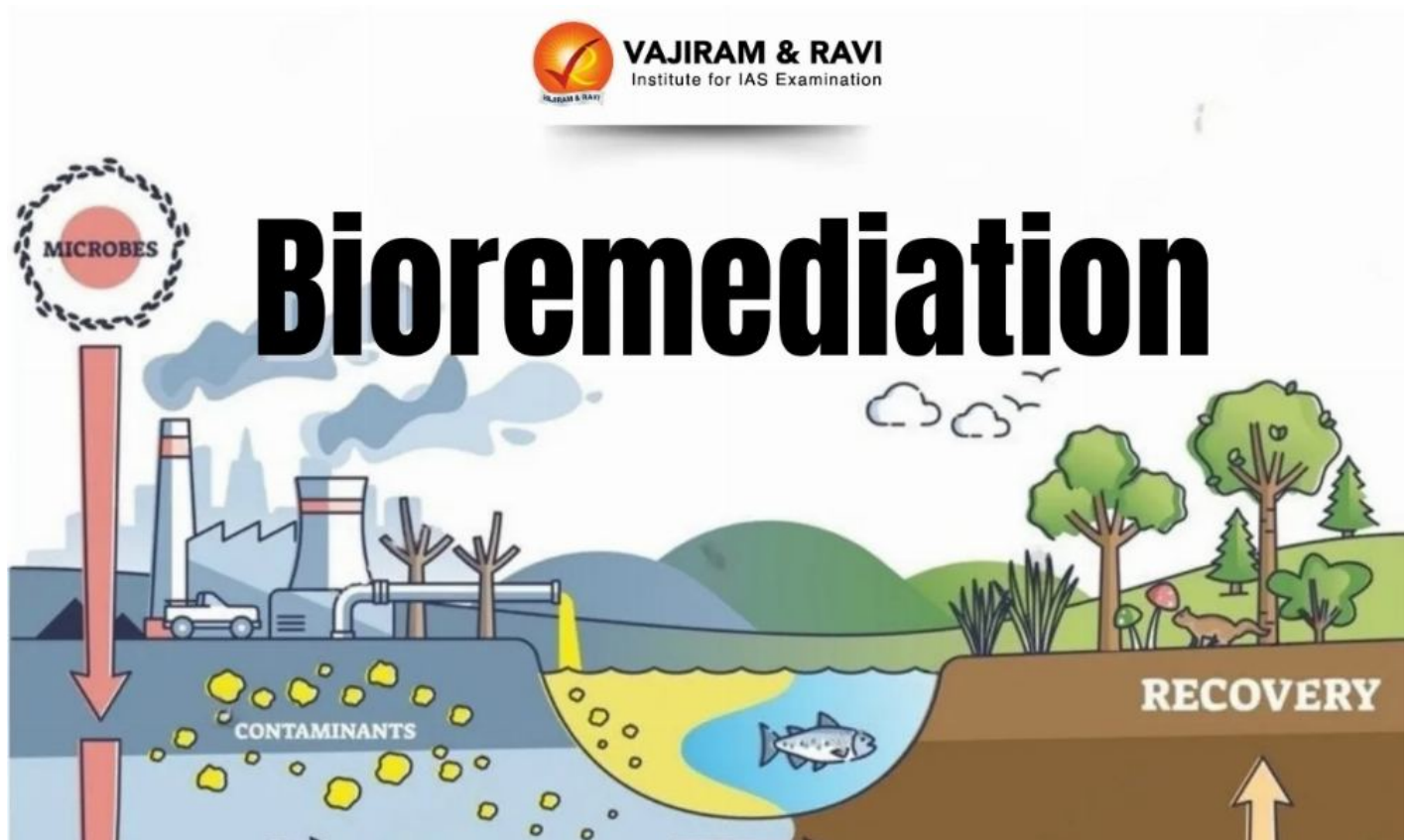


Bioremediation

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Bioremediation Latest News

Bioremediation offers a cheaper, scalable, and sustainable alternative, especially in a country like India where vast stretches of land and water are affected but resources for remediation are limited.

About Bioremediation

- Bioremediation literally means **“restoring life through biology.”**
- It is the **use of living organisms, primarily microorganisms, to degrade environmental contaminants** into less toxic forms.
- It is used to **clean up contaminated soil, air, and water.**
- It harnesses microorganisms such as **bacteria, fungi, algae, and plants to sequester or transform toxic substances** such as **oil, pesticides, plastics, or heavy metals.**
- These organisms metabolise these pollutants as food, **breaking them down** into **harmless by-products** such as **water, carbon dioxide, or organic acids.**

- In some cases, they **can convert toxic metals into less dangerous forms** that **no longer leach into the soil** or groundwater.
- **Two Broad Types** of Bioremediation:
 - **In situ bioremediation**, where **treatment happens directly at the contaminated site**, such as when oil-eating bacteria is sprayed on an ocean spill;
 - **Ex situ bioremediation**, where **contaminated soil or water is removed, treated in a controlled facility, and returned** once cleaned.
- For bioremediation to be effective, the **right temperature, nutrients, and food** also **must be present**.
- Proper conditions allow the right microbes to grow and multiply—and eat more contaminants.

Bioremediation Advantages

- It cleans up the environment naturally without the use of toxic chemicals. So, it is an **environmentally friendly** method.
- Contaminants are converted into water and harmless gases.
- It is **cost-effective**, as extensive equipment and labor are not needed.
- It is a **permanent solution**, as the **degraded material cannot revert back** to the previous one.
- It is a recommended method for removing oil stains.

Bioremediation Disadvantages

- It **takes a large area and time** from months to years.
- It is **limited to the compounds** which are **degradable**.
- It is **not able to remove all kinds of impurities** from the contaminated site. Like, some kind of inorganic contaminants cannot be treated with this bioremediation method.
- **Some heavy metals cannot be completely broken down**, resulting in **toxic by-products**.

Source: **TH**

Source: <https://vajiramandravi.com/current-affairs/bioremediation/>

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