

LAKE RESTORATION



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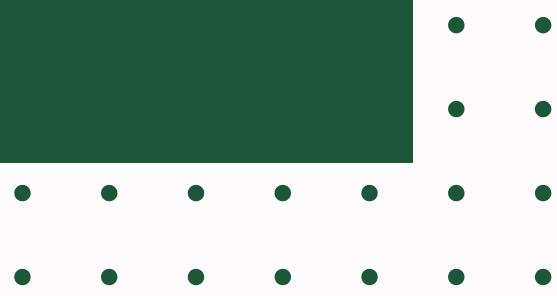
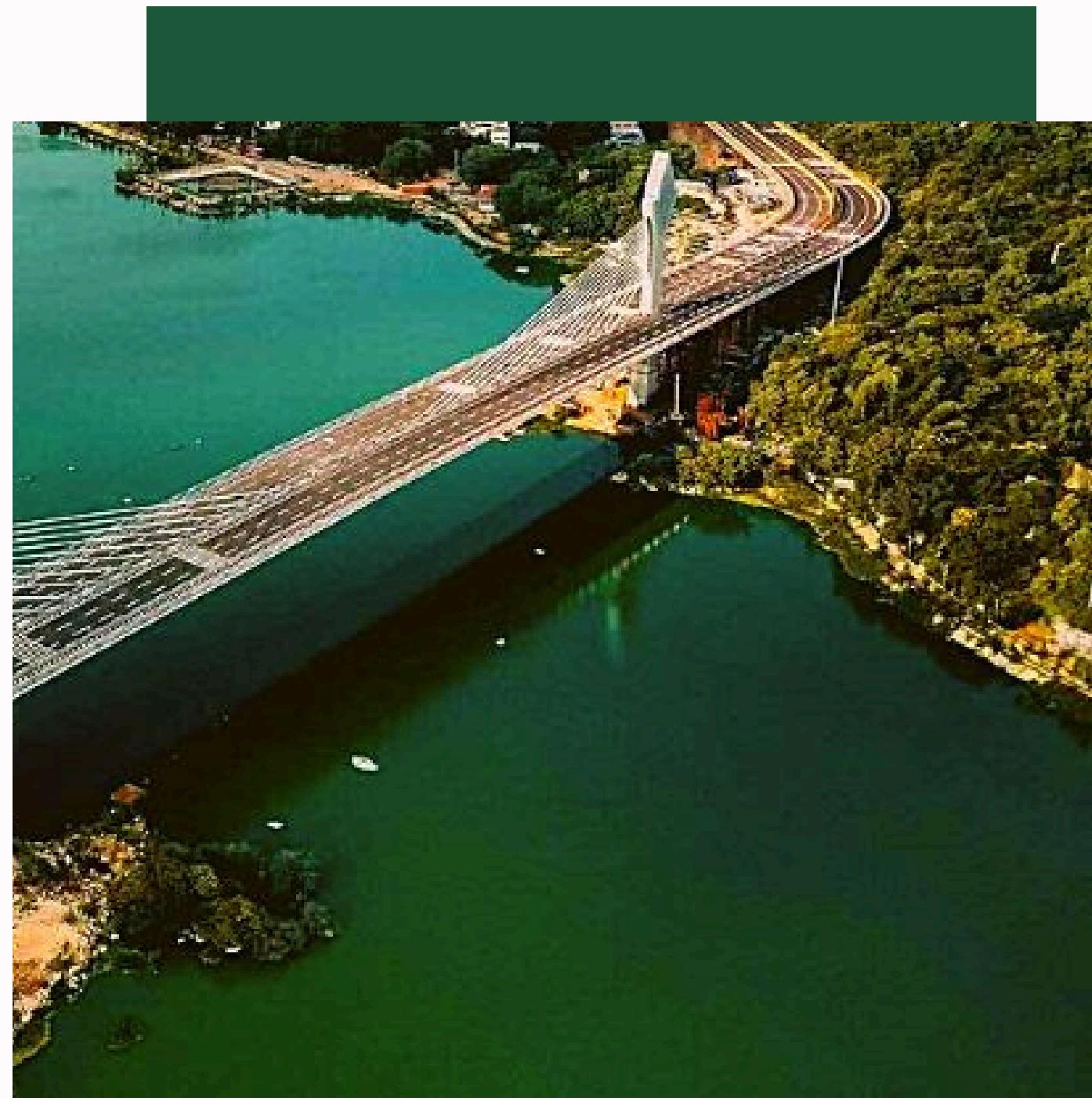
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Solution

- Ecosystem dynamics
- Native species selection
- Monitoring techniques and innovative solutions

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Steps of Restoration



About Durgamcheruvu Lake :

01

Durgam Cheruvu, also known as Raidurgam Cheruvu, is a freshwater lake in the Rangareddy district, Jagathgiri Gutta, Telangana, India. Covering 83 acres (34 ha), it is situated near Hyderabad.

