Biological Magnification

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What is Biomagnification?

Biomagnification is the process which is said to be the tendency of pollutants, which an increase theconcentration of a substance, such as thepesticideDDT, occurs in a food chain.

The consequences are

- Persistence
- Food chain energetics
- Low rate of internal degradation/excretion of the substance
- Biomagnification occurs when organisms at the bottom of the food chain concentrate the material above its concentration in the surrounding soil or water.

Role of Biological Magnification

- Biomagnifications occurs mainly in food chain tropic level process.
- The second stage of biomagnification occurs when the producer is eaten(pyramid of biomass)
- Biological magnification, also called as biomagnification or bioamplification.

Characterization of Biomagnification

- **Bioaccumulation** -The accumulation of compounds in animal or plant tissue over time that can't be excreted from the organism, which occurs within tropic levels.

- **Bioconcentration** - Occurs when uptake from the water is greater than excretion.

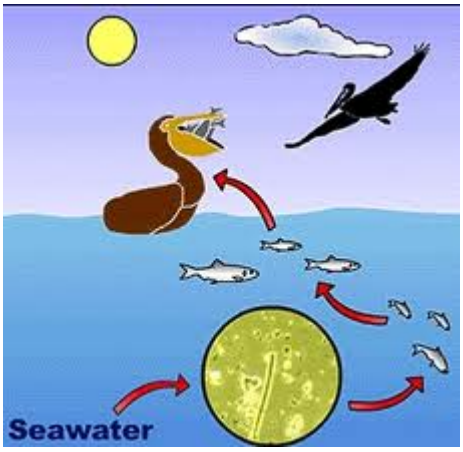
- **Biodilution** - opposite of Biomagnification- Pollutants get smaller in concentration as it takes place in food web.

Small concentrations of chemicals in the environment can find their way into organisms in high enough dosages to cause problems.

In order for biomagnification to occur, the pollutants are the following:

- long-lived
- mobile
- soluble in fats

- biologically active



Biomagnification of DDT

Classic example for Magnification:

- DDT stands for dichloro, diphenyl trichloroethane.

Heavy metals:

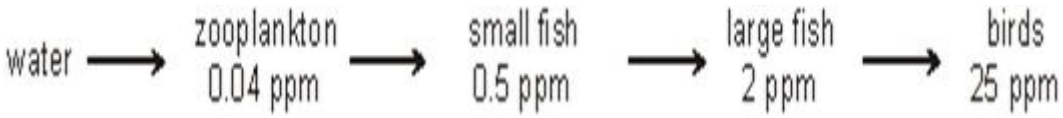
- Mercury forms organic species such as methyl mercury
- Cyanide reports a spill of toxic substance.
- Selenium cause reproductive failures.

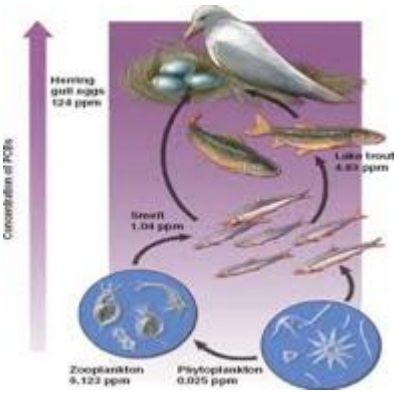
Other pollutants:

- hydrogen-3, carbon-14, iodine-131 or strontium-90
- Mechanical injury, strangulation, or starvation can be caused when Plastics are eaten by many organisms.
- Oil spills are a serious problem inmarine environments.

Main consequence of DDT in Biomagnification:

1. Cannot be easily metabolized, and does not break down in the body.
2. Soluble in fat than in water and hence accumulates in body fat and is not excreted.
3. DDT is deadly or may have more insidious, long-term effects.
4. Interferes with the deposition of calcium in the shells of the bird's eggs. The eggs laid are very soft and easily broken; birds so afflicted are rarely able to raise young and this causes a decline in bird’s numbers.
5. DDT accumulates in the fat tissue of animals at the top of the food chain.





Food chain shows typical concentrations of DDT found in a food chain

DDT Concentration

Increase of 10 million times

?

DDT in fish-eating birds

?

DDT in large fish

?

DDT in small fish

?

DDT in Zooplankton

?

DDT in water

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Reference Links:

- http://en.wikipedia.org/wiki/Biomagnification
- http://wiki.answers.com/Q/What_is_biological_magnification
- http://www.youtube.com/watch?v=B9n_8KH235c
- http://www.marietta.edu/~biol/102/2bioma95.html
- http://www.youtube.com/watch?v=ezw-CJkPCEc&NR=1

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