Gully Erosion

Prelims – Indian and World Geography

Mains – *General Studies-I* (Geographical features and their location-changes in critical geographical features)

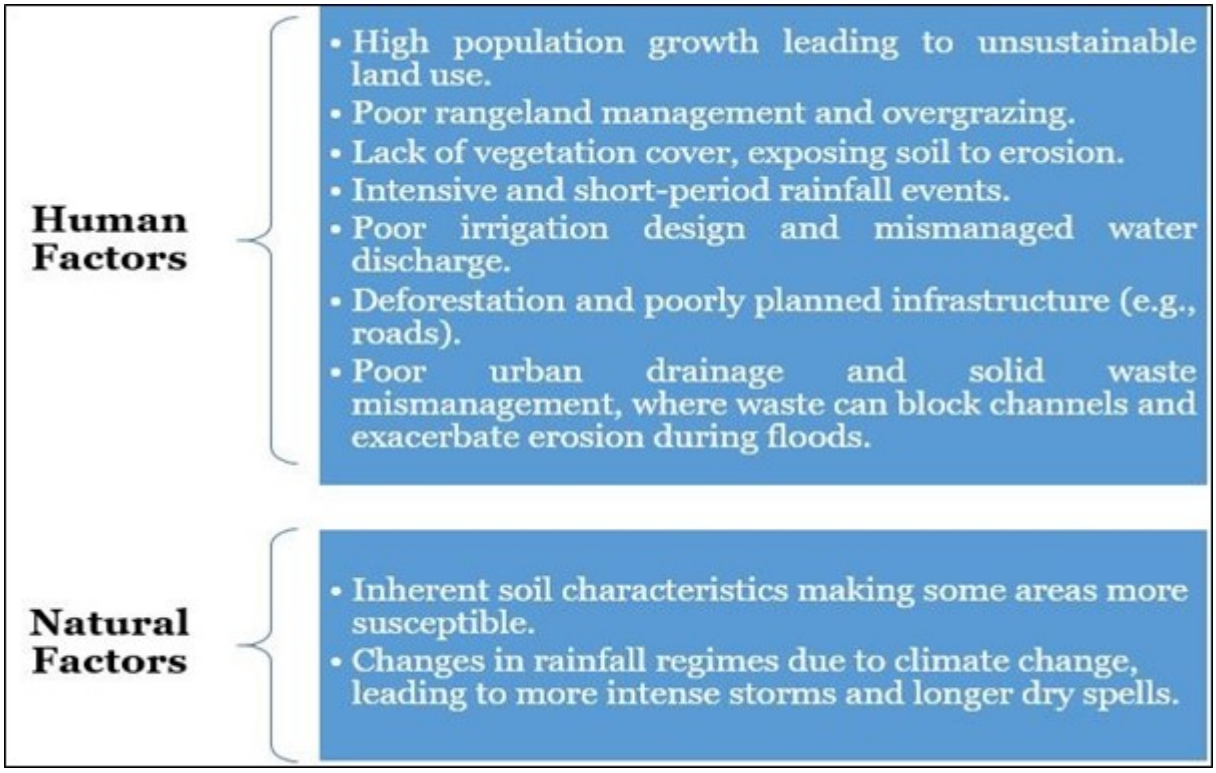
Why in news?

A recent study published in Scientific Reports (February 2025) highlights gully erosion as a major and often overlooked driver of global land degradation, exacerbated by climate change and land-use changes.

- Gully erosion is the *most severe form of soil erosion, characterized by deep incisions (several tens of meters) into soil*, caused by surface and subsurface water runoff.
- It differs from other types of erosion due to its depth, higher specific soil losses, and unpredictable nature, often resembling the destructive impact of landslides.

Causes of Gully Erosion

- Gully erosion is a result of a complex interplay of natural and human factors.



Consequences of Gully Erosion

- **Loss of Fertile Topsoil** – The most significant impact is the *irreversible loss of*

topsoil, which can take centuries to rebuild, severely affecting agricultural productivity.

- **Impact on SDGs** – It directly undermines efforts towards zero hunger, clean water and sanitation and climate action.
- **Damage to Infrastructure** – Gullies can swallow farmland, roads, and buildings, disrupting livelihoods and connectivity.
- **Increased Water Stress and Droughts** – Degraded land loses its *capacity to retain water*, exacerbating water scarcity and drought conditions.
- **Displacement and Migration** – In severe cases, gully erosion can lead to village abandonment and forced migration.
- **Agricultural productivity** – Prolonged gully erosion leads to the formation of "badlands," *severely impacting agricultural productivity*.

Impact in India and world

- Globally, research has identified numerous locations where gully erosion has caused severe damage to life and property, with *Nigeria* being particularly affected.
- In India, gully landforms are present in 1*9 states and the National Capital Region*, with at least 77 districts requiring urgent intervention.
- The most affected states in India are *Jharkhand and Chhattisgarh, followed by Madhya Pradesh and Rajasthan*.

Gully erosion poses a significant challenge to India's commitment to restore 26 million hectares of degraded land by 2030 under the UN Convention to Combat Desertification.

Mitigation and Management

- Mitigating existing gullies is *challenging and costly*, and predicting their formation is difficult, limiting proactive interventions.
- The primary approach is often *reactive land management* after gully formation, including:
  - Establishing vegetation cover to stabilize the soil.
  - Implementing soil and water conservation measures like check dams and gully plugging.
  - Runoff attenuation and/or diversion techniques.
- The appropriateness of these measures depends on local runoff characteristics and gully stability.
- An important aspect of mitigation is *preventing the removal of eroded sediment*, allowing for the formation of new wetlands that can further stabilize the land and support vegetation.

Reference

Down to Earth | Gully erosion

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