Environment Class 16

28th March, 2024 at 9:00 AM

BIOREMEDIATION (09:12 AM)

- It is an environmentally friendly cost-effective method to treat and clean up environmental pollutants such as pollutants in ground and surface waters, and landfills, by utilizing, **micro-organisms to degrade, remove or neutralize pollutants.**
- **In-Situ Remediation:**
- It involves the treatment of contaminated material at the site.
- E.g., bio-venting involves pumping air into the soil to stimulate microbial activity.
- **Ex-Situ Remediation:**
- It involves the removal of contaminated material to be treated elsewhere.
- E.g. Biopiles, where excavated soil is mixed with nutrients, moisture, and controlled aeration, for the degradation of pollutants.
- **Phyto-Remediation:**
- This includes plants to absorb, accumulate and detoxify pollutants.
- E.g. **Poplar trees:** Treat contaminated groundwater
- **Sunflower:** Extract toxic metals from the soil in the aftermath of Chernobyl.
- There are certain **challenges in Bio-Remediation:**
- The effectiveness depends upon environmental conditions such as temperature, pH, presence of oxygen.
- Bio-remediation techniques are slower and may not be suitable for all types of situations.
- The complete breakdown of pollutants, particularly heavy metal pollutants often does not occur.

PLASTIC POLLUTION (09:30 AM)

- Plastic pollution is one of the biggest environmental issues we are facing.
- Most plastic does not bio-degrade, it harms marine life and accumulates in gyres.
- The breakdown of plastic waste leads to microplastics, and microbeads, which are ingested by marine organisms entering the food chain and potentially impacting human health.
- Many plastics also leech toxic chemicals such as Bisphenol-A into food and beverages.
- **To tackle plastic pollution, we need to:**
- reduce its uses which should include minimizing or eliminating Single-use plastic.
- recycling and upcycling
- biodegradable compostable plastic

EXTENDED PRODUCER RESPONSIBILITY (09:56 AM)

- It is based on the **'Polluters Pay' principle.**
- All the stakeholders have a responsibility to tackle particular waste-related issues. However, producers have the highest responsibility.
- This concept was introduced in E**lectronic Waste Management Rules, 2011** as of now it is integrated into Electronic Waste Management Rules 2016, Plastic Waste Management Rules 2016 and Battery Waste Management 2022.
- Under Plastic waste rules, they also introduced the concept of the **Plastic Credit Model,** a market-based mechanism to implement EPRs.
- As per the amendment in 2022, single-use plastic has been banned and the minimum thickness of plastic bags has been increased from 75 microns to 12 microns.

GLOBAL CONVENTIONS (10:17 AM)

- **Basel Convention, 1992**
- This aims to tackle the **Transboundary Movement of Hazardous Waste.**
- Such movement can't occur without the Prior Informed Consent of the country where the waste is being moved.
- It does not include waste from the shipping industry and radioactive waste.
- **Stockholm Convention on Persistent Organic Pollutants (POPs) 2004**
- It aims to eliminate or reduce persistent organic pollutants which are **dangerous chemicals with high lifetime, biomagnification and carcinogen.**
- Started with the 12 most dangerous POPs called **Dirty Dozens.**
- As of now, many more chemicals can be added
- Many of these PoPs are pesticides or industrial chemicals.
- **Rotterdam Convention**
- it is a multilateral treaty to promote shared responsibility for the international trade of **hazardous chemicals.**
- it promotes the open exchange of information which includes direction on safe handling, possible dangerous impacts and any known restrictions or bans thus it works on PIC.
- **Minamata Convention 2013**
- It is a global treaty to protect human health and the environment from the adverse **impact of mercury.**
- It aims to phase out the use of mercury in several products.
- mercury can cause, Minamata disease, there is no safe pollutant limit for mercury
- ***MARPOL Convention, 1973***
- *The MARPOL Convention, 1973, aims to **prevent marine pollution** by regulating the discharge of harmful substances from ships into the ocean.*
- *It sets standards for oil, chemicals, sewage, garbage, and emissions, promoting environmental protection in maritime activities.*

DISCUSSION ON PYQs (10:52 AM)

ALTERNATIVE ENERGY SOURCES (11:25 AM)

- It includes all non-fossil fuel sources.
- **Non-Conventional Energy Sources:**
- Renewable: Ocean Thermal, Solar, Wind, etc.
- Non Renewable: Nuclear Energy

SOLAR ENERGY (11:43 AM)

- There are two ways to utilize solar energy :
- **i. Solar Thermal Technology**
- This includes
- **a. Solar Water Heating:** Capturing solar energy to heat water directly for residential, commercial or industrial use.
- **b. Concentrated Solar Power:** This uses a **Concave Mirror/Parabolic Mirror** or convex lens to concentrate sunlight onto a small area typically a heat-absorbing fluid.
- Thus fluid is used to produce steam which drives a turbine connected to a generator to produce electricity.
- This is used for large-scale power generation.
- **ii. Solar photovoltaic**
- Photovoltaic cells are dependent on sunlight and convert sunlight to electricity using silicon.
- They generate direct current which can be converted into AC.
- **Challenges Associated with Solar:**
- Intermittency: Solar Energy is dependent on sunlight, making it an intermittent energy source, it cannot be relied upon during bad weather conditions or the night.
- Such intermittent supply also makes the power grid unstable.
- Land and water use.
- High capital cost.
- For photo voltaic cells increasing efficiency remains a challenge.
- for PV recycling of panels is important otherwise it will cause another set of waste problems.

Topic for the next class: Non Conventional Energy Sources (Continued)