



General Studies-3; Topic: Conservation, environmental pollution and degradation

Soil Microbiomes

Introduction

- Researchers have called for including soil microbiomes under the One Health goals that function at the nexus of human, wildlife and the shared environment health.
- One Health approach recommends global strategies to identify and manage the spread of infectious diseases and antimicrobial resistance (AMR).

Role of Soil Microbiomes

- Soil microbiomes play a crucial role in maintaining healthy water and environmental stability.
- They underpin global food security that affects the sustainability of terrestrial life.
- They provide a habitat for microorganisms that benefit the environment by delivering ecosystem and host functions.

Concerns / Challenges

- Soil microbiomes work as a reservoir of human pathogens that induce antibiotic resistance genes (ARGs) and are sources of organic and inorganic pollutants.
- They impact human and animal immune systems by interacting with them through food chains.
- They directly influence the quality of the environment through air and water.
- Soil-borne pathogens such as *Yersinia pestis*, *Clostridium botulinum* and *Bacillus anthracis* are present in soil across the globe.
- They cause hundreds of millions of infections each year via direct or indirect interactions with human, animal and plant food cycles.
- The researchers fear such disruption can lead to an endemic or pandemic.
- Soil microbiomes have assisted in transferring *Salmonella enterica* serotype type, responsible for typhoid, from soil to plants and eventually to consumable fruits and seeds.

Way Forward

- An integrated and interdisciplinary approach among global bodies is needed to fill the gaps and overcome the challenges.
- Establishment of a knowledge-hub network for data collection, knowledge sharing and making policy recommendations.
- Integrating, storing and sharing soil microbiome data to understand the distribution of soil-borne pathogens and ARGs worldwide.
- This information could benefit policymakers to chalk policies and provide insights on the threats in soil systems.
- International agencies could initiate periodic soil assessments relevant to One Health.
- Engaging concerned stakeholders, including the public, to highlight the critical role soil microbiomes play in One Health.