02

Durgam Chevuru lake which was once a freshwater lake with crystal clear water is now a stinking mess. Durgam Cheruvu in Hyderabad has become a foul sight. Despite being one of the largest lakes in Cyberabad, it is now marred by stagnant garbage and overgrown with water hyacinth.

03

Due to the pollution and contamination of the lake, there were several problems created which affected the environment in various ways.



Problems

Water Quality Degradation:

Contamination from various sources, including industrial effluents, untreated sewage, and runoff from urban areas, has significantly degraded the water quality of Durgam Cheruvu. Elevated levels of pollutants such as heavy metals, nutrients, and organic matter pose a threat to aquatic life and ecosystem health.

Pharmaceutical Contamination:

The lake is heavily contaminated with pharmaceuticals, constituting 50% of the pollution. This poses a significant risk to both the environment and public health.

Multiple Pollutants:

Besides pharmaceuticals, the lake also contains other pollutants, including metabolites (9%) and herbicides (8%). The presence of diverse contaminants compounds the environmental and health risks.

Problems

Pollution Sources

The study identifies two primary sources of contamination – effluents from pharmaceutical units in the area and domestic wastewater from the Madhapur and Jubilee Hills neighborhoods. Identifying and addressing these sources is crucial for effective pollution control.

Health Risks

The pollutants found in the lake can lead to a range of health problems, including cancer, reproductive issues, and neurological disorders. This highlights the direct threat posed to the well-being of both the local population and the ecosystem.

Environmental Impact

The contamination is harmful to aquatic life, potentially causing fish and other aquatic animals to perish. This not only disrupts the balance of the ecosystem but also has cascading effects on the livelihoods of communities dependent on the lake.

Problems

Erosion and Sedimentation:

Contamination and pollution can contribute to soil erosion and sedimentation within the lake. Sedimentation reduces the water-holding capacity of the lake, affects aquatic habitats, and can lead to increased flooding during heavy rainfall.

Algal Bloom:

Excessive nutrient loading, often from agricultural runoff and untreated sewage, can result in nutrient enrichment in the lake, leading to algal blooms. These blooms can deplete oxygen levels in the water, harming fish and other aquatic organisms, and contributing to the formation of dead zones.

Need for Recovery

Ecosystem dynamics, a factor influencing lake recovery:

Ecosystem dynamics play a critical role in lake restoration efforts. Lakes are complex ecosystems influenced by a variety of biotic and abiotic factors, and their health can be affected by human activities, pollution, habitat destruction, and other stressors.

Nutrient Cycling and Eutrophication:

Eutrophication, or the excessive enrichment of lakes with nutrients (such as nitrogen and phosphorus), can lead to algal blooms, oxygen depletion, and degraded water quality. Ecosystem dynamics, including nutrient cycling, play a key role in understanding and addressing eutrophication.

Need for Recovery

Vegetation Dynamics:

Aquatic vegetation, including submerged and emergent plants, plays a crucial role in lake ecosystems. Vegetation provides habitat for aquatic organisms, helps stabilize sediments, and contributes to nutrient cycling.

Community Engagement and Stakeholder Involvement:

Ecosystem dynamics extend beyond biological and physical processes to include human interactions. Engaging local communities and stakeholders in lake restoration efforts is crucial for long-term success. Understanding the social dynamics and incorporating local knowledge can enhance the sustainability of restoration initiatives.

Need for Recovery

Native selection, a factor in lake recovery:

Native species selection in lake restoration is crucial for several reasons. Native species are adapted to the local ecosystem, making them better suited to the environmental conditions of the lake. They often have natural defenses against local pests and diseases, promoting a more balanced and sustainable ecosystem.

Introducing native species also helps maintain biodiversity, as these species are part of the natural food web and ecological interactions. They contribute to the overall resilience of the ecosystem, enhancing its ability to withstand environmental changes.

Step : 1 Comprehensive Assessment

Ideally, we should conduct thorough assessment of the current state of Durgam Cheruvu lake, including the types and levels of pollutants

Using various monitoring techniques we can apply to find trends in the problems and help find the effective solution for them:

