

IMPORTANCE OF ENVIRONMENTAL EDUCATION FOR SUSTAINABLE DEVELOPMENT

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INTRODUCTION

- About Pollution
- Present status
- Role of Environment Education



EFFECT OF GLOBAL WARMING



- Melting of Ice in North and South Pole.
- All the Water Drained to Sea.
- Rise in Sea Level.

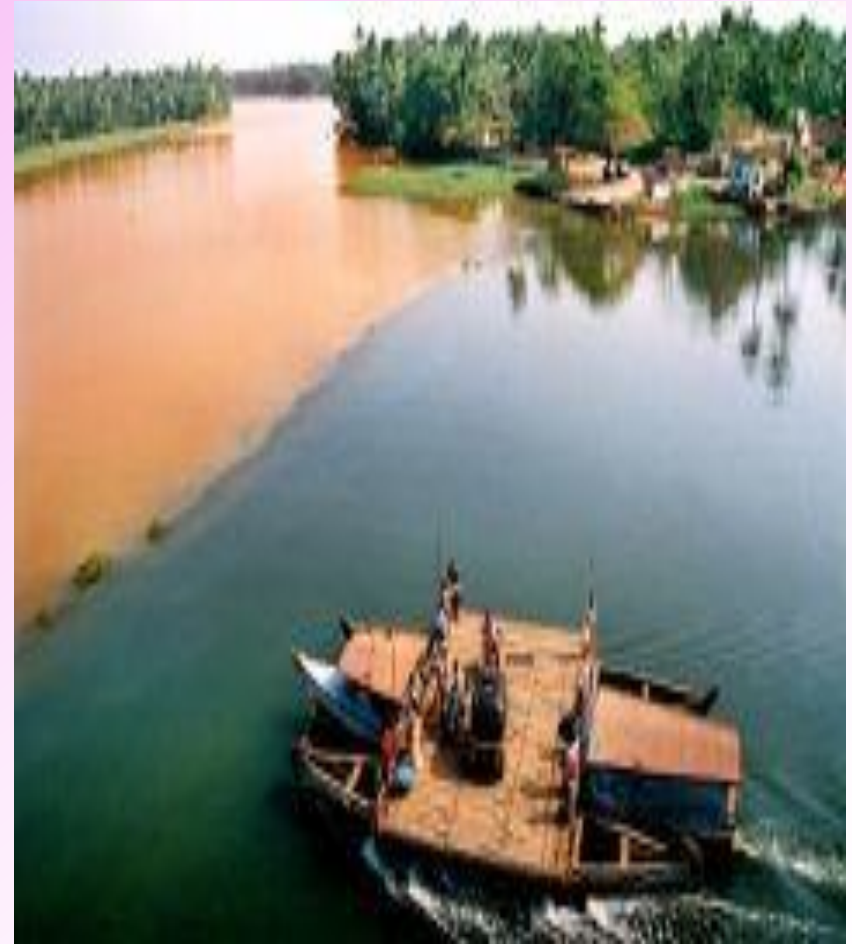
So, What is Effect?



Air Pollution

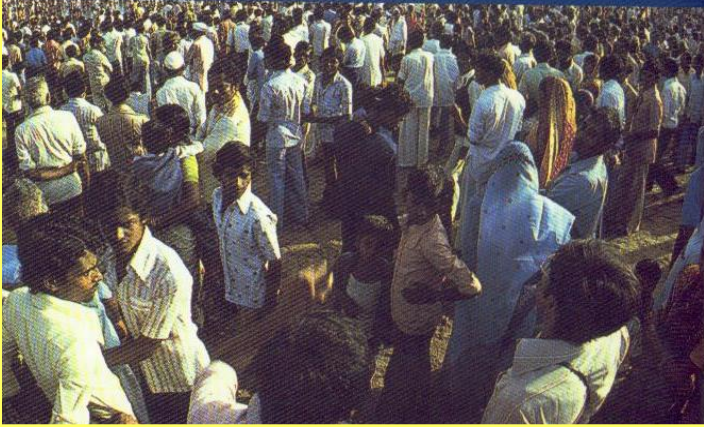


Water Pollution



TODAY'S PROBLEMS

It is only a matter of time before the world runs out of conventional fuels to support the needs of an ever-increasing population.



Natural Calamity - TSUNAMI



For Example Effects: 26 December 2004



TYPES OF POLLUTION

Every day, earth becomes more and more polluted.

- ***Air pollution*** fills our lungs with **deadly substances**.
- ***Water pollution*** is rapidly eradicating what little freshwater we have left.
- ***Land pollution*** is causing once-fertile lands to become little more than **deserts**



Awareness about the following issues are needed.

- Difference between sustainable development and environmental sustainability.
- Unique definition for sustainable development
- Will depending on Science and Technology alone deliver environmental sustainability?



Sustainable development and environmental sustainability

Definition for sustainable development :

“ Development that meets the needs of the present without compromising the ability of future generation to meet their own needs”

- The resource base is not inexhaustible
- sustainable development is economic development
- Without environmental sustainability it is impossible to achieve sustainable development.



Unique definition for sustainable development:

An indicator is needed

- for comparing the relative progress made by different countries towards sustainable development at a given time or
- for measuring progress made by a given country or region over time.



- operational definition must be based on the reduction in consumption of goods and services by the affluent within and between nations.
- The production and consumption must be curbed to achieve even a modest degree of sustainable development and determined efforts must be made to reduce consumption through formal education



Science, technology and environmental sustainability

Role of science and technology in delivering environmental sustainability:

- sustainable development and global environmental sustainability achieved not only with the application of science and technology alone. Example : USA
- progress towards sustainable development is dependent upon a fundamental change in societies' attitude to nature and the environment
- to bring about this change of attitude is education in moral and ethical philosophy. In the young minds it is essential to reinforce the environment-respecting moral values.



Can science and technology deliver sustainable development

- impacts of science and technology
- turnout to be good or bad is determined by their environmental impacts.
- economic development through industrialization
- World Bank and International Monetary Fund



Benefits of Science

- paying a high 'price' for it in terms of environmental degradation
- this has serious implications for future generations.
- science and technology can help the process of sustainable development in a limited way but they cannot deliver them.



NEED FOR ENVIRONMENTAL EDUCATION

- All major natural resources in the country are in grave danger of irreparable damage.
- A society cannot survive if its natural resources are rendered unfit for use by its people.
- The only hope of salvaging this grave situation is by making **the young** aware that they need to proactively begin to protect the environment they will inherit.
- Science and Technology can help in a limited way but cannot deliver it.



NEED FOR ENVIRONMENTAL EDUCATION (Contd.)

- The moral and ethical education for changing people's attitude
- To protect children living in polluted regions, environmental education represents a relevant means of prevention
- It is need for the hour to propose the environmental education with the essential elements of moral philosophy.
- For conceptual change



Essential components Of The environmental education

- Alerting the public to the need to achieve global sustainable development and the likely consequences of failing to do so.
- Focusing the educational curricula for global sustainable development by incorporating the know – how and skills and also the moral imperatives.



Curriculum development

Reasons for including moral education in Engineering Curricula:

- As future planners, designers, builders and decision makers , students shoulder special responsibility in protecting the integrity of nature and the natural environment.
- Human beings are rational creatures who have an innate need to rationalize all their actions and thoughts .Moral philosophy provjdes this rationale, and by doing so gives us our humanity.
- Albert Einsteins statement “Science without philosophy is just mechanics”.



Criteria for curriculum development:

- The focus must be on reducing consumption with a view to achieving sustainability. The content should be holistic, covering all essential aspects.
- The content should comprises two strategic elements:

The '**end- of- the pipe**' element based on science and technology to deal with pollution already produced.

