

Plant Diversity Loss in Grasslands

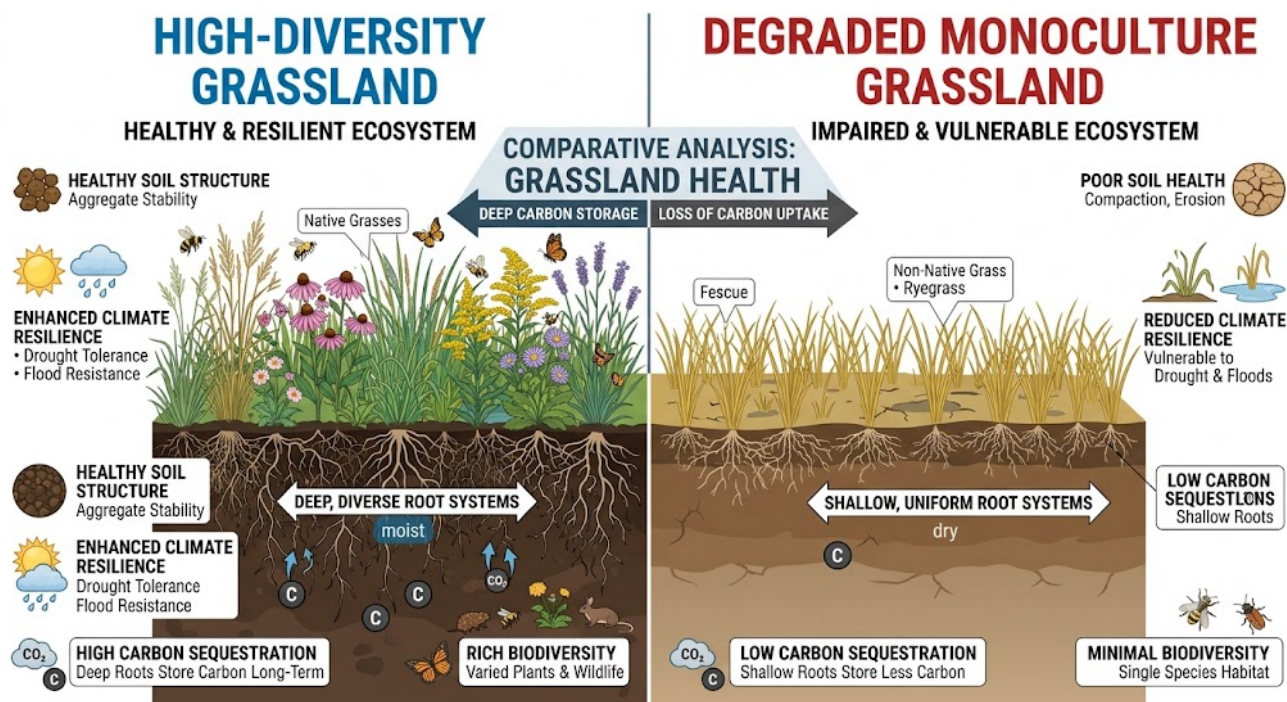
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Why in News?

Recently, a major study revealed that losing plant species diversity in grasslands could reduce their global CO₂ uptake through photosynthesis by 15% by 2050.

Key Scientific Findings

- In extreme regional cases such as the tropical grasslands of **Paraguay, India, and parts of sub-Saharan Africa**, strongly reduced plant diversity could slash carbon absorption by **up to 50%** by mid-century.
- **Functional Niche Complementarity**
 - Biodiverse grasslands feature a mix of deep-rooting and shallow-rooting species, C3 and C4 photosynthetic pathways, and nitrogen-fixing legumes.
 - This variety maximises water, nutrient, and solar radiation efficiency across varied microclimates, driving higher overall carbon sequestration rates.
- **Biodiversity as "Insurance"**
 - Diverse plant communities act as a buffer against weather shocks (e.g., severe droughts, heatwaves). When stress kills off specific sensitive species, resilient neighbouring species expand to maintain ecosystem-level photosynthesis.
- **Vulnerability of Monocultures**
 - Monocultures or species-poor pastures lack ecological redundancies, making them prone to structural productivity crashes during prolonged heatwaves or rainfall deficits.



Implications

- **Grasslands as Climate Real-Estate**
 - Grasslands (including meadows, steppes, savannas, and pastures) cover **nearly 25% to 30% of the Earth's ice-free land surface**.
 - Unlike forests, where carbon is heavily stored in above-ground biomass vulnerable to wildfires, grasslands store most of their carbon underground in deep root networks and organic soil matter, making them more reliable long-term carbon sinks.
- **Impact on the Global South & India**
 - Tropical and semi-arid grasslands in developing nations (such as India's Banni grasslands, Deccan thorn scrub savannas, and Terai-Duar inundation grasslands) face severe degradation due to overgrazing, invasive alien species (e.g., *Prosopis juliflora*, *Lantana camara*), and land-use conversion.
 - A drop in grassland primary productivity directly degrades forage quality for pastoralist communities, threatening rural livestock economies and food security.

Policy Mandates

- Highlights the hazard of converting natural open grassy ecosystems (OGEs) into monoculture tree plantations under misplaced carbon credit schemes, which destroys native plant diversity and worsens water security.
- Emphasizes that grassland restoration must prioritize **re-establishing native multi-species plant diversity** rather than merely expanding total green cover percentage.

Reference

[Down to Earth | Loss of diversity in grasslands](#)