NEXT IAS

SUMMARY OF
DOWN TO EARTH

[16 – 31 August, 2024]

WAYANAD LANDSLIDES

Context

- Recently, Wayanad of Kerala faced a devastating landslide that claimed over 250 lives that underscores the urgency of understanding and mitigating landslide risks.

About Landslides

- These are defined as the **movement of a mass of rock, debris, or earth** down a slope. These are a geological phenomenon that involves the **sudden and rapid movement of a mass of rock, soil, or debris down a slope** under the influence of gravity.
- They are a **type of mass wasting**, which denotes any downward movement of soil and rock, generally **occurring in clay-rich soil.**
- In India the entire Himalayan tract, hills/mountains in sub-Himalayan terrains of North-east India, Western Ghats, the Nilgiris in Tamil Nadu and Konkan areas are landslide-prone.

Causes of Landslides

Natural Causes

- **Heavy Rainfall:** Heavy rainfall is one of the most common triggers of landslides. It increases pore water pressure as well as the weight of soil by making it saturated.
- **Erosion**: Clay and vegetation present within the soil or rock act as cohesive elements and help bind particles together. By removing these cohesive elements, erosion makes an area more prone to landslides.
- **Earthquakes**: Intense ground shaking due to earthquakes causes instability in rocks and soils, thus triggering landslides.
- **Volcanic Eruptions:** Ash and debris deposited by volcanic eruptions overload slopes while the accompanied seismic activity causes instability.

Anthropogenic Causes

- **Deforestation:** By holding soils as well as obstructing the flow of falling debris, vegetation cover plays an important role in preventing landslides in any area. Deforestation takes away this preventive cover and increases vulnerability to landslides.
- **Encroachment** in Vulnerable Terrains: Of late, humans have been encroaching in landslide-prone areas such as hilly terrains. This has led to increased construction activities in these areas and increased chances of landslides.
- **Uncontrolled Excavation:** Unauthorised or poorly planned excavation activities, such as mining, quarrying, etc destabilise slopes and increase the chances of landslides.
- **Climate Change:** Climate change caused by various anthropogenic activities has led to abrupt alterations in precipitation patterns and increased frequency of extreme weather events.

Types (On The Basis of Movement)

- **Falls**: They refer to the type of landslide that involves the collapse of material from a cliff or steep slope, which then falls down the slope and collects near the base.
- **Topples**: Under this type of landslide, the falling mass undergoes forward rotation and movement around an axis or point at or near the base.
- **Slides**: Under this type of landslide, there is a distinct zone of weakness that separates the moving material from a more stable underlying material.
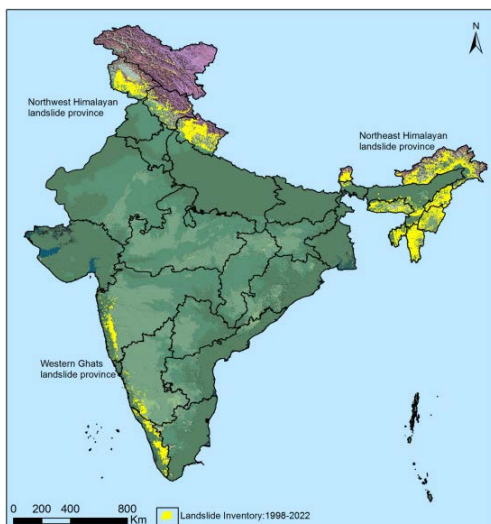
Impacts of Landslides in India

- **Loss of Lives and Property:** Landslides claim lives, destroy homes, and disrupt

communities. Vulnerable populations often suffer the most.

● **Infrastructure Damage:** Roads, bridges, and other infrastructure can be severely affected, hindering connectivity and emergency response.

● **Environmental Degradation:** Landslides alter landscapes, erode soil, and impact biodiversity. They also contribute to sedimentation in rivers and reservoirs.

● **Economic Costs:** Landslides result in direct economic losses due to damage and indirect costs related to recovery efforts.

Landslide Prone Areas in India

● ISRO's National Remote Sensing Centre created a database of landslide-prone regions of India based on events during 1998 – 2022, and released the Landslide Atlas of India.

● In addition to aerial images, high-resolution satellite images captured using ResourceSat-1 and 2, etc., were used to study the landslides.

● As per this atlas, some of the prominent statistics regarding landslides in India are as follows:

  ○ India is among the top five landslide-prone countries in the world.

  ○ Excluding snow-covered areas, around 12.6% of India's geographical land area is prone to landslides.

● A rough break-up of reported landslides in India is as follows:

  ○ About 66.5% from the North-Western Himalayas;

  ○ About 18.8% from the North-Eastern Himalayas

  ○ About 14.7% from the Western Ghats.

● As per the Landslide Atlas of India, major landslide prone areas in India are as follows:

  ○ The Northeastern Region (comprises about 50% of the total landslide prone areas in India)

  ○ Areas of Uttarakhand, Himachal Pradesh, and Jammu & Kashmir lying along the Himalayas.

  ○ Areas of Maharashtra, Goa, Karnataka, Kerala, and Tamil Nadu lying along the Western Ghats.

  ○ The Araku region in Andhra Pradesh along the Eastern Ghats.

Landslide Vulnerability in India

● According to the Geological Survey of India (GSI) about 0.42 million square km of India's landmass, or about 13% of its area, spread over 15 states and four Union Territories, is prone to landslides.

● About 0.18 million square km, or 42% of this vulnerable area is in the Northeastern region, where the terrain is mostly hilly.

● This area is also prone to earthquakes, which too, are a major trigger for landslides.

Vulnerable Terrain

● **Himalayas and Western Ghats:** These majestic mountain ranges are among the most vulnerable areas prone to landslides in India. While the Himalayas are well-known for their seismic activity and associated landslides, the Western Ghats—

stretching along the western coast of India—are equally susceptible.

