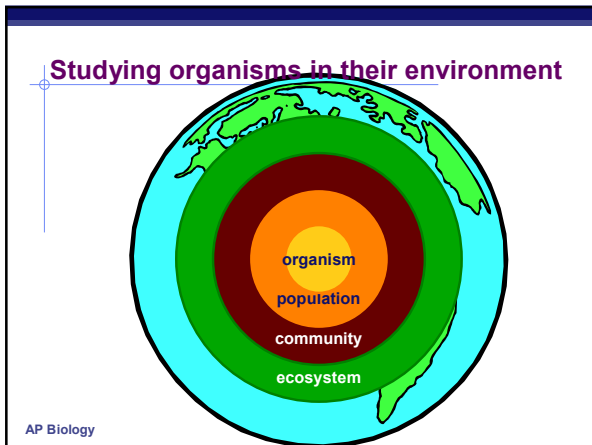


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Essential questions

- What limits the production in ecosystems?
- How do nutrients move in the ecosystem?
- How does energy move through the ecosystem?

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Ecosystem

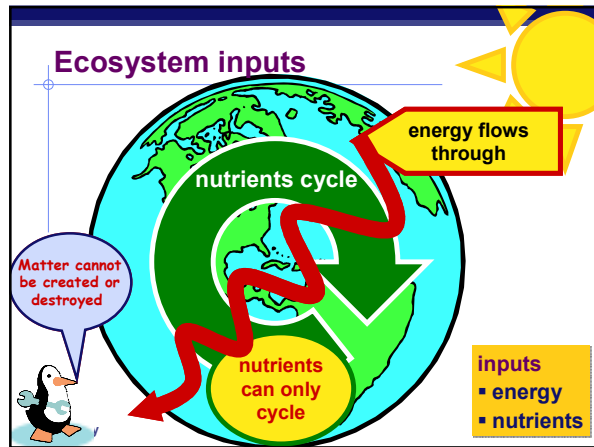
- All the organisms in a community plus abiotic factors
 - ♦ ecosystems are **transformers of energy** & **processors of matter**
- Ecosystems are self-sustaining
 - ♦ what is needed?