The '**before-the-pipe**' element concerned with pollution prevention and reduction.



MAJOR AREAS TO BE COVERED

Curriculum units and materials have to be developed in five areas:

- 1. Air Quality**
- 2. Ecosystems & Biodiversity**
- 3. Energy Resources**
- 4. Land Use**
- 5. Water Quality**



CURRICULUM

- **Air** - acid rain, indoor air pollution, ozone, radon
- **Conservation** - energy, environmental stewardship, natural resources, pollution prevention
- **Ecosystems** - ecology, endangered species, global warming, habitats, watersheds
- **Human Health** - drinking water, fish advisories, indoor air, lead, ozone depletion, pesticides, radon, smog
- **In Your Neighborhood** - databases, local issues, maps
- **Waste & Recycling** - garbage, household, hazardous & solid waste, landfills, superfund cleanups, trash
- **Water** - drinking water, ecosystems, lakes, oceans, rivers, water pollution, watersheds



IMPORTANCE OF WATER RESOURCES

- According to the latest census of India statistics, only 38 percent of the 192 million households in India enjoy the privilege of grossly under-priced piped water supply.
- “Water is a resource which is much too free.
- Under-pricing of this vital resource has ironically put it beyond the reach of the poor majority.
- **A resource conscious society should carefully calculate the cost — and price — of its natural resources.**
- Since we haven't done so, there's a lot of pilferage and waste.
- Water should be a costed resource, only then will we use and save it as a precious resource.
- Water management should receive top priority as environment education is introduced in schools and colleges





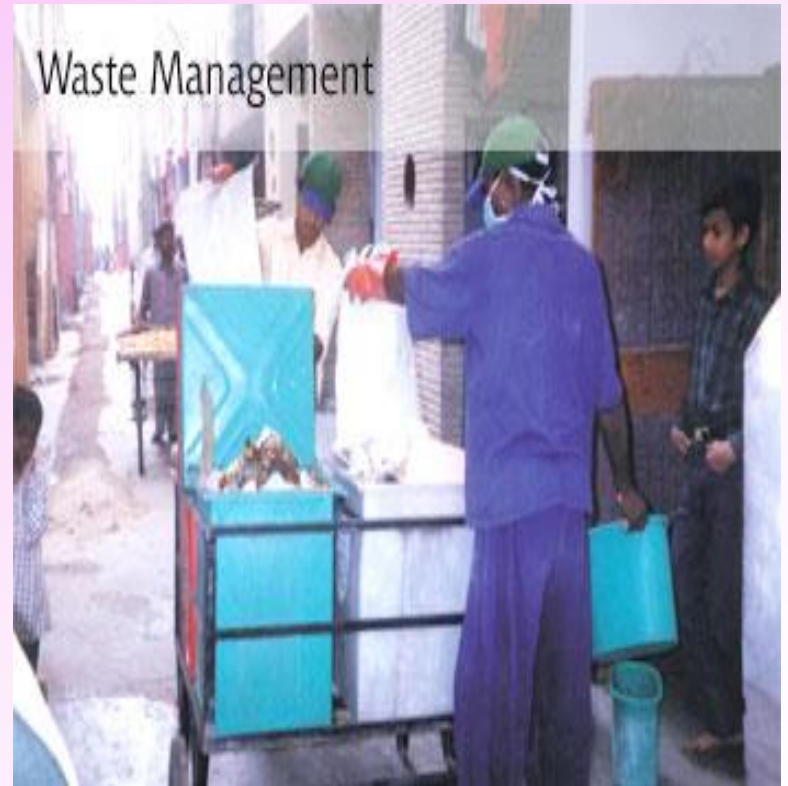
- Though children and youth in rural India are physically closer to nature, they seldom have access to natural resources to satisfy their basic needs.
- For instance though they may live beside a river, it's rare for rural youth to have experienced piped water.
- Instead river water is transported across hundreds of miles to cities. Continuous mismanagement and waste of water resources and years of large-scale deforestation has transformed India from a once water-rich society into a water-insecure nation.



A black and white line drawing of a suburban street scene. On the left, a single-story house with a chimney and a garage is shown. A person is walking on the sidewalk in front of the house. To the right of the house, another person is mowing the lawn. A car is driving on the road, and a person is crouching on the sidewalk in the foreground. The scene is set in a suburban neighborhood with a winding road and some trees in the background.



Management of waste



Today's status of Environmental Education

- While environment education is a compulsory subject in schools, Children are just mugging another subject — environment studies.
- For example the prescribed curriculum won't help a student in getting a mound of rubbish outside a house or school cleared.
- Students are being taught mere facts and figures.
- We have to make **our children to realise that they are part of the problem, and therefore they have to be part of the solution**



Effective Handling of EE

- Mandating environment education as a boring study subject is the best way to kill it.
- Instead it should be introduced as a voluntary, extra-curricular activity to arouse the interest and awareness of students in green issues.
- Indeed environment education as a hands-on extra-curricular activity rather than an academic classroom subject is arousing growing enthusiasm across the country.
- Enhancing research activities by providing incentives



Understanding environmental behavioural change through communication

- Developing a 'responsible environmental behaviour' became one of the tasks of environmental education
- The 'responsible environmental behaviour' is defined as “ the whole of actions of an individual within the society, that takes into account, in a conscious way, the perennial and harmonious relationship between these actions and environment”.
- Communication is a way of approaching and explaining processes in society and it can be defined as “ the exchange processes among the individual and group members of a given society”.



Creating Environmental Awareness

- Global Learning and Observations to Benefit the Environment (GLOBE)
- (NASA), USA. Over 50,000 schools all over the world, of which 86 are in India, are enrolled in the GLOBE programme.
- A School in Lucknow, they have set up a small weather monitoring station in their school. Children use the station to maintain temperature and cloud charts, measure rainfall, gather weather-related information and feed it into the GLOBE website. The data is then used to forecast worldwide weather trends and to develop environment protocols,”



Conclusion

- Effective policy must be implemented to curb consumption by the affluent
- We need moral education to instill genuinely environment respecting moral values in the young student society.
- Conventional educational methodology is no longer adequate for the real needs of tomorrow
- Though there are definitional and implementation flaws, environment NGOs and activists need to be given credit and accolades for creating a nation-wide awareness of the crisis of environment deterioration.



- Future student generation must acquire knowledge and skills in technologies and keep pace with rapid advances in practically in all areas.
- The communication perspective opens the door to another kind of tools that environmental educators can use in order to improve the educational practice.
- **Minds on** experience is also needed with **Hands on** experience.



