Microbes in Plastic Clean-up: Bioremediation

Why in News?

A team of Argentine scientists is using **microorganisms native to** Antarctica to explore the idea of **cleaning up pollution from fuels and, potentially, plastics** in the pristine expanses of the white continent.

- The continent is protected by a **1961 Madrid Protocol** that stipulates it must be kept in a pristine state.
- Over 300 million tons of plastic are produced every year for use in a wide variety of applications. At least 14 million tons of plastic end up in the ocean every year, and **plastic makes up** 80% of all marine debris **found from surface waters to deep-sea sediments.**

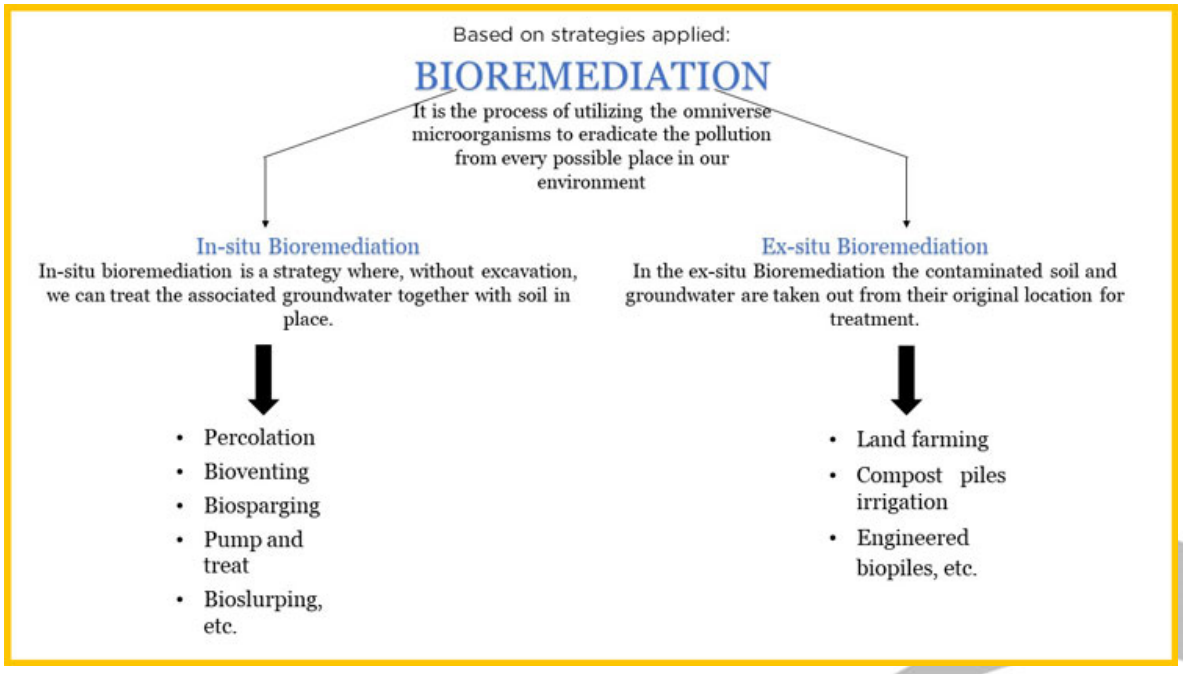
How was the Research carried out on Microbes?

- The researchers **collected samples of plastic from the Antarctic seas** and studied to see if the microorganisms are eating the plastics or simply using them as rafts.
- The team carried out **bioremediation tasks.**
- The team **helped the microbes with nitrogen, humidity and aeration** to optimize their conditions.
- This work uses the **potential of native microorganisms - bacteria and fungi that inhabit the Antarctic soil,** even when it is contaminated - and make these microorganisms eat the hydrocarbons.
- The **tiny microbes munch through the waste**, creating a naturally occurring cleaning system for pollution caused by diesel that is used as a source of electricity and heat for research bases in the frozen Antarctic.
- The research on how the microbes could help with plastic waste could have potential for wider environmental issues.

What is Bioremediation?

- It is a **branch of biotechnology** that employs the use of living organisms, like microbes and bacteria, in the removal of contaminants, pollutants, and toxins from soil, water, and other environments.
- Bioremediation is **used to clean up oil spills or contaminated groundwater.**
- Bioremediation may be done **"in situ"**–at the site of the contamination–or **"ex situ"**–away from the site.

//



What are the Benefits of Bioremediation?

- By relying solely on natural processes, it **minimizes damage to ecosystems.**
- Bioremediation often **takes place underground**, where amendments and microbes can be pumped in order to clean up contaminants in groundwater and soil.
    - Consequently, **bioremediation does not disrupt nearby communities** as much as other cleanup methodologies.
    - “Amendments” to the environment, such as molasses, vegetable oil, or simple air optimize conditions for microbes to flourish, thereby accelerating the completion of the bioremediation process.
- The bioremediation process **creates relatively few harmful byproducts** (mainly due to the fact that contaminants and pollutants are converted into water and harmless gases like carbon dioxide).
- Bioremediation is **cheaper** than most cleanup methods because it does not require substantial equipment or labor.

Source: TH