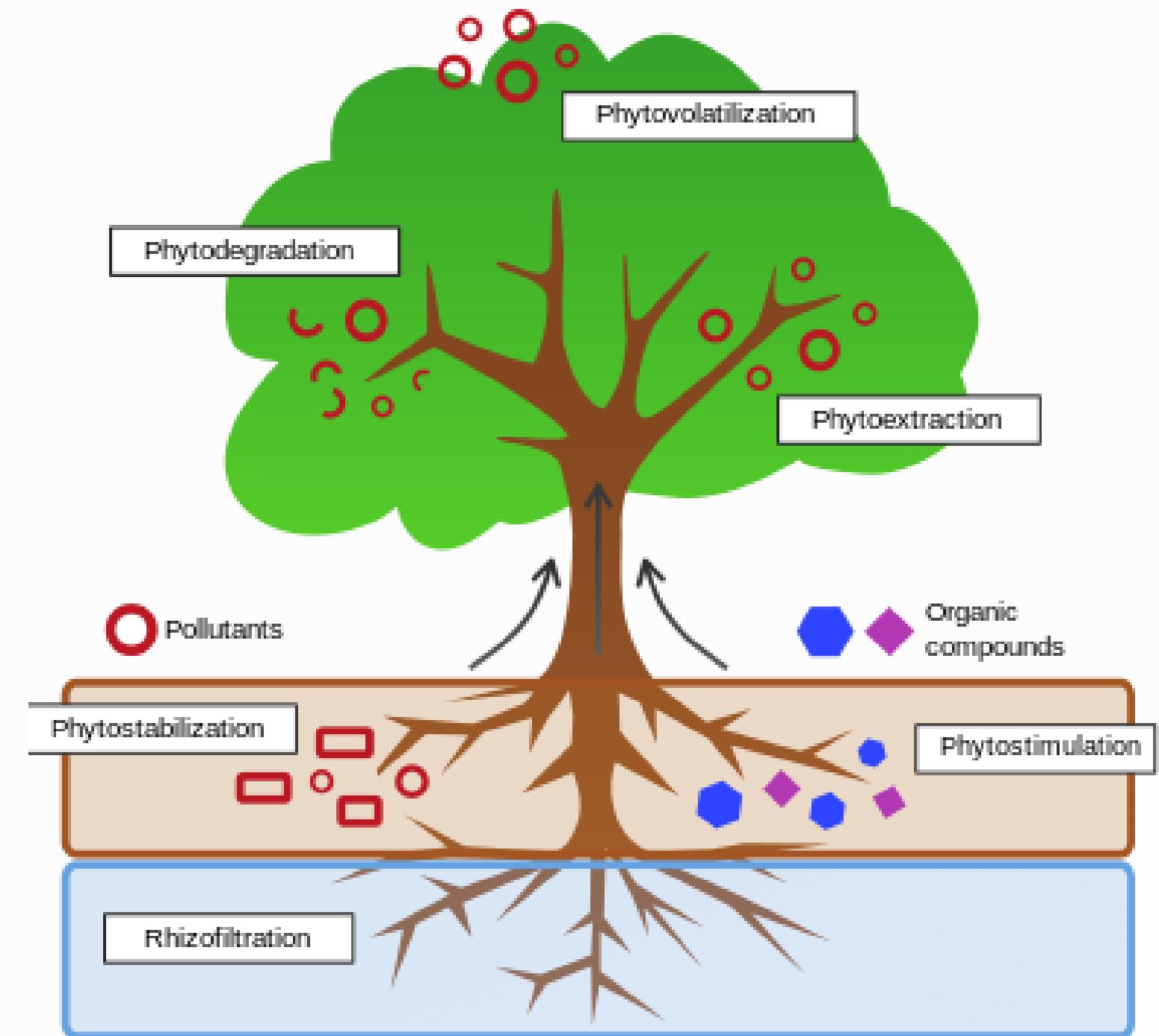
- **Fish Population Monitoring**
- **Algal Biomass Monitoring**
- **Phytoplankton Monitoring**
- **Long-Term Monitoring Programs**

Step 2: Identify and Mitigate Pollution Sources

- Collaborate with local industries to implement stringent effluent treatment measures in pharmaceutical units to minimize the release of pollutants.
- Upgrade and implement advanced wastewater treatment facilities in residential areas to reduce domestic wastewater pollution
 - A. Pharmaceutical Contamination
 - B. Metabolites and Herbicides
 - C. Domestic Waste

