



Biodiversity & Environment

Sand and Dust Storms

Tags:

- GS Paper - 3
- Conservation
- Environmental Pollution & Degradation
- GS Paper - 2

For Prelims: United Nations Convention to Combat Desertification, Sand and dust storms, Agriculture, Deforestation, Aral Sea, United Nations Food and Agriculture Organization.

For Mains: Sources of Sand and Dust Storms, Effective Ways to Minimize the Impacts of Sand and Dust Storms.

Why in News?

The recent meeting of the United Nations Convention to Combat Desertification (UNCCD) shed light on the far-reaching consequences of sand and dust storms and proposed crucial policy recommendations to mitigate their effects.

What are Sand and Dust Storms?

▪ About:

- **Sand and dust storms** are meteorological events that occur when **strong winds lift large amounts of sand and dust particles** from the ground and transport them over long distances.
- They mainly **affect arid and semi-arid regions**, but can also impact areas far from their source.

- Annually, over **two billion tonnes of sand and dust** traverse **extensive distances across the Earth's atmosphere**, creating a global phenomenon with profound implications.

- **Sources of Sand and Dust Storms:**

- According to the **UNCCD**, sand and dust storms are caused by **both natural and human factors**.
 - About **75% of global dust emissions originate from natural sources** in the world's drylands, such as **hyper-arid regions**, topographic depressions, and dry ancient lake beds.
 - The remaining **25% are attributed to human activities**, mainly agriculture.
- Some of the **Anthropogenic** Causes of Sand and Dust Storms are:
 - **Unsustainable Agricultural Practices:** Agriculture stands as a primary anthropogenic source, with activities like **tillage, land clearing, and abandoned croplands** contributing to dust emissions.
 - **Land Use Changes:** Alterations in land use patterns, **including** deforestation and urbanization, contribute to the destabilization of surfaces, enhancing dust emissions.
 - **Water Diversion:** Excessive diversion of water from rivers for agricultural purposes can lead to the shrinkage of water bodies, creating new sources of sand and dust storms.
 - For example, **the excessive diversion of water from rivers in Central Asia** over several decades towards agriculture has shrunk the **Aral Sea**, a pre-existing lake between Kazakhstan to its north and Uzbekistan to its south.
 - It has now become the **Aralkum Desert**, a significant new source of sand and dust storms.
- **Climate-Related Amplifiers:**

- **Aridity and Minimal Precipitation:** High air temperatures, minimal precipitation, and arid conditions act as drivers, amplifying the likelihood and intensity of these storms.
- **Extreme Weather Events:** Intensified wind patterns and **prolonged droughts due to** climate change exacerbate the severity and frequency of sand and dust storms.
- **Impacts:**
 - **Environmental Impacts:**
 - **Soil Degradation:** Sand and dust storms **strip away fertile topsoil, affecting soil quality and fertility.**
 - This degradation reduces the land's ability to support vegetation, impacting agriculture and leading to desertification.
 - The loss of fertile soil also **affects water retention and nutrient availability.**
 - **Ecosystem Disruption:** These storms can alter ecosystems by burying vegetation, disrupting natural habitats, and affecting wildlife.
 - Invasive species **carried by the storms** might outcompete native species, leading to biodiversity loss and ecological imbalance.
 - **Socioeconomic Impacts:**
 - **Health Effects:** Health impacts are wide-ranging, **affecting respiratory health, causing allergies,** and exacerbating existing conditions like asthma.
 - Recent incidents, such as a **two-day storm in Mongolia in 2021,** illustrate the devastating impact on human lives, displacing thousands and causing casualties alongside substantial livestock losses.
 - **Economic Losses:** Sand and dust storms cause substantial economic losses by **damaging infrastructure,**

reducing agricultural productivity, disrupting transportation, and increasing healthcare costs.

- These events can also impact tourism **and trade**, affecting local and regional economies.
- **Social Disruption:** Disrupted daily life due to these storms can lead to social unrest, migration, and displacement.
- **Global Implications:**
 - **Transboundary Impact:** Sand and dust storms do not adhere to **geopolitical boundaries**; they can cross borders, affecting multiple countries.
 - **Climate Feedback:** The transportation of dust particles globally due to these storms can **influence climate feedback loops**, impacting weather patterns and potentially contributing to climate change.

Note: Sand and dust storms also present a formidable challenge to **achieving 11 of the 17 Sustainable Development Goals**, according to the United Nations Food and Agriculture Organization (FAO) report Sand and dust storms: A Guide to Mitigation, Adaptation, Policy, and Risk Management Measures in Agriculture.

What are Effective Ways to Minimize the Impacts of Sand and Dust Storms?

- **Preventive Measures:**
 - **Soil Moisture Management:** Implement effective water conservation methods to retain soil moisture and prevent desertification.
 - **Regulatory Framework:** Enforce strict land-use regulations to **curb activities leading to soil degradation and dust emissions**, such as overgrazing or improper land development.
 - **Eco-friendly Practices:** Promote sustainable **agricultural techniques like agroforestry and contour plowing** to preserve soil structure and reduce wind erosion.
- **Preparedness:**

- **Early Warning Systems:** Developing and implementing **effective early warning systems to forecast sand and dust storms**. This allows communities to prepare and take necessary precautions.
- **Education and Awareness:** Educating communities about the **risks, impacts, and protective measures** against sand and dust storms can help reduce vulnerability.
- **Emergency Response Plans:** Establishing plans to respond effectively during and after sand and dust storms, including **providing shelter, medical care, and support for affected communities**.
- **Mitigation Strategies:**
 - **Infrastructure Development:** Building infrastructure like **windbreaks, barriers, or green belts** to reduce the speed and impact of wind carrying dust and sand.
 - **Technological Solutions:** Researching and investing in innovative technologies for **dust suppression and soil stabilization**.

What is the United Nations Convention to Combat Desertification?

- The **UNCCD is the only legally binding framework set up to address desertification and the effects of drought**.
 - There are currently **197 Parties** to the Convention, including **196 country Parties and the European Union**.
- The Convention based on the principles of participation, **partnership and decentralization, is** a multilateral commitment to mitigate the impact of land degradation, and protect our land so we can provide **food, water, shelter and economic opportunity to all people**.
- The Convention addresses specifically the **arid, semi-arid, and dry sub-humid areas**, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found.

- **UPSC Civil Services Examination, Previous Year Questions**
- **Prelims**

Q. What is/are the importance/importances of the ' United Nations Convention to Combat Desertification' ? (2016)

1. It aims to promote effective action through innovative national programmes and supportive international partnerships.
2. It has a special/particular focus on South Asia and North Africa regions, and its Secretariat facilitates the allocation of major portions of financial resources to these regions.
3. It is committed to a bottom-up approach, encouraging the participation of local people in combating desertification.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (c)

