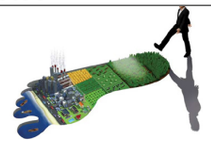
Enriched ... ecosystems

Ecological Footprint

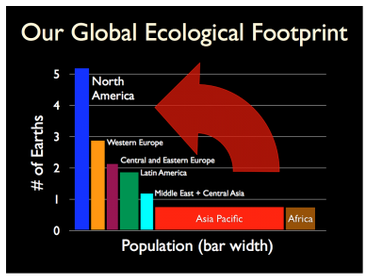
def: the surface area a human (or population) requires to obtain the resources for satisfying all of his/her needs and to dispose of all his/her wastes

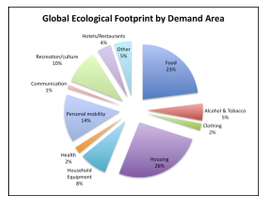
The Planet Life.mp4



Formula

ecological footprint = land and water occupied +
land and water used to produce goods and services+
land and water used to dispose of wastes





Some stats:
ecological carrying capacity

> estimated to be 1.8 hectares/person (18 000m^2)

> Canada ... 7.6 hectares!

National Geographic The Human Footprint.mp4

Human Footprint part 2.mp4

Study of harm caused to an ecosystem or organism by pollution and radiation.

c Def: Any type of substance or radiation that causes harm to an ecosystem or organism.

4 types

1) inorganic = Pb, As, P
2) organic = insecticides, pesticides, herbicides, PCBs
3) microbial = viruses & bacteria
4) radioactive = U, Pt, Ra

Toxicity of contaminant depends on 3 factors

1) concentration (ex. 0.01 ppm Pb)
2) type of organism affected
3) length of exposure

Toxicity threshold

Level of concentration where the contaminant starts to cause harm to an organism.

Lethal dose

Amount of a contaminant that will cause the death of an organism.

Bioaccumulation

def: Accumulation of contaminants in tissues of organisms over time

Bioconcentration

Shows that concentration of a contaminant increases with each trophic level. Higher on the food chain higher contaminant concentration.

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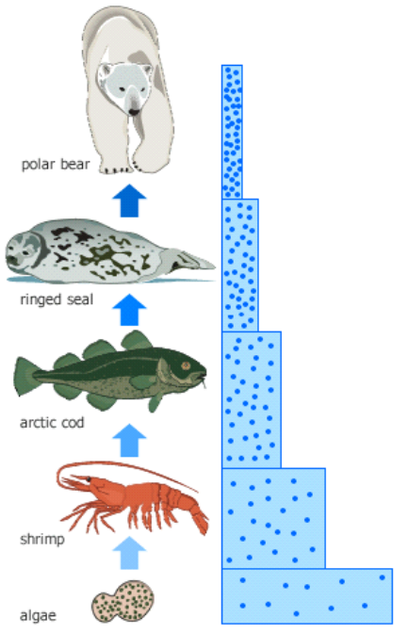

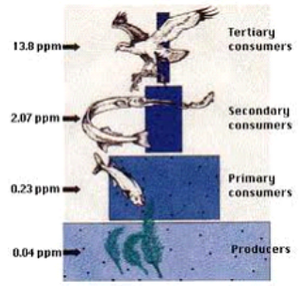

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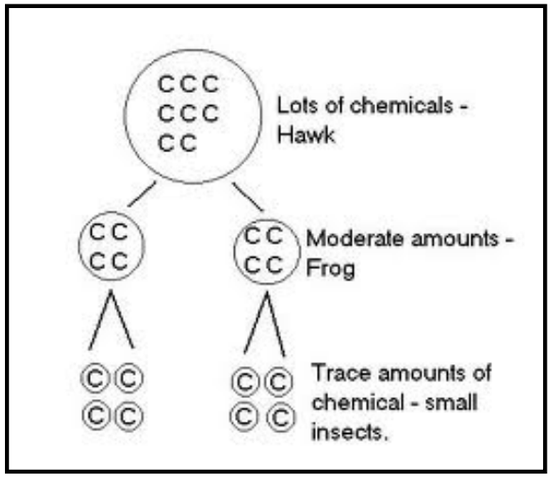


Biotechnology Solutions

Using living organisms to help reduce or eliminate contaminants or wastes in an environment