Education For Life
Education Through Life
Education Throughout
Life

Mahatma Gandhi



THANK YOU



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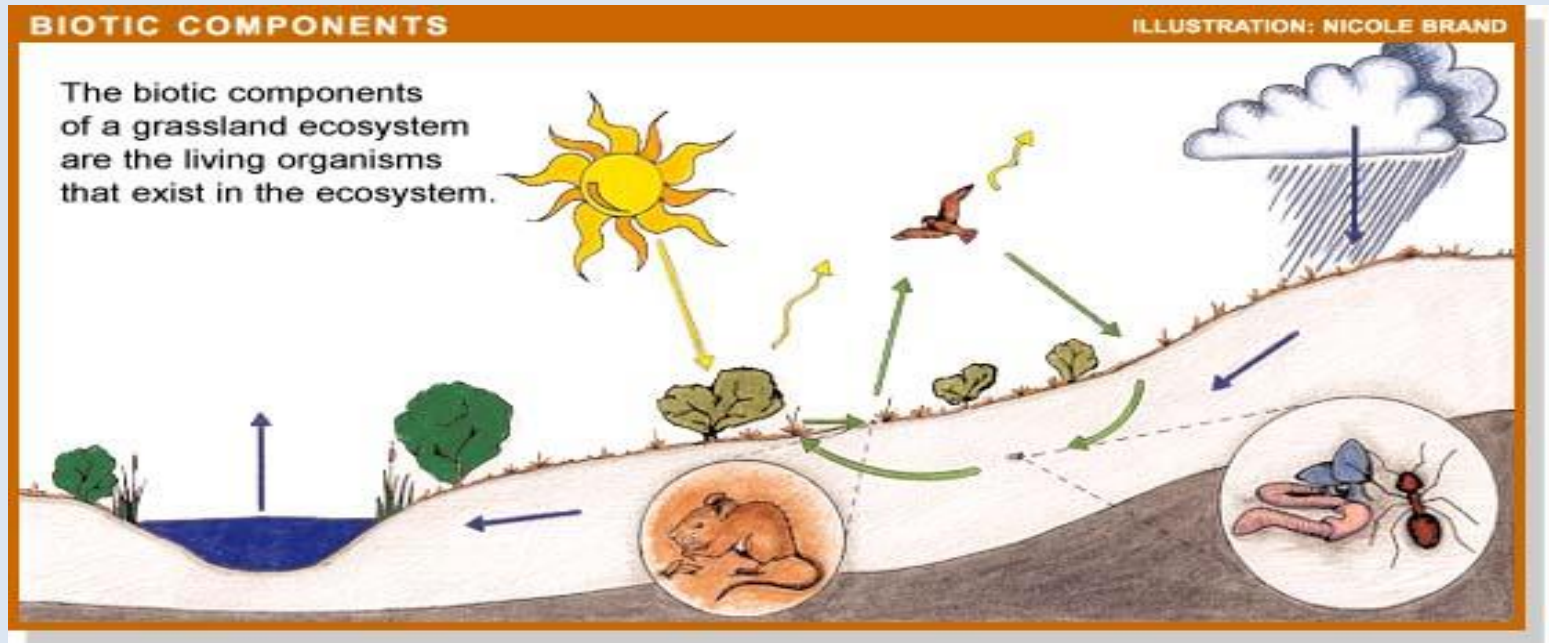
Ecology



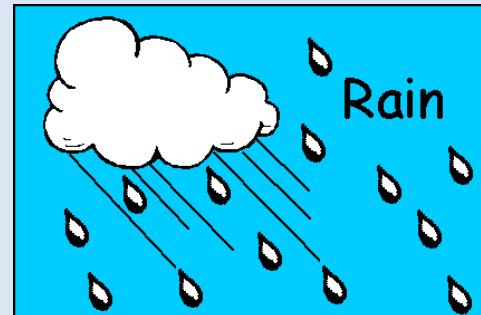
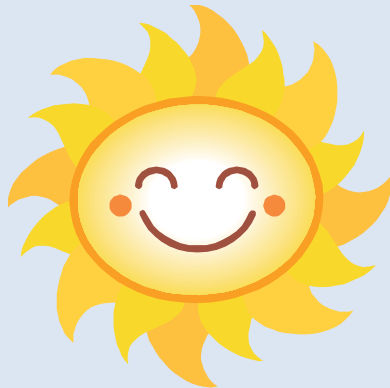
Ecology—the scientific study of interactions between different organisms and between organisms and their environment or surroundings



Biotic—living factors that influence an ecosystem



Abiotic—non-living factors that influence an ecosystem



Producers

A. Sunlight is the main energy source for life on earth

B. Also called autotrophs

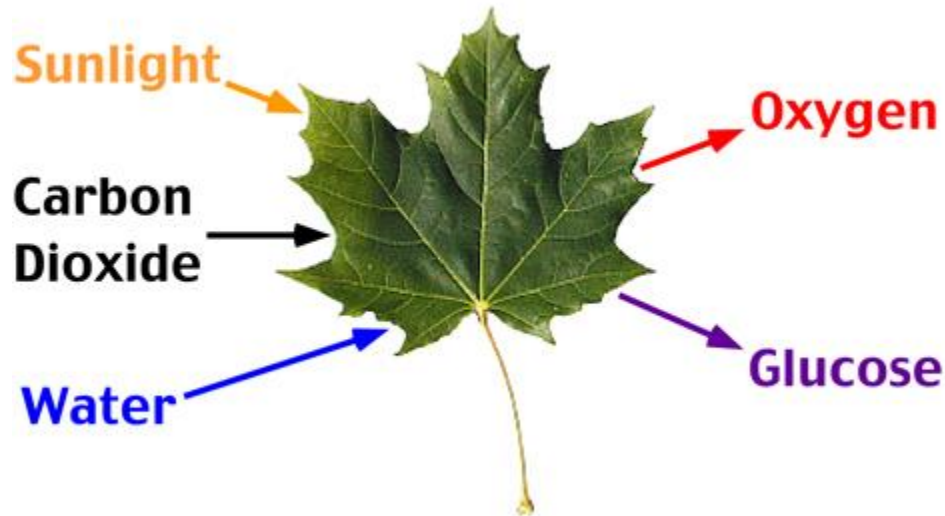
C. Use light or chemical energy to make food

1. Plants
2. plant-like protists (algae)
3. Bacteria



D. Photosynthesis—use light energy to convert carbon dioxide and water into oxygen and carbohydrates

(Remember: $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{Light Energy}} 6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6$)



E. Chemosynthesis—performed by bacteria, use chemical energy to produce carbohydrates

Consumers

- A. Organisms that rely on other organisms for their energy and food supply
- B. Also called heterotrophs



Herbivores—obtain energy by eating **only plants**



Carnivores—eat **only animals**

Omnivores—eat **both** plants and animals



Decomposers—breaks down dead organic matter

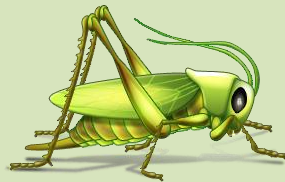
Feeding Interactions

- A. Energy flows through an ecosystem in **one direction**—**from the sun** or inorganic compounds **to autotrophs** (**producers**) and then **to heterotrophs** (**consumers**)

