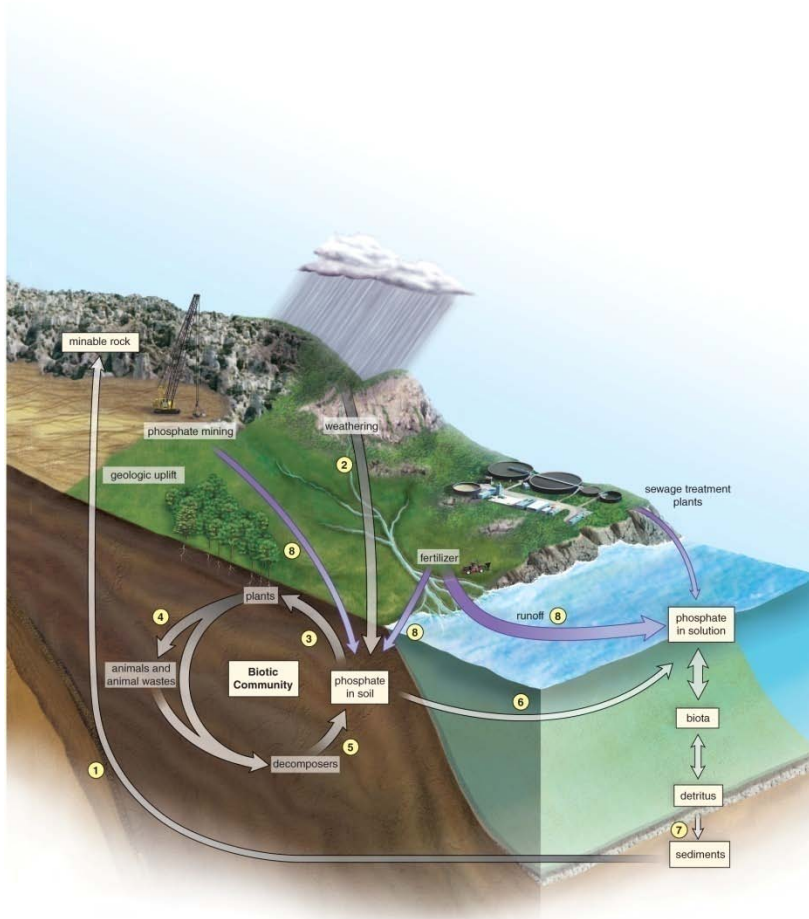
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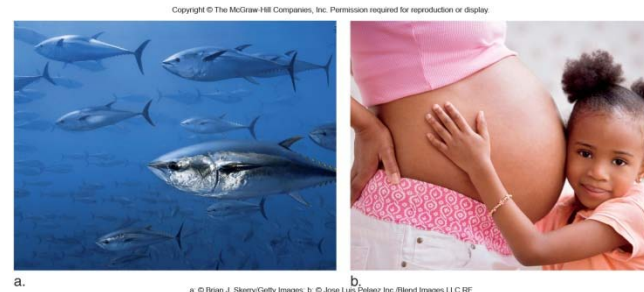
Phosphorus Cycle

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**Trace 8 steps:
phosphorus &
human activities**

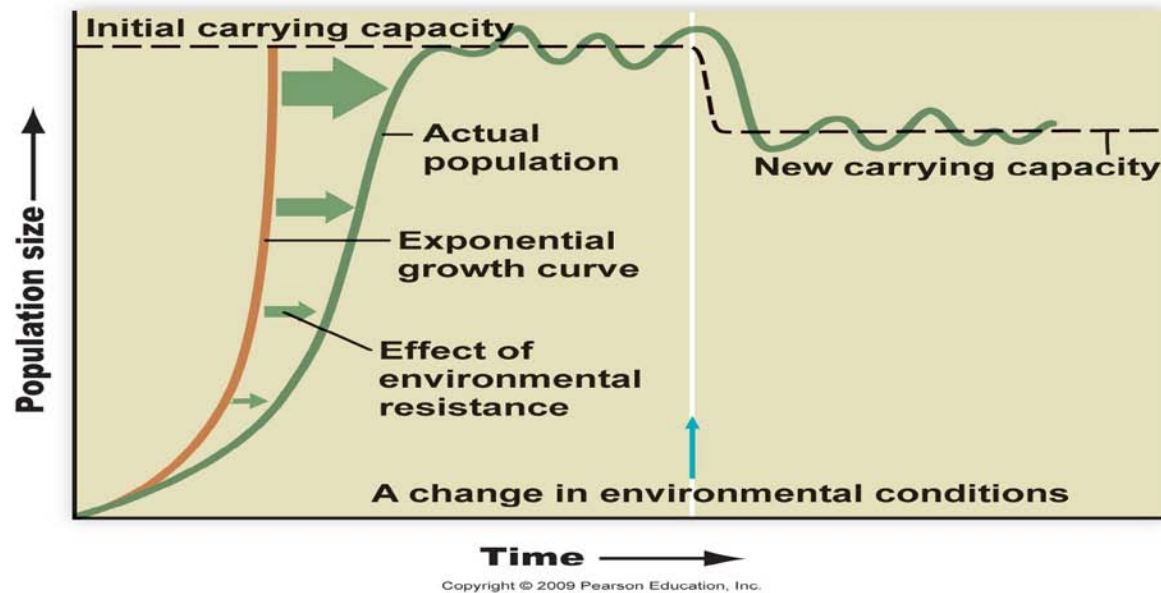
- **eutrophication:
rich water from sewage**
- **bio. magnification:
toxins move up food chain**