○ Interestingly, outside of the Himalayas, Kerala stands out as the most vulnerable state. Its unique topography, characterised by steep slopes and abundant rainfall, contributes to this vulnerability.

Kerala's Landscape

- Around 50% of Kerala's terrain features slopes exceeding 20 degrees, making it prone to soil erosion and landslides. The loose topsoil overlaying rocks in these areas exacerbates the risk.
- Wayanad, nestled in the Western Ghats, exemplifies this vulnerability. Its lush green hills and dense forests create an idyllic landscape but also set the stage for natural disasters.

Factors Behind Landslides

- **Conditioning Factors (related to the local environment and terrain)**
  ○ **Soil Topography:** The type of soil, its stability, and how it interacts with underlying rock layers play a crucial role.
  ○ **Rocks and Geomorphology:** The composition and structure of rocks influence slope stability.
  ○ **Slope Angle:** Steep slopes are more prone to landslides.
  ○ **Vegetation Cover:** Dense vegetation can stabilise slopes, while deforestation increases the risk.
- **Triggering Factors (These factors initiate landslides)**
  ○ **Heavy Rainfall:** Excessive rain saturates the soil, reducing its cohesion and triggering slides.
  ○ **Earthquakes:** Seismic activity can destabilise slopes.

○ **Human Activities:** Construction, mining, and deforestation disturb the natural balance, making slopes more susceptible.
- **Role of Climate Change**
  ○ **Intensifying Climate Change:** Landslides are increasing due to climate change. Extreme weather events, including heavy rainfall, are becoming more frequent.
  ■ Rising temperatures can alter soil properties and vegetation dynamics, affecting slope stability.

Mitigation Measures

- **Early Warning Systems:** Implementing real-time monitoring and alert systems to notify communities in landslide-prone areas.
  ○ **The 'Global Status of Multi-Hazard Early Warning Systems 2023'** report analyses the latest data one year into the **Early Warnings for All Initiative (EW4All)** that was formally launched at the COP27 meeting in Sharm El-Sheikh.
  ○ It reveals that 101 countries now have multi-hazard early warning systems, which is based on more complete data from the **Sendai Framework Monitor.**
- **Land Use Planning:** Proper zoning and regulations to prevent construction in high-risk zones.
- **Vegetation Restoration:** Reforestation and afforestation help stabilise slopes.
- **Slope Stabilization Techniques:** These include retaining walls, terracing, and bioengineering methods.
- **Education and Awareness:** Educating communities about landslide risks and safety measures.

Measures Taken in India

- The **Disaster Management Act, of 2005** provides a comprehensive legal and

institutional framework for the management of various disasters including landslides.

- **The National Landslide Risk Management Strategy (2019)** covers all aspects of landslide disaster risk reduction and management, such as hazard mapping, monitoring, and early warning systems.

- The **National Disaster Management Authority (NDMA)** has issued Guidelines on Landslide Hazard Management (2009) that outline the steps that should be taken to reduce the risk of landslides.

- The **National Institute of Disaster Management (NIDM)** has been providing capacity building and other support to various national and state-level disaster management authorities.

- Efforts have been made towards better prediction of weather. E.g. **Ensemble Prediction System**. This will help predict disasters like landslides.

- **National Landslide Forecasting Centre (NLFC) in Kolkata:** It was established under the **Geological Survey of India (GSI)**, and has started relaying daily forecast bulletins for **three regions** — Kalimpong and Darjeeling districts in West Bengal and Nilgiris district in Tamil Nadu.

Suggested Measures

Gadgil Committee Recommendation

○ **Ecologically Sensitive Zones:** The report recommended classifying 64% of the Western Ghats into **Ecologically Sensitive Zones (EEZs)** called ESZ1, ESZ2 and ESZ3, based on Ecologically Sensitive Area (ESA).

○ **Western Ghats Ecology Authority:** Under the Environment (Protection) Act, 1986, a professional body to manage the ecology of the region and to ensure its sustainable development was recommended by the committee.

○ **Ban on Growing Single Commercial Crops:** Crops like tea, coffee, cardamom, rubber, banana and pineapple, which have led to "fragmentation of forest, soil erosion, degradation of river ecosystems and toxic contamination of the environment" should be curtailed.

○ **Community participation:** The panel had urged the Ministry of Environment and Forests to take critical steps to involve citizens, including proactive and sympathetic implementation of the provisions of the **Community Forest Resources of the Forest Rights Act.**

Kasturirangan Committee aka High-level Working Group (HLWG)

○ **Eco-Sensitive Area (ESA):** 37% of the Western Ghats should be classified as an ESA.

○ **Prohibited activities:** Mining, quarrying, thermal power plants, and other "red industries" should be prohibited in the ESA.

○ **Hydropower projects:** Hydropower projects should only be allowed in areas where a 30% ecological flow is maintained. They should also undergo a cumulative Impact Assessment.

○ **Sustainable agriculture:** Sustainable agricultural practices should be promoted.

  ■ Local communities should be involved in decision-making and decentralised governance.

○ **Ecotourism:** Community ownership-based eco-sensitive tourism should be promoted.

  - On the other hand, there is a need to promote terrace farming which can help *reduce landslide risks; afforestation and construction of bunds to reduce the flow of falling materials; retaining walls* can be built on mountain slopes to stop the falling materials coming down.

- As suggested by the **10th FYP,** mitigation measures should be built into the development process itself.
- **Traditional knowledge of the local community** should be used to tackle such kinds of disasters. **Education and training** can help ensure the preparedness of the disaster management authorities as well as the local community.

Conclusion

- While landslides pose a significant challenge, