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① Bioremediation of soil & water contaminated with oil spills.

Bioremediation is a biological process whereby organic wastes are biologically degraded under controlled conditions.

- The process involves the use of living organisms, primarily microorganisms, to degrade the environmental contaminants.
- In this process, contaminant compounds are transformed by living organisms through reactions that take place as a part of their metabolic processes.
- For bioremediation to be effective, microorganisms must enzymatically attack the contaminants and convert them to harmless products. Hence it is effective only on microbial growth & activity.
- Various factors influence this process: These factors include - existence of a microbial population capable of degrading the pollutants, the availability of contaminants to the microbial population, the environment factors (e.g. type of soil).

② Bioremediation strategies: →

① Exsity & ② Insity → treating the contaminated material at the site (used due to lower cost & less disturbance) removed of the contaminated material to be elsewhere treated.

• Insity & Exsity involves diff technologies. — Bioventing, biosparging, bioreactor, composting, land-farming, bioaug.

mentation & bioaugmentation

- Advantages of bioremediation: - It is a natural process & therefore used as an acceptable waste treatment process for contaminated material in soil.
 - The residues for the treatment are usually harmless products & include CO_2 , water & cell biomass.
 - Bioremediation can often be carried out on site, without causing a major disruption of normal activities.
 - Less expensive than other technology for cleanup of hazardous waste.

★ Water Contaminated with Oil Spills: →

- An oil spill is accidental release of liquid petroleum hydrocarbons like crude oil from tankers, off-shore platforms, drilling rigs and wells into environment during exploration activities.
- Mostly this type of pollution occurs due to human activities.
- Environmental impacts: -
 - oil spill affects the physical, chemical and biological characteristics of both water & land.

- Oil spills also affects the survival of aquatic plants & animals.
- In plants, it floats on top of the water which reduces penetration of sunlight, thus it restricts the process of photosynthesis of marine plants & phytoplankton's which is producer, thus it affects the marine food chain.
- In case of Animals oil forms a thick black layer above the water. The viscosity of water also increases, which hinders the locomotion of organisms in the water.
- The oil coats the body of the aquatic animals, which reduces the heat insulation capacity and leads to hypothermia i.e. decrease in temp. ex^l seal, killer whales.
- Oil spills also affects the feathers of birds during submerging and impairs the ability to fly and escape from predators.
- Recently collision of two oil tankers had lead to oil spills in Mumbai in ~~July~~ August 2010; has proved extensive damage of marine ecosystem and as well as mangrove plants.