Human Population Growth

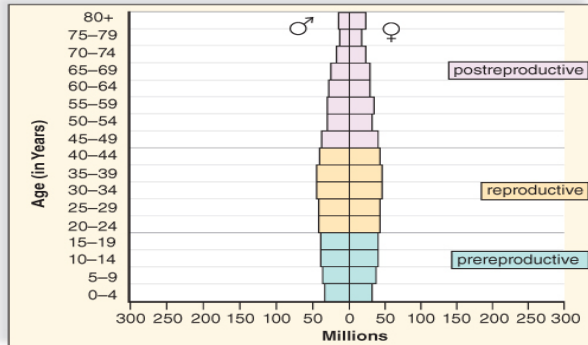
terms:

- a) actual rate - pop. increase over time
- b) biotic potential - max. growth, ideal conditions
- c) carrying capacity - max. pop., current conditions
- d) J curve - exponential growth

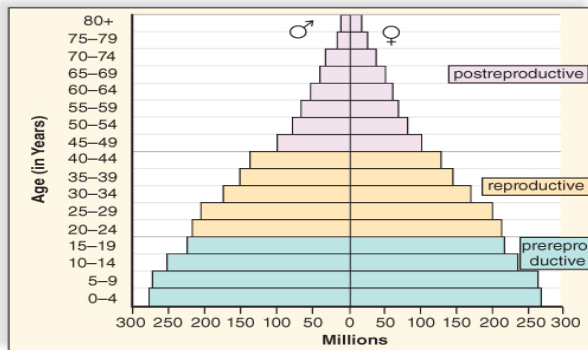


Economics & Pop. Growth

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a. More-developed countries (MDCs)



b. Less-developed countries (LDCs)



c.

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economic dev. vs birth rate
- more dev.; lower birth rate

mdc (more dev, country)

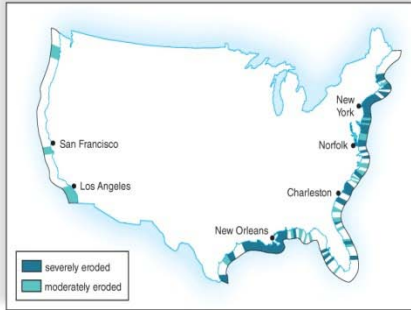
- "column" - same 3 groups

ldc (less dev. country)

- pyramid: few post-reprod.,
many reprod. & pre-reprod.

Land

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land: a place to live

land pollution:

1) beach erosion

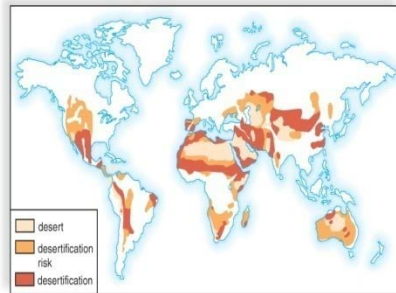
- housing on the coast

2) desertification

- overuse the land

3) deforestation

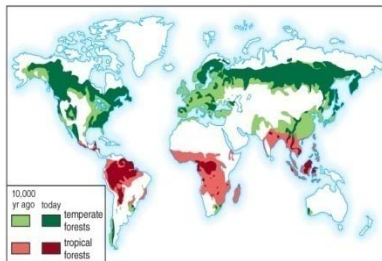
- remove too many trees



a.

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a.

b. © L. Hobbs/PhotoLink/Getty RF

Water

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water: to drink

water conservation:

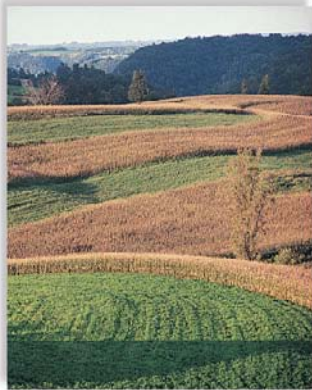
- a) drought resistant plants
- b) drip irrigation
- c) waste water recycling

sinkhole:

excess water withdrawal

Food

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a. Polyculture

a: © Laish Brnston/Visuals Unlimited; b: © Inga Spence/Visuals Unlimited; c: Courtesy V. Jane Windsor, Division of Plant Industry, Florida Department of Agriculture & Consumer Services



b. Contour farming



c. Biological pest control

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Photo by Tim McCabe, USDA Natural Resources Conservation Service

food: to eat

**farming:
many crops,
contours,
bio-pesticides**

**livestock:
needs fossil
fuel, fertilizer,
herbicides,
pesticides,
crowded, food**

Energy

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a.



c.



b.



d.