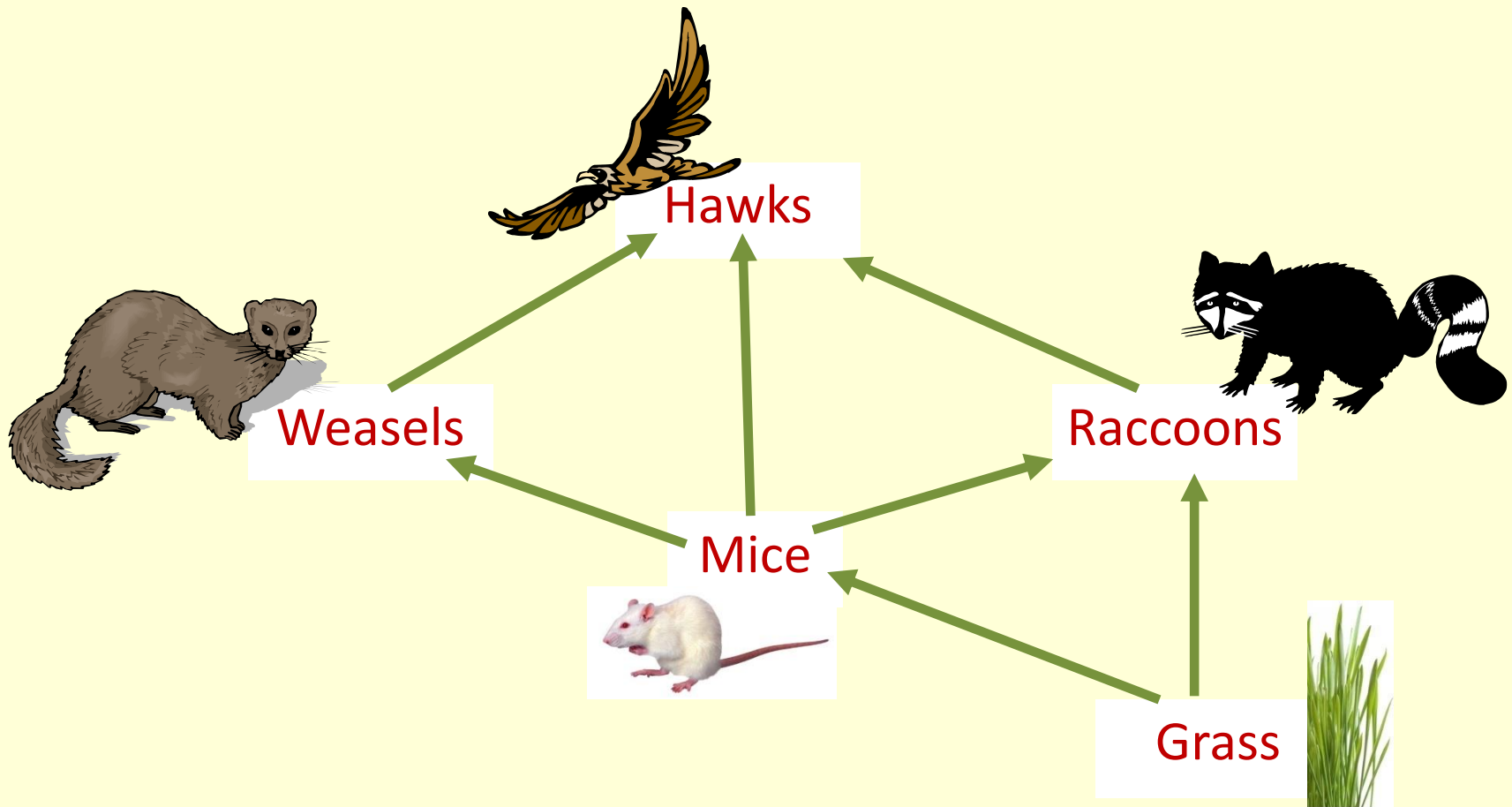
B. **Food Chain**—series of steps in which organisms **transfer energy** by eating and being eaten

1. Arrows go in the **direction** of how energy is **transferred**
2. Start with **producer** and end with top **consumer** or carnivore

Ex: **grass** → **cricket** → **frog** → **raccoon**



C. Food Web—network of food chains within an ecosystem

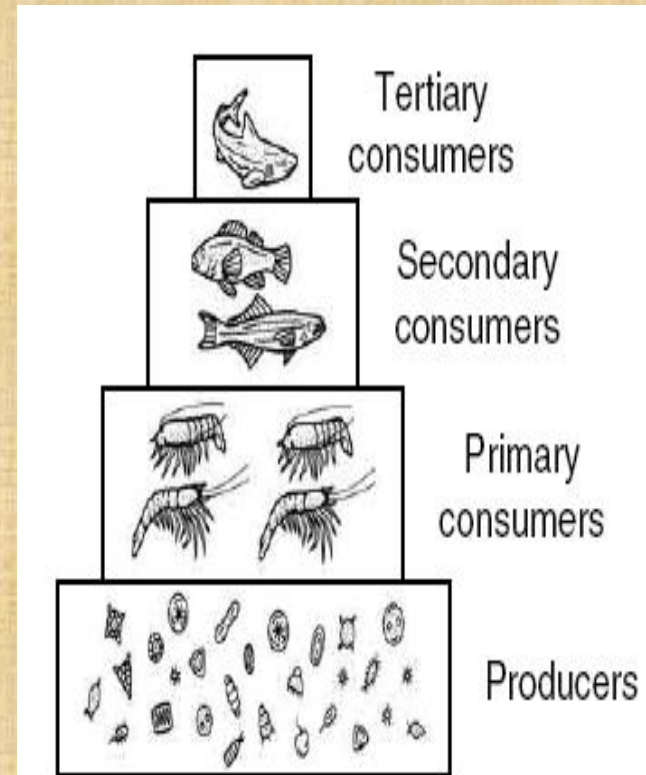


Which of the organisms above is the producer? **Grass**

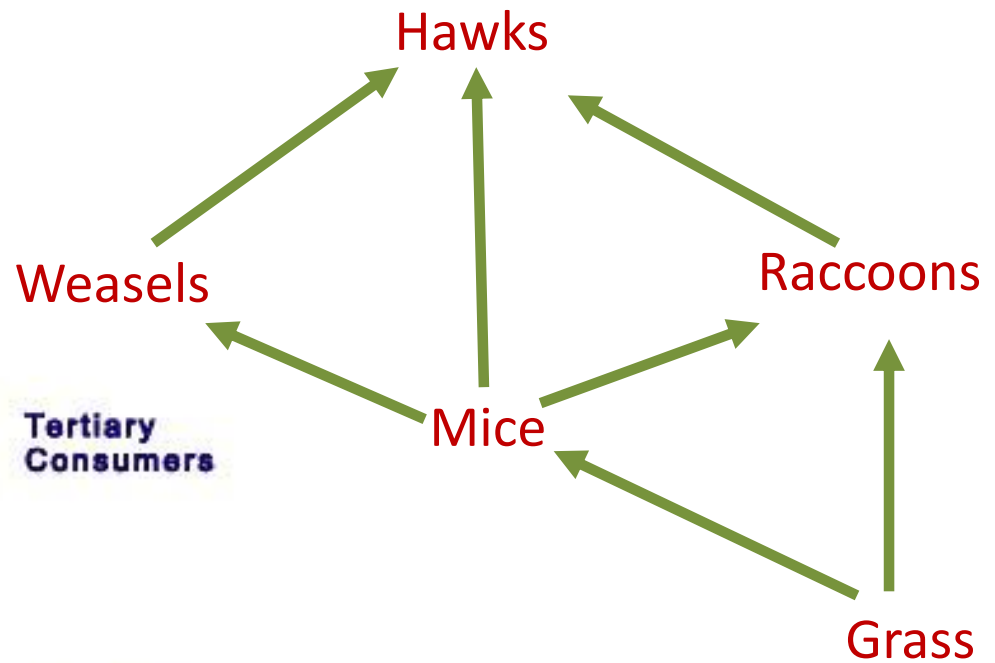
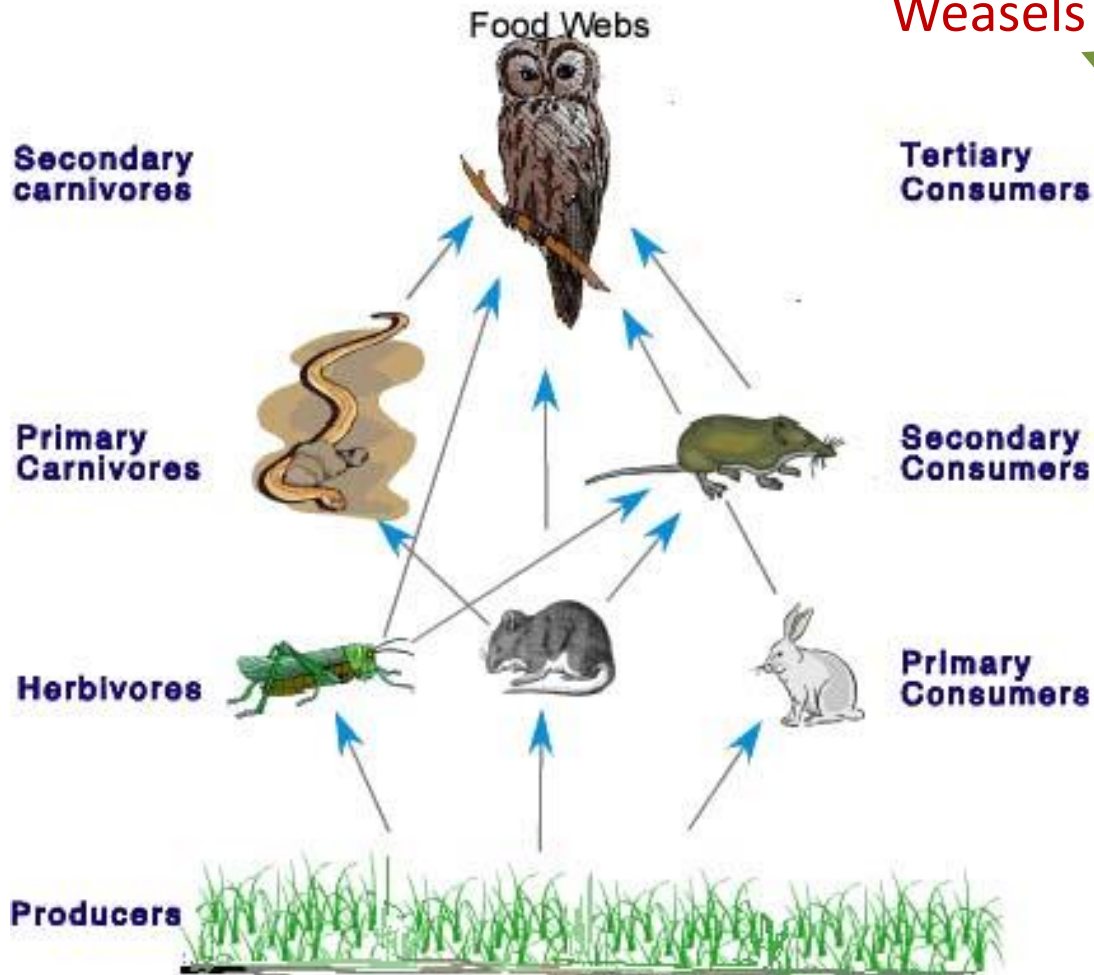
Which of the organisms above is the top consumer? **Hawks**

