



Bioremediation

Published On: 02-12-2025

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 sitibioremediation, where treatment happens directly at the contaminated site, such as when oil-eating bacteria is sprayed on an ocean spill

Ex sitibioremediation, 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

Kamaraj IAS Academy

Plot A P.127, AF block, 6 th street, 11th Main Rd, Shanthi Colony, Anna Nagar, Chennai, Tamil Nadu 600040

Phone: **044 4353 9988 / 98403 94477** / Whatsapp : **09710729833**

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