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energy: to move

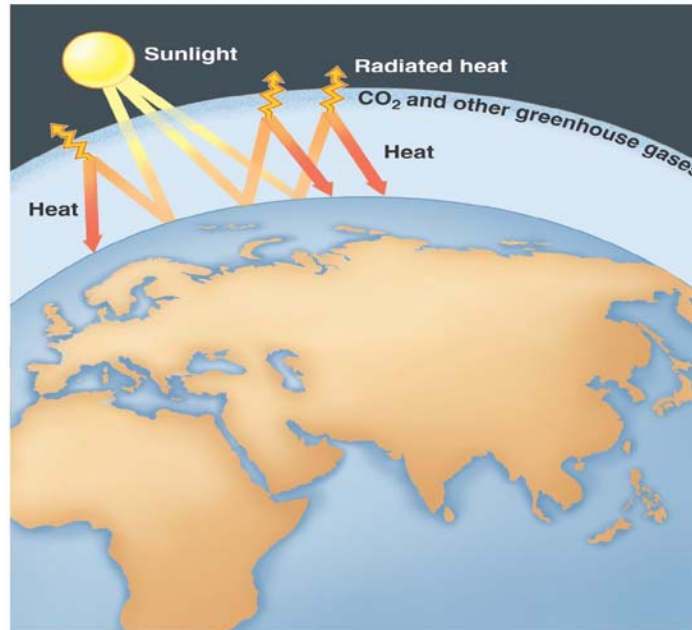
**renewable energy:
water, wind, sun (2)**

**non-renewable
world energy supply:
6% nuclear power
81% fossil fuel**

**pollution:
climate change from
greenhouse gases**

Greenhouse Effect

↑ greenhouse gases: CO_2 , N_2O , CH_4 , halons, CFC's
→ forms a "glass" like a greenhouse,
which allows sun light to pass, but retains heat
→ hot temp. on earth → global warming



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Global Warming

evidence:

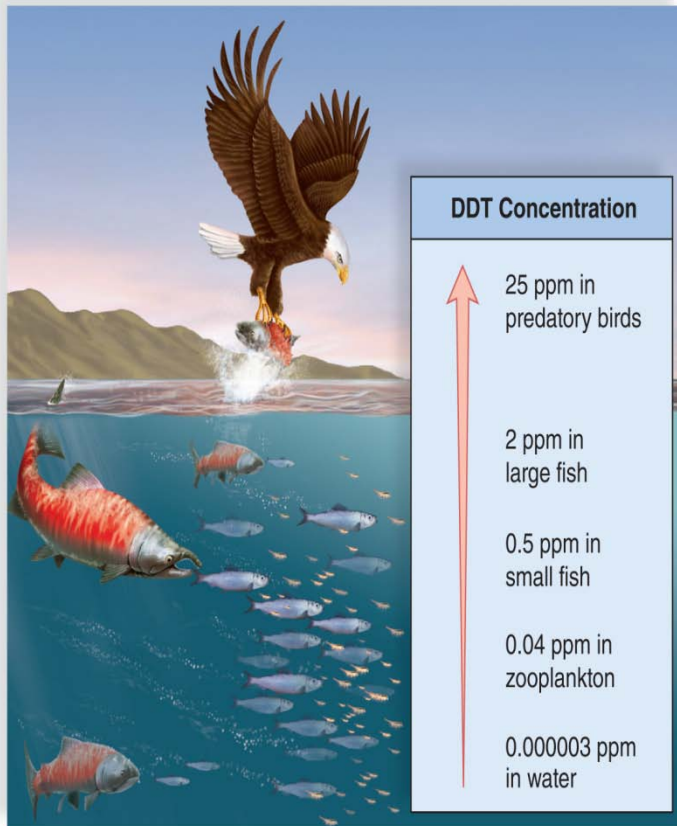
- 1) ↑ avg. global surface temp per year: 1 deg F**
- 2) ↑ CO₂ levels in atmosphere**
 - from fossil fuel burning (coal, oil, gas)**

effects:

- 1) rise in sea level from melting of glaciers**
 - loss of coastal land and cities**
- 2) climate changes, eg rain, drought**
 - loss of crops and livestock**
- 3) health effect from weather changes**

Minerals

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minerals: to build

examples: sand, gravel, metals

pollution:

1) strip mining - rain washes heavy metals (mercury, lead) into streams & rivers

2) land fills

- CFC's affect ozone layer

3) biological mag.