D. Trophic Levels—each step in a food chain or food web

1. Level 1—Producers (autotrophs)
2. Level 2—Primary Consumers (herbivores)
3. Level 3—Secondary Consumers (carnivores or omnivores)
4. Level 4—Tertiary Consumers (carnivore—usually top carnivore)

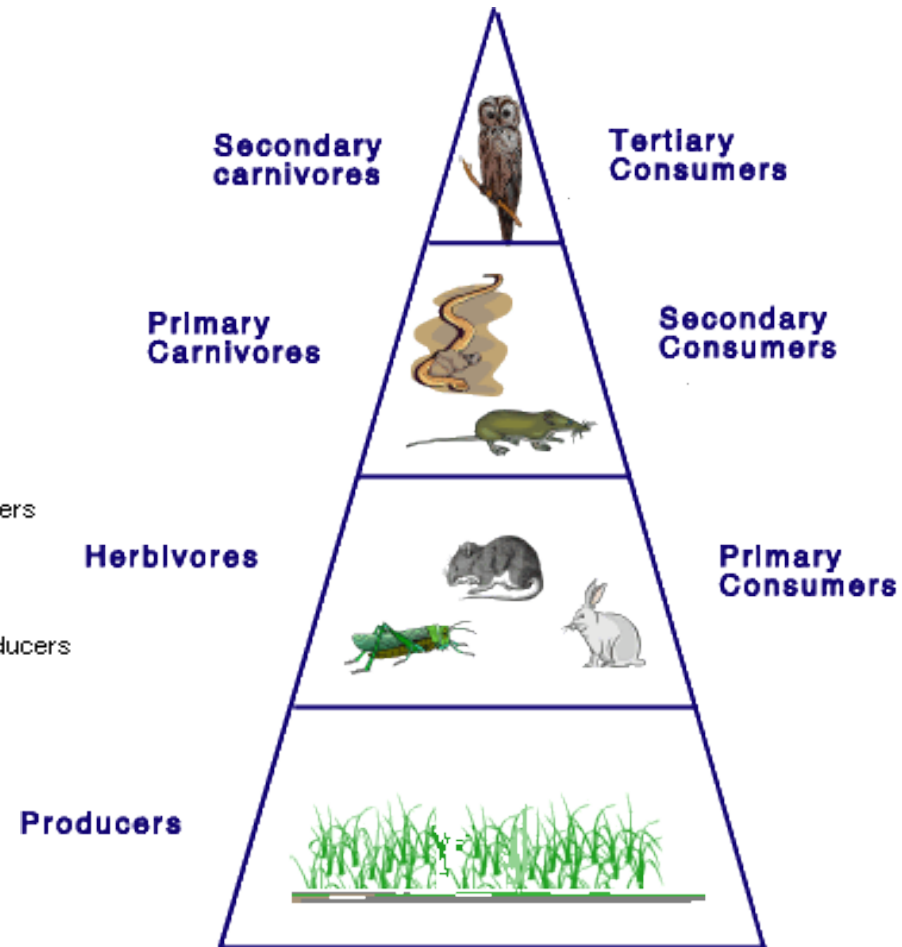
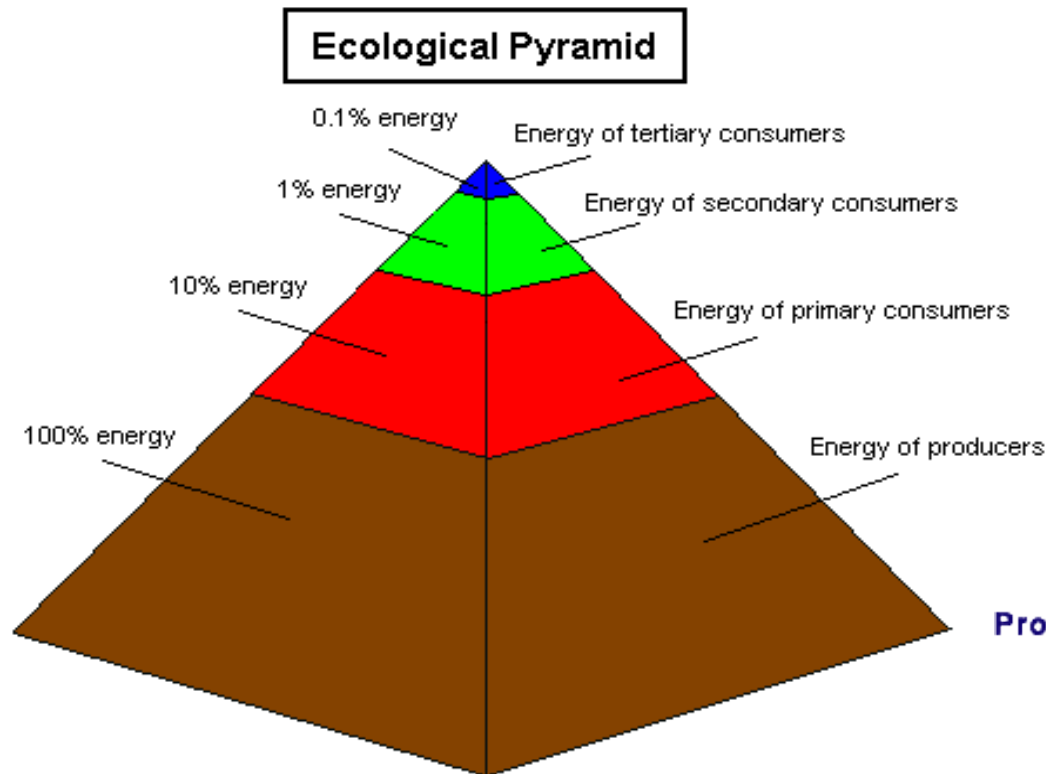