Step 3: Implement Remediation Technologies

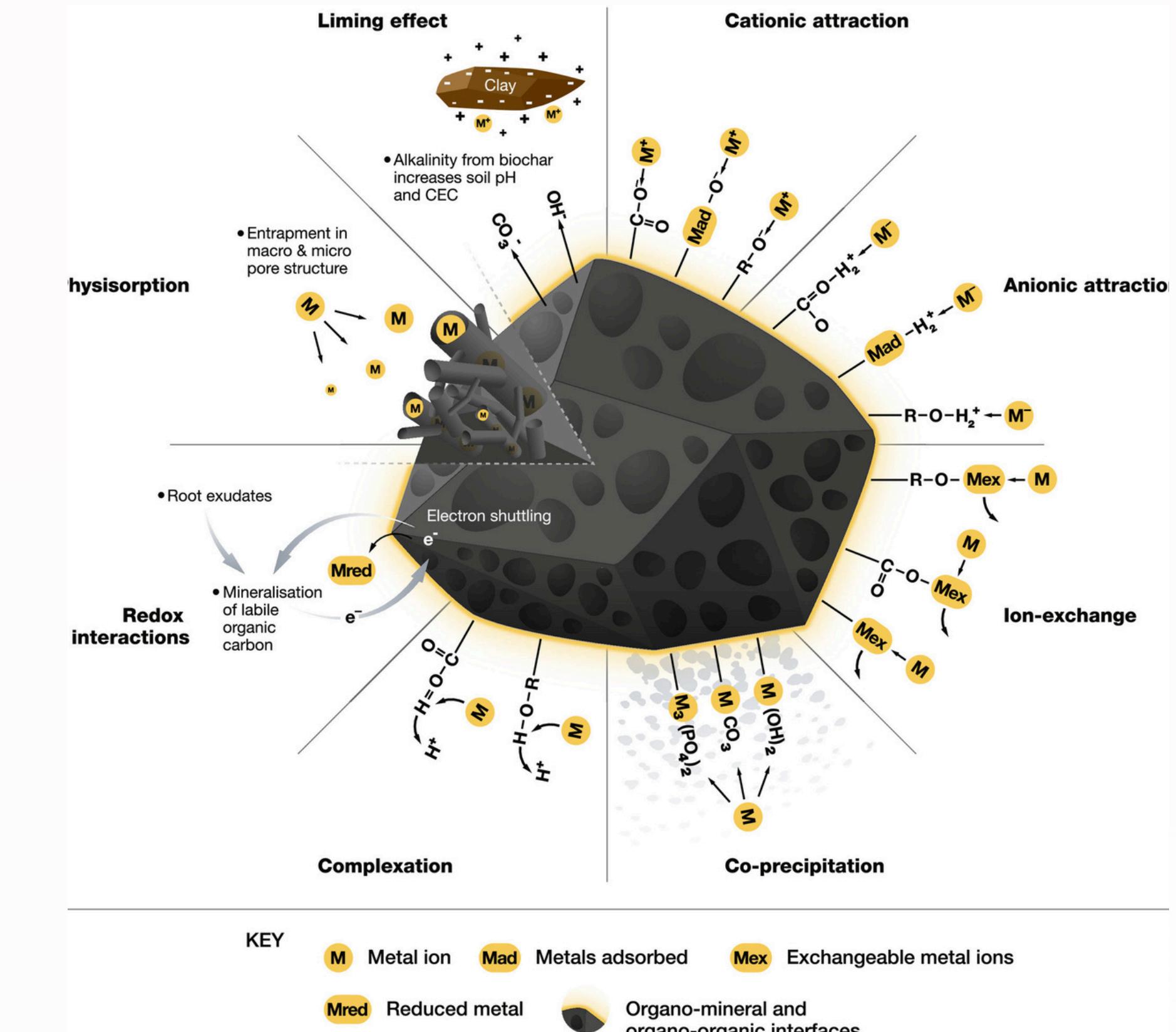
A. Phytoremediation : Phytoremediation harnesses the natural ability of plants to absorb and accumulate pollutants from water and soil. Aquatic plants such as water hyacinth, duckweed, and canna lilies can effectively remove various pharmaceuticals, heavy metals, and organic pollutants. These plants can be strategically planted in designated areas of the lake to act as natural filtration systems.



Step 3: Implement Remediation Technologies

B. Enzyme-Based Remediation : Enzymes are biological catalysts that can selectively degrade specific pollutants. Enzymes can be immobilized on solid supports and introduced into the lake water to target and break down specific pharmaceuticals or other contaminants. This approach offers a more targeted and environmentally friendly remediation method.

C. Adsorption using Biochar:
 Biochar is a charcoal-like material produced from organic matter, such as agricultural waste or wood chips. It has a high surface area and porous structure, making it an effective adsorbent for various pollutants, including pharmaceuticals and heavy metals. Biochar can be added to the lake water effectively remove contaminants.



Step 3: Implement Remediation Technologies

D. Using micro algae and bacteria as a source for eliminating pollutants by assimilation.

There are certain micro algae and bacteria that can assimilate and degrade various kinds of pollutants and organic compounds : example is *pseudomonas putida* which is known for its ability to assimilate aromatic compounds and is used for treating naphthalene infested soil.

Conclusion :

In light of past unsuccessful attempts to restore Durgam Cheruvu lake in Hyderabad, our revised plan emphasizes a strategic reevaluation. Learning from prior failures, we aim to transform the lake into a tourist attraction, reversing adverse conditions like algal blooms. By reassessing and adapting measures to the unique ecosystem dynamics, we seek to rectify past shortcomings and restore the lake's charm. The goal is to implement effective solutions that address pollution sources, reintroduce native species, and engage the community, ultimately reviving Durgam Cheruvu as a picturesque and thriving destination.

Thank You