▪ capture energy
▪ transfer energy
▪ cycle nutrients



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Ecosystem inputs



energy flows through

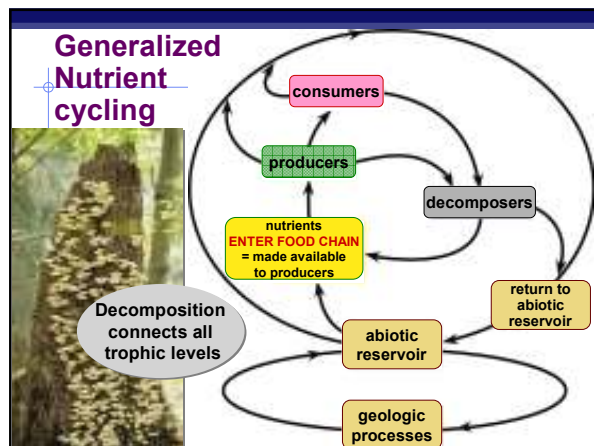
nutrients cycle

Matter cannot be created or destroyed

inputs

- energy
- nutrients

Generalized Nutrient cycling



consumers

producers

decomposers

nutrients ENTER FOOD CHAIN = made available to producers

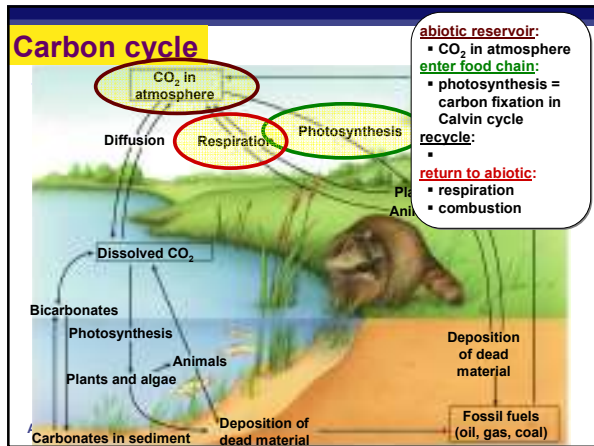
return to abiotic reservoir

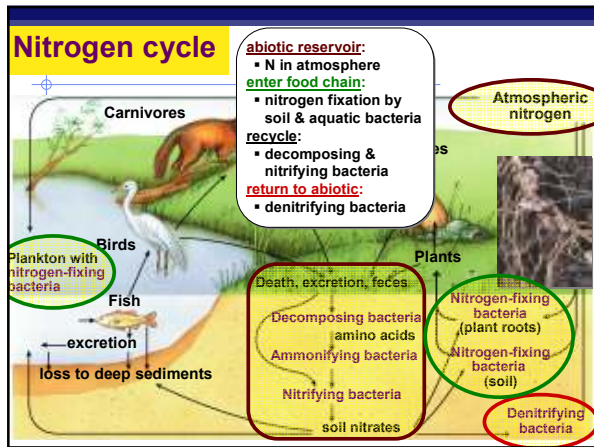
abiotic reservoir

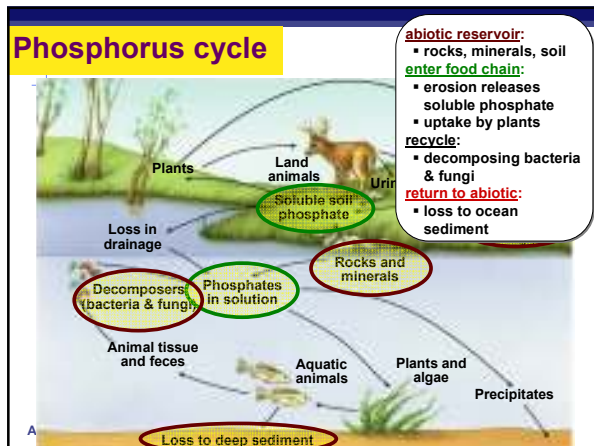
geologic processes

Decomposition connects all trophic levels

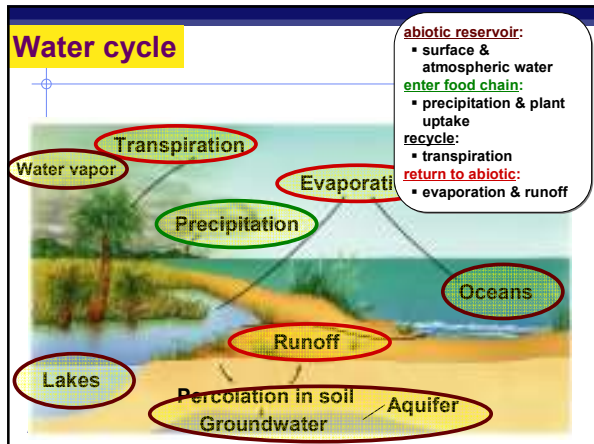
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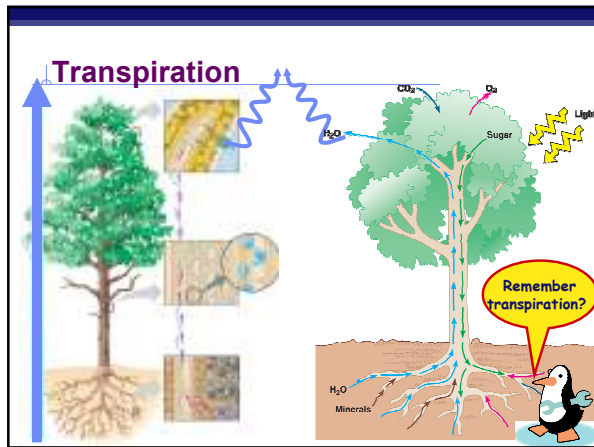






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Breaking the water cycle

- Deforestation breaks the water cycle
 - ◆ groundwater is not transpired to the atmosphere, so precipitation is not created

forest → desert
desertification

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Repairing the damage

- **The Greenbelt Movement**
 - ◆ planting trees in Kenya
 - ◆ restoring a **sustainable** ecosystem
 - ◆ establishing democracy
 - ◆ empowering women