Plastic TPS Biodegradation Video.mp4

Oil Spill Bioremediation Oil Eating Microbes.mp4

Biodegradation

Using microorganisms to breakdown organic matter into inorganic matter

Bioremediation

Using decomposers to help reduce effect of contaminant

Phytoremediation

Using plants or algae to remove contaminants

ex. cabbage, spider plants

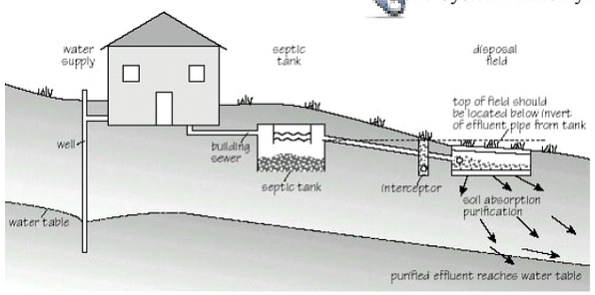
Waste water treatment

Water discharged after household or industrial use ... polluted!

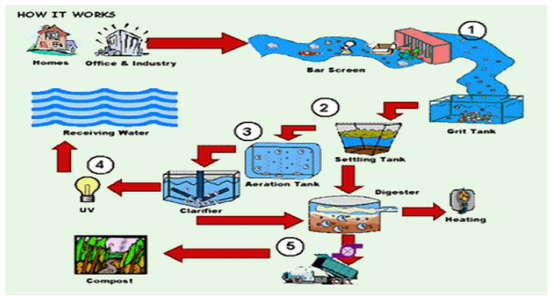
Substances: chemicals, organic wastes, microbes and fertilizers

Septic tanks and waste water treatments

eptic System Anatomy.mp4



he water treatment process.mp4



Steps:

1- Grit tank/flocculation: takes out biggest particles.

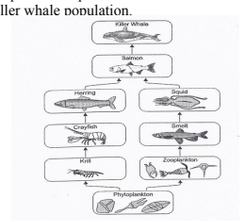
2- Sedimentation: Particles go to the bottom of the tank.

3- Aeration: O^2 added to water to help taste and smell and remove some minerals.

4- Disinfection: Chemical added to water to kill microorganisms. Chlorine, Ozone

Past exam questions

1. A population of killer whales in the Gulf of St. Lawrence is listed as endangered under the Canadian Species at Risk Act. This species spends about half the year foraging in inland waters and relies almost exclusively on salmon as prey. Recent data suggests that this killer whale population has declined approximately 7% over the past 4 years. The concentration of water contaminants (mercury, pesticides, PCBs) has been steadily increasing in the last 4 years and traces of these amounts were found in all species of plants and animals living in the Gulf of St. Lawrence. Using the information provided, give the possible explanation for the decline of this killer whale population.



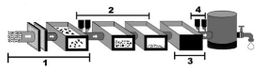
2. Germain and Lucy live with their three children. Their daily tasks are divided so that each family member contributes to the smooth running of the household. Here are a list of their daily chores:

- They live in a 5 bedroom house.
- They have a big backyard with a swimming pool.
- Germain is in charge of doing groceries. He takes the only family vehicle, a van, to the corner market, where he buys local produce. He also goes to the nearby farm to buy organic beef and chicken.
- Lucy is in charge of keeping the kitchen clean. She uses the dishwasher at least once a day to save time washing the dishes herself. Since cooking is time consuming and both parents work, the family goes out to a restaurant or orders out two or three times a week.
- Sophie, the youngest daughter, takes care of the garden where they grow some of their own vegetables.
- Samuel is in charge of keeping the bathroom clean. He often cleans up after his morning shower.
- Annie, the eldest daughter, is in charge of taking out the recycling. Compost and garbage.

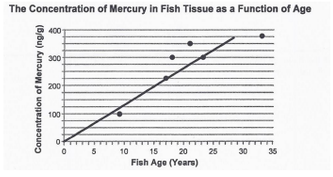
a- Give an explanation of one aspect of their lifestyle that helps to reduce their ecological footprint.
b- Give an explanation of one aspect that can be changed to reduce their ecological footprint.

3. Match the following words (use the letters) with the numbers on the diagram: /2

a- Aeration
b- Disinfection
c- Grit tank/flocculation
d- sedimentation



4. The copper red horse is a fish that feeds primarily on mollusks. It can live to be over 30 years old. Due to over-pollution, the global population of the copper redhorse is now limited to the River in Quebec. It was identified as an endangered species in 2007 and is protected by the Species at Risk Act. Biologists analyzed the levels of toxins in these fish. They compiled the data into the following graph showing mercury concentration in the fish tissue.



a) What primary biological phenomenon of the copper redhorse fish is the graph representing?
b) Describe this phenomenon in the context of the copper redhorse fish.