- pesticides (DDT) accumulate in food chain

Ozone

2 ozone (O₃) layers:

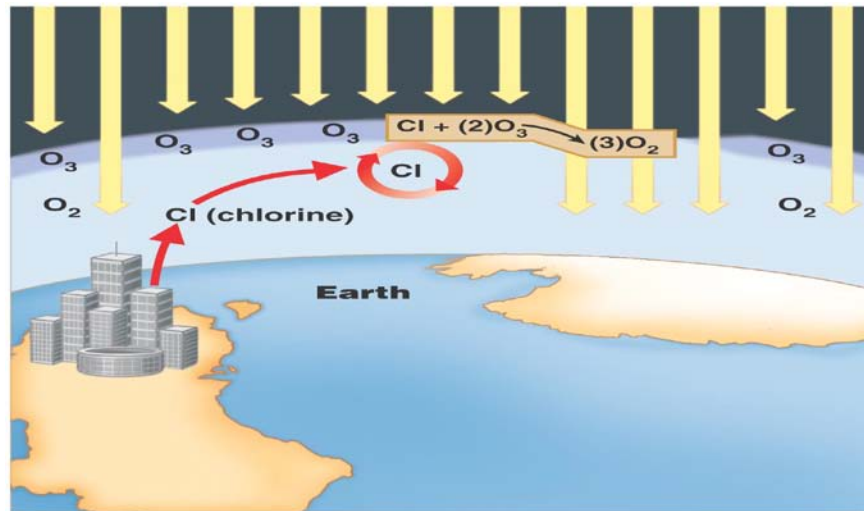
1) surface - ozone production, air pollutant

(O₂ + exhaust → ↑ O₃ → resp. prob.)

2) higher level - ozone depletion, UV rays penetration

↑CFC's → ↑O₂, ↓O₃ → ↑ O₃ holes → ↑ UV

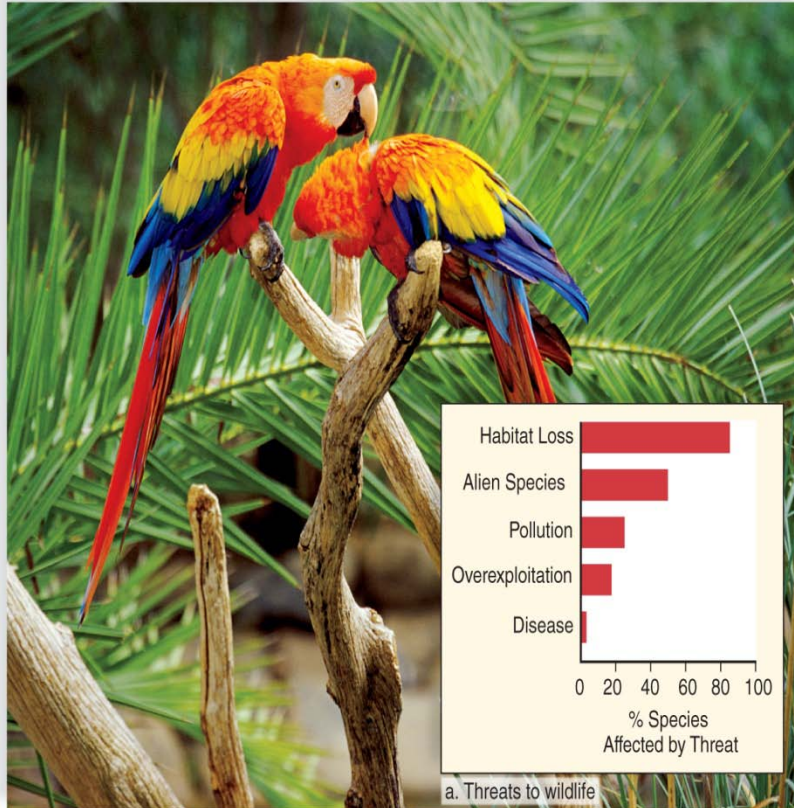
(CFC: refrigerator, air conditioner, aerosol sprays)



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Biodiversity

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b. Macaws

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biodiversity:
variety of life (species) on earth

lose biodiversity from:

- 1) habitat loss**
- 2) alien species**
- 3) pollution**
- 4) overexploitation**
- 5) disease**

***review 3 examples each**

Indirect Value of Biodiversity

indirect value*:

- 1) waste disposal**
- 2) provide freshwater**
- 3) prevent soil erosion**
- 4) maint. biogeochem. cycles**
- 5) regulate climate**
- 6) ecotourism**

***review 3 examples each**