Wangari Maathai

Nobel Peace prize 2004

Studying ecosystems

Hubbard Brook Experimental Forest

38 acre deforestation

7800 acres

Effects of deforestation

- 40% increase in runoff
 - ◆ loss of water
- 60x loss in nitrogen
- 10x loss in calcium

nitrate levels in runoff

Concentration of nitrate (mg/l)

Year

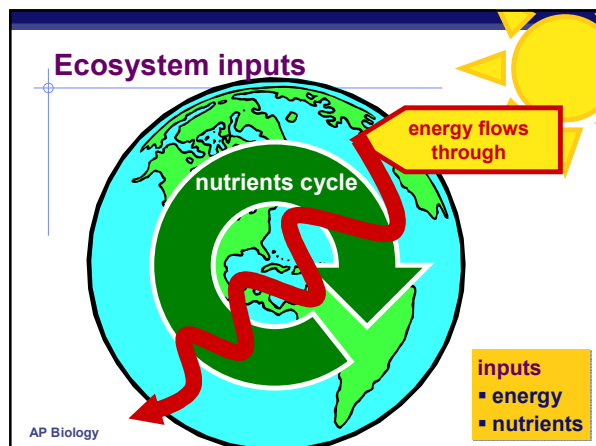
Deforestation

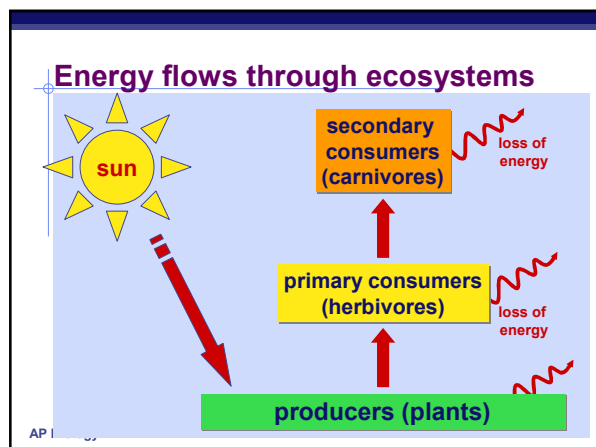
loss into surface water

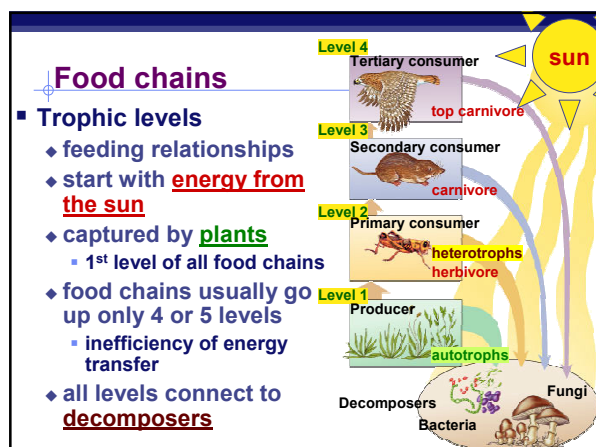
loss out of ecosystem!

Why is nitrogen so important?

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Inefficiency of energy transfer

- Loss of energy between levels of food chain
 - To where is the energy lost? **The cost of living!**

17% growth
only this energy moves on to the next level in the food chain

33% cellular respiration

50% waste (feces)

energy lost to daily living

sun

Ecological pyramid

- Loss of energy between levels of food chain
 - can feed fewer animals in each level

1,000,000,000 J of sunlight

1,000,000 J

100,000 J

100 J

1 J

Primary producers

Primary consumers

Secondary consumers

Tertiary consumers

sun

Humans in food chains

- Dynamics of energy through ecosystems have important implications for human populations
 - how much energy does it take to feed a human?
 - if we are meat eaters?
 - if we are vegetarian?

Trophic level

What is your ecological footprint?!

try eaters

corn

Human vegetarians

Human meat-eaters

Cattle

Corn

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Food webs

- Food chains are linked together into **food webs**
- Who eats whom?
 - a species may weave into web at more than one level
 - bears
 - humans
 - eating meat?
 - eating plants?

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Any Questions?? We're working on a lot of them!

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