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)
Mains
Q. The process of desertification does not have climate boundaries. Justify with examples. (2020)

Biodiversity & Environment

Emissions Gap Report 2023: UNEP

Tags:

•GS Paper - 2

•Important International Institutions

•GS Paper - 3

•Conservation

•Environmental Pollution & Degradation

For Prelims: Emissions Gap Report 2023, United Nations Environment Programme (UNEP), Global Warming, Greenhouse Gas Emissions (GHG), Nationally Determined Contributions (NDCs), Net-Zero.

For Mains: Emissions Gap Report 2023: UNEP, Environmental pollution and degradation.

Why in News?

Recently, United Nations Environment Programme (UNEP) has released a report titled- **the Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)**, stating that urgent Climate Action is crucial to avoid the alarming trajectory of Temperature Rise.

- The report is the 14th edition in a series that brings together many of the world's top climate scientists to look at future trends in greenhouse gas emissions and provide potential solutions to the challenge of Global Warming.

What Emissions Gap Report (EGR)?

- The EGR is UNEP's spotlight report launched annually in advance of the Annual Climate negotiations.
- The EGR tracks the **gap between where global emissions are heading with current country commitments** and where they ought to be to limit warming to 1.5°C.

What are the Key Highlights of the Report?

- **Temperature Rise Trajectory:**
  - Current pledges under the Paris Agreement set the world on a course for a **2.5-2.9°C temperature rise above pre-industrial levels** by the end of this century.
    - Paris Agreement (also known as the Conference of Parties 21 or COP 21) is a landmark environmental accord that was adopted in **2015 to address climate change and its negative impacts.**
  - To limit warming to 1.5-2°C, substantial emission cuts of **28-42% by 2030 are necessary.**
- **Global Emissions Trends:**
  - Greenhouse Gas Emissions (GHG) hit a new record of **57.4 Gigatonnes of Carbon Dioxide Equivalent (GtCO2e) in 2022**, with a 1.2% increase from the previous year.
    - Fossil CO2 emissions account for approximately two thirds of current GHG emissions using 100-year global warming potentials.

        - According to multiple datasets, fossil CO2 emissions grew between 0.8–1.5% in 2022 and were the main contributor to the overall increase in GHG emissions. In 2022, fluorinated gases emissions grew by 5.5%, followed by Methane at 1.8% and nitrous oxide (N2O) at 0.9%.
    - GHG emissions across **the G20 also increased by 1.2% in 2022**. However, members vary widely in their trends with increases in **China, India, Indonesia and the United States of America,** but decreases in Brazil, the European Union and the Russian Federation. Collectively, the **G20 currently accounts for 76% of global emissions.**

- **Emissions from Major Economic Sectors:**
    - Emissions can be split into five major economic sectors, Energy supply, industry, agriculture and Land use, land-use change and forestry (LULUCF), transport and buildings.
    - In 2022, energy supply was the largest source of emissions at 20.9 GtCO2e (36% of the total), followed by Industry (25%), followed by agriculture and LULUCF CO2 (18%), transport (14%) and buildings (6.7%).
- **Mitigation Efforts:**
    - If current policies and pledges continue, **global warming will likely reach 3°C above pre-industrial levels** by the end of the century.
    - Implementing unconditional Nationally Determined Contributions (NDCs) could limit the rise to 2.9°C, while conditional NDCs might cap it at 2.5°C.
- **Net-Zero Pledges:**

    - Although countries have made Net-Zero Pledges, none of the G20 Countries are reducing emissions at a pace **consistent with their targets.**
    - Even in the most optimistic scenario, the likelihood of limiting warming to 1.5°C is only 14%.
- **Progress and Challenges:**
    - Policy progress since the Paris Agreement has reduced the implementation gap but is not sufficient.
    - Nine countries updated their NDCs, potentially reducing emissions by **about 9% annually by 2030.**
    - However, further reductions are essential to establish least-cost pathways for limiting global warming to 1.5°C.

What are the Recommendations to Bridge the Emissions Gap?

- **Low-Carbon Development:**
    - There is a need for **global, low-carbon development transformations,** especially focusing on the energy transition.
    - The extraction and **planned use of fossil fuels far exceed** the carbon budget for meeting temperature goals.
- **Support and Financing:**
    - Countries with greater capacity and responsibility for generating emissions will **need to take more ambitious action** and provide financial and technical support to developing nations.
    - Low- and middle-income countries, which already account for more than two-thirds of global emissions, **must meet their legitimate development needs and aspirations** with low-emission growth trajectories.
- **Carbon Dioxide Removal:**

- Carbon dioxide removal will be needed more in the future. However, there are many risks with new methods of carbon dioxide removal, one of the main ones being that the technology isn't in place yet.
- Essentially, the longer we wait, the harder it's going to be. The world needs to lift the needle out of the groove of insufficient action and begin setting new records on cutting emissions, green and just transitions and climate finance – starting now.

What are the Initiatives to Reduce Emissions in India?

- Bharat Stage-IV (BS-IV) to Bharat Stage-VI (BS-VI) emission norms.
- UJALA scheme.
- International Solar Alliance.
- National Action Plan on Climate Change (NAPCC).
- Ethanol Blending in India by 2025.
- India Updated its NDC.What is the United Nations Environment Programme?

- **About:**
  - It is a leading global environmental authority established on 5th June 1972.
  - It sets the global environmental agenda, promotes sustainable development within the United Nations system, and serves as an authoritative advocate for global environment protection.
- **Headquarters:**
  - Nairobi, Kenya.
- Major Reports:

    - Emission Gap Report, Adaptation Gap Report, Global Environment Outlook, Frontiers, Invest into Healthy Planet.
- Major Campaigns:
    - Beat Pollution, UN75, World Environment Day, Wild for Life.

UPSC Civil Services Examination Previous Year Question

Prelims

Q. The 'Common Carbon Metric', supported by UNEP, has been developed for

(a) assessing the carbon footprint of building operations around the world

(b) enabling commercial fanning entities around the world to enter carbon emission trading

(c) enabling governments to assess the overall carbon footprint caused by their countries

(d) assessing the overall carbon foot-print caused by the use of fossil fuels by the world in a unit time

Ans: (a)

Mains

Q. Discuss global warming and mention its effects on the global climate. Explain the control measures to bring down the level of greenhouse gases which cause global warming, in the light of the Kyoto Protocol, 1997. (2022)