Food Webs



IV. Ecological Pyramids

- A. Diagram that shows the relative amount of energy or organisms contained within each trophic level of a food chain or web



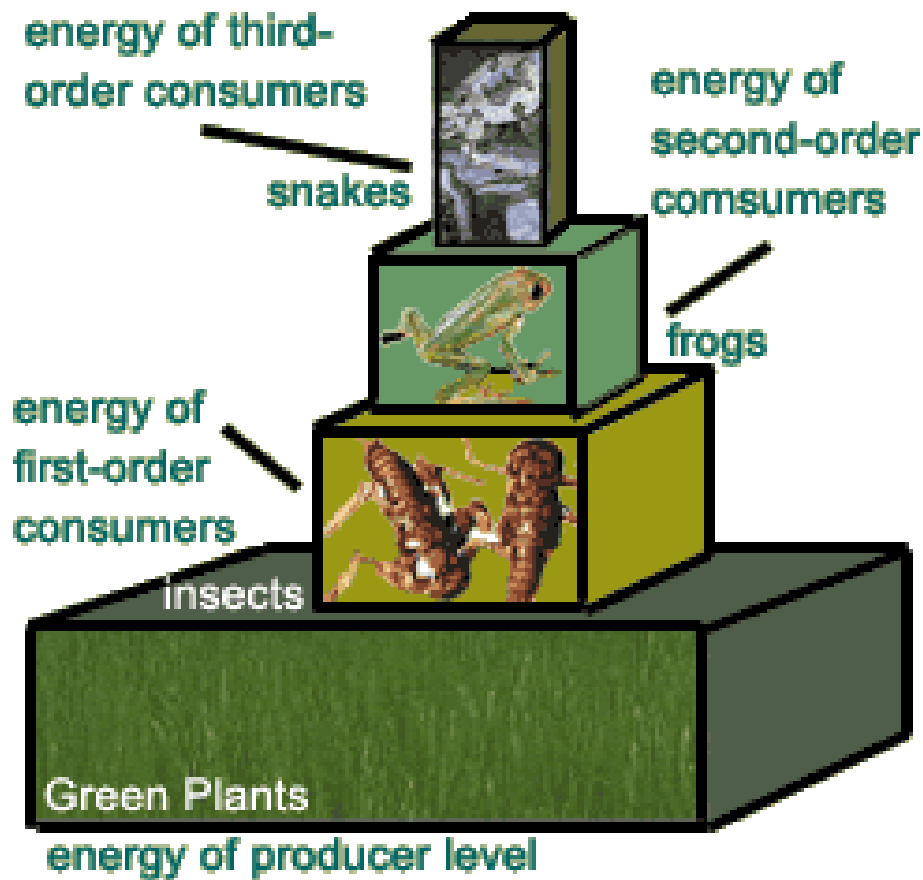
B. **Energy** Pyramid shows relative amount of energy available at each trophic level

1. Organisms in a trophic level use the available **energy** for life processes (such as growth, photosynthesis, cellular respiration, metabolism, etc.) and release some energy as **heat**

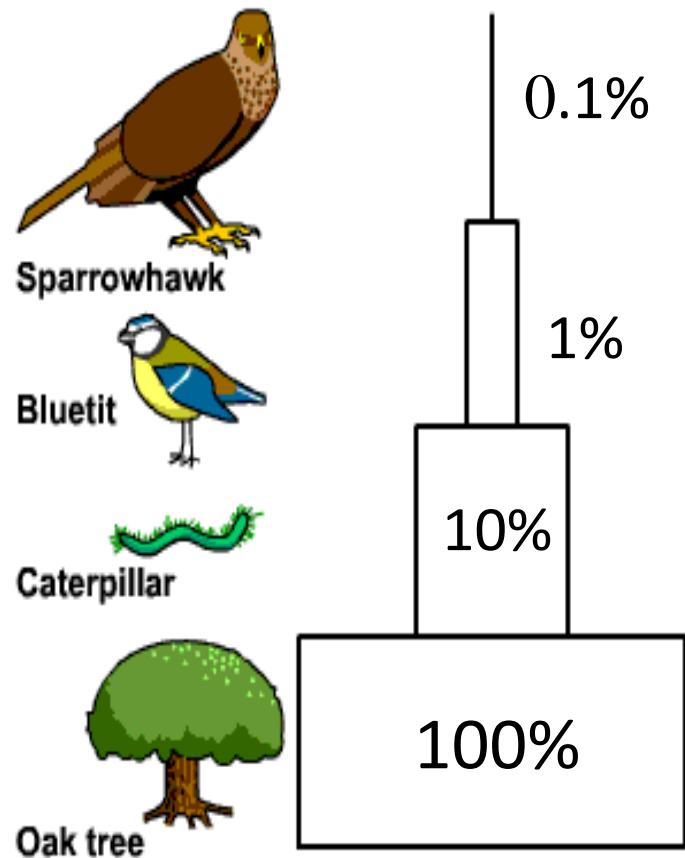
Remember: Every chemical process that happens in your body **releases heat** as a byproduct (ex: burning calories).

2. **Rule of 10**—only **about 10%** of the available energy within a trophic level is **transferred** to the next higher trophic level

C. **Biomass** Pyramid—represents the amount of **living** **organic matter** at each trophic level

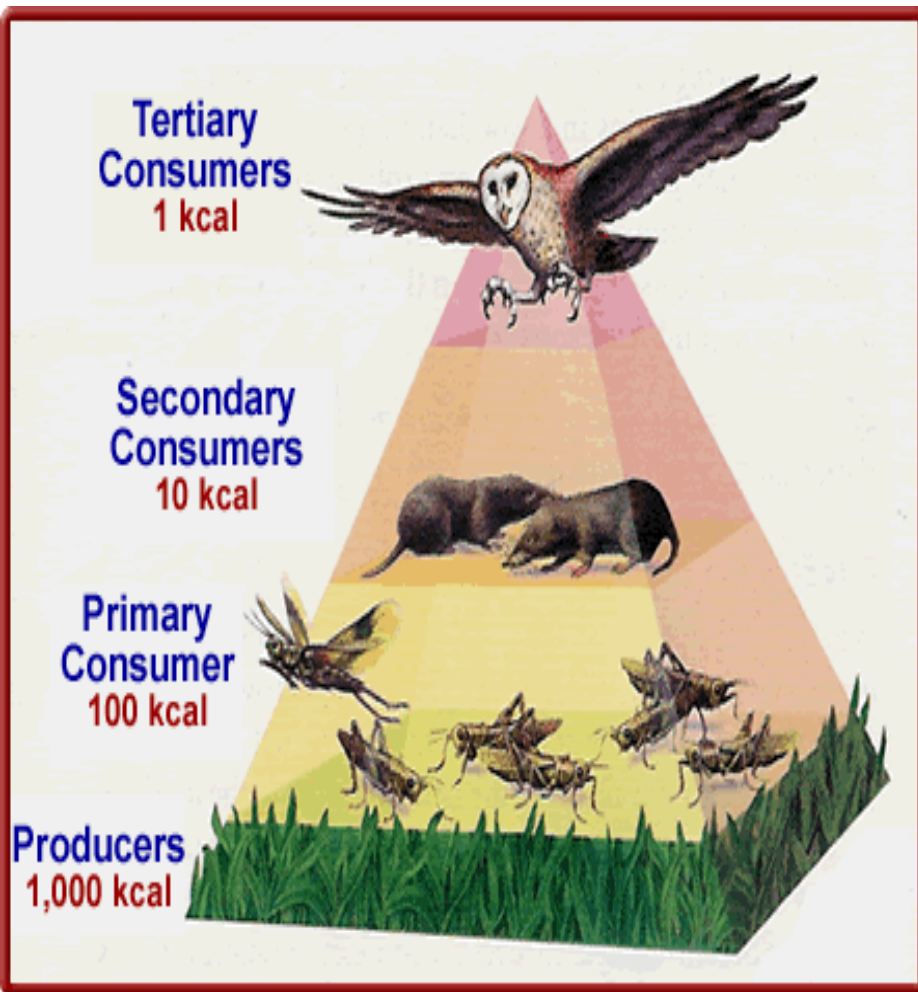


Energy Pyramid



Biomass Pyramid

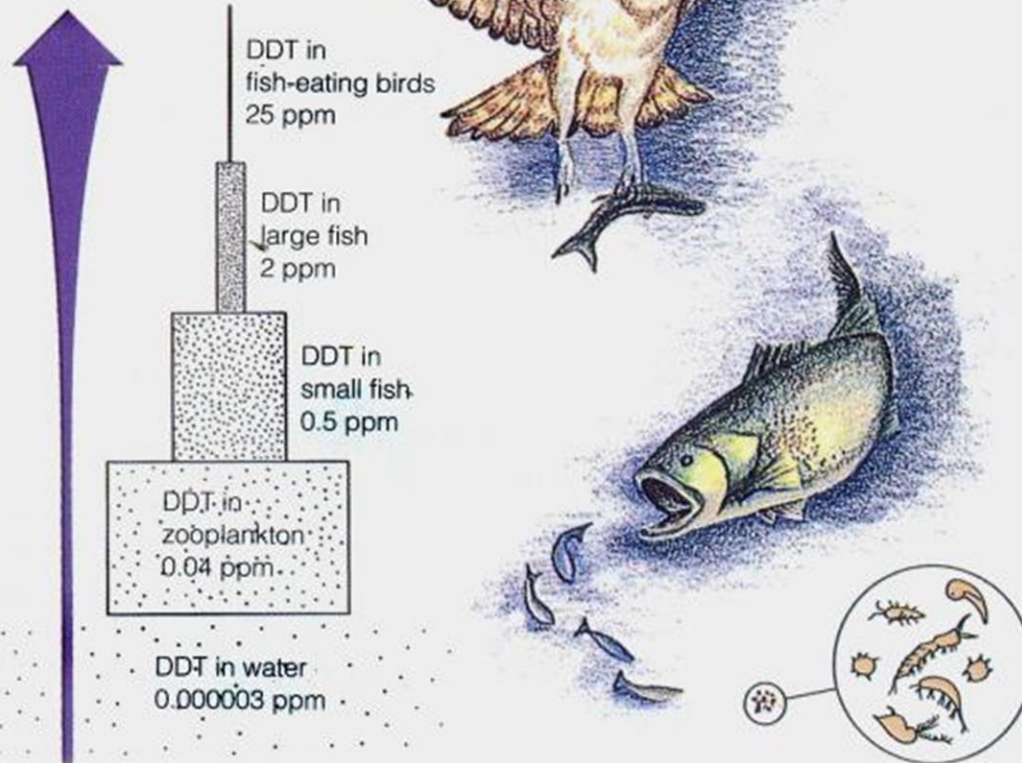
Energy and Biomass Pyramid (together)



Represents amount of energy available at each level as well as amount of living tissue—both decrease with each increasing trophic level

BIOMAGNIFICATION

DDT concentration:
increase of
10 million times



Heavy metals
Ex: mercury

Pesticides
Ex: DDT
(dichlorodiphenyltrichloro
ethane)

Organochlorides:
Ex: PCBs

V. Ecological Interactions between organisms

A. **Competition**—when two organisms of the same or different species attempt to use an ecological resource in the same place at the same time.

Ex: **food, water, shelter**





Monkeys compete with each other and other animals for food.

Rams compete with each other for mates.





Until Americans introduced gray squirrels into parts of England in the early 20th century, red squirrels had been the only species of squirrel in the country. The gray squirrels were larger and bred faster and successfully competed for resources. Within a couple years of overlap in an area, the red squirrels disappeared.

B. Niche—the ecological niche involves both the **place** where an organism lives and the **roles** that an organism has in its **habitat**.

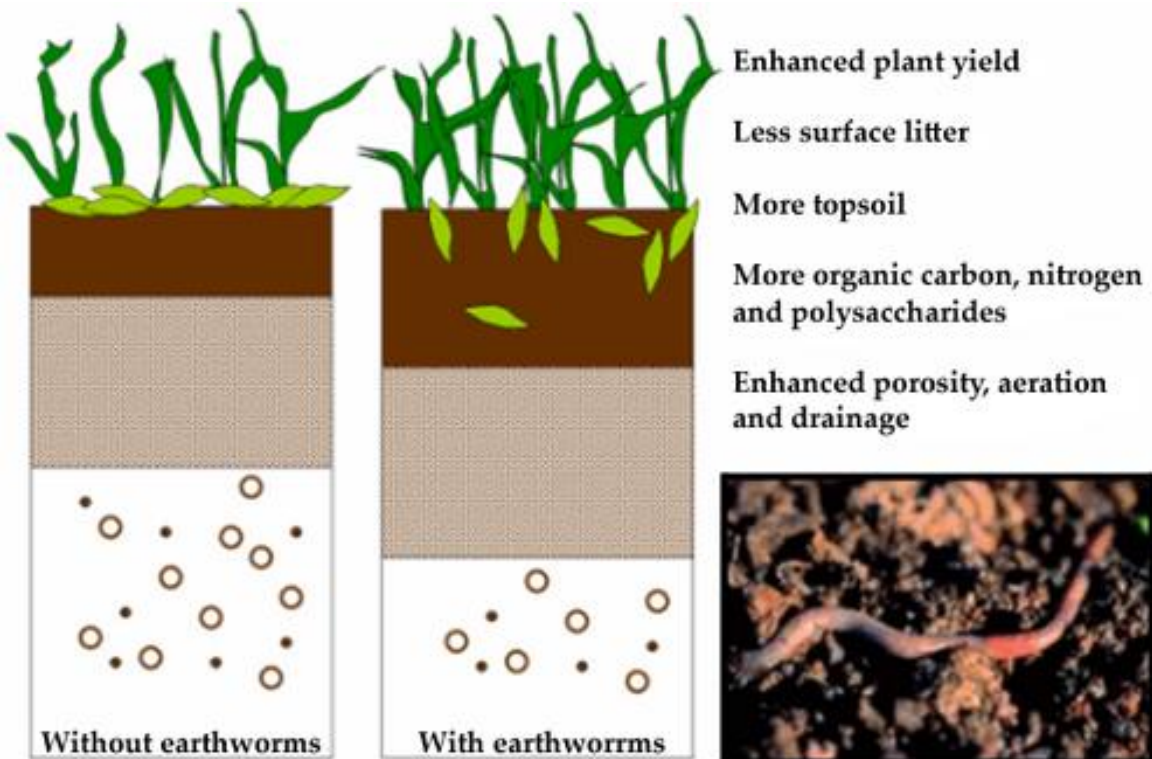
Example: The ecological niche of a **sunflower** growing in the backyard includes absorbing light, water and nutrients (for photosynthesis), providing shelter and food for other organisms (e.g. bees, ants, etc.), and giving off oxygen into the atmosphere.



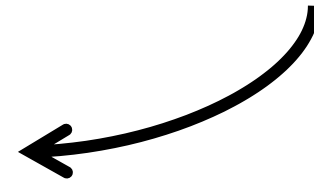
The ecological niche of an organism depends not only on where it lives but also on what it does. By analogy, it may be said that the habitat is the organism's "address", and the niche is its "profession", biologically speaking.

"Address"—Soil, Ground, etc.

Worm's Niche



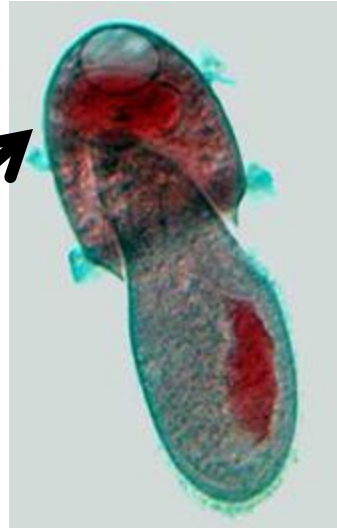
"Profession"—Mix-up soil

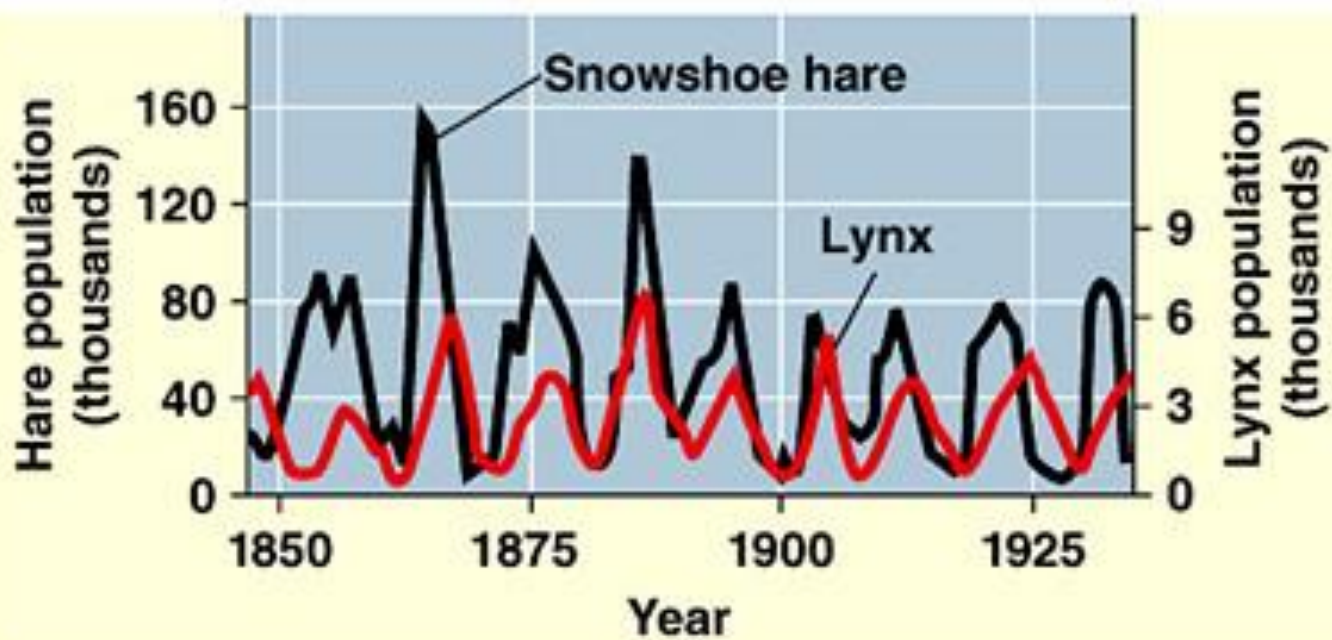


C. **Predation**—one organism captures and feeds on another organism

1. **Predator**—one that does the killing

2. **Prey**—one that is the food





D. **Symbiosis**—any relationship in which two species live closely together

1. **Mutualism**—both species benefit (WIN-WIN)

a. Ex: **insects and flowers**

Can you think of any other examples that we've talked about in class?



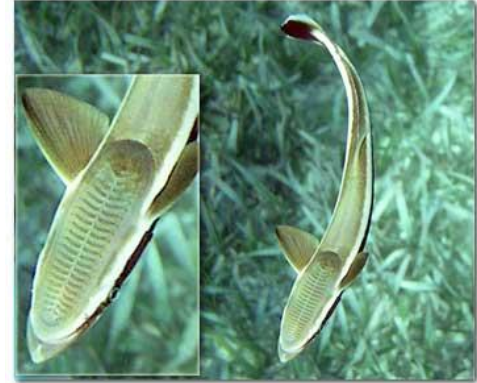
2. **Commensalism**—one member of the association benefits and the other is neither helped nor harmed.
(WIN-0)

Example: **barnacles on a whale**





The Remora fish attaches to the shark and gets a free ride.



Commensalism

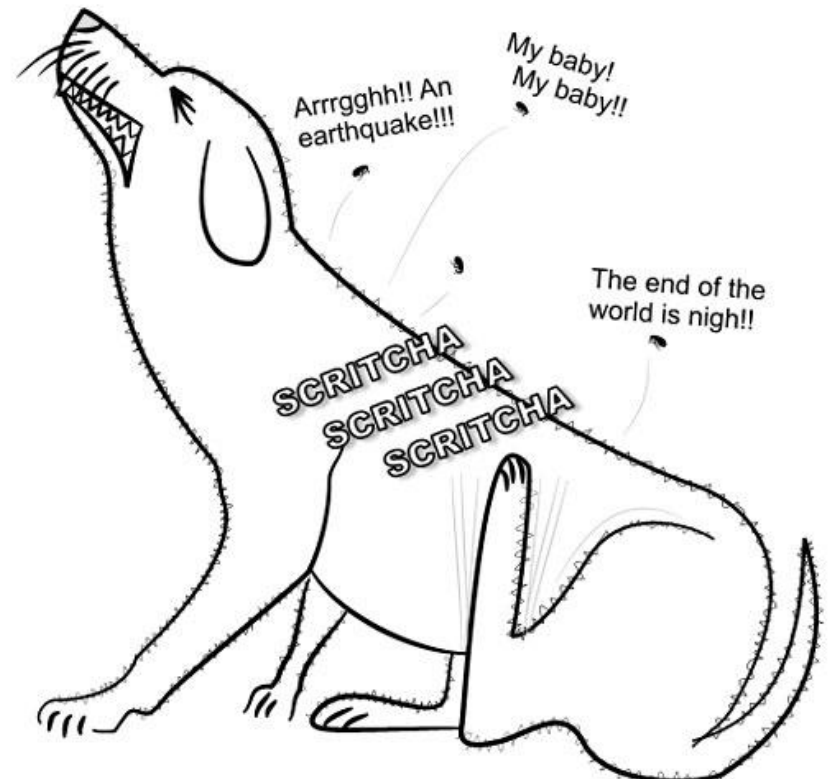
Birds build nests in trees.



3. **Parasitism**—one organisms lives on or inside another organism (host) and harms it.

The parasite obtains all or part of its nutritional needs from the host. (WIN-LOSE)

Example: **fleas on a dog**





Wasp eggs on back of caterpillar.

Parasitism



Sea lampreys feed on fluids of other fish.



Mosquito biting a human.

Mutualism, Commensalism or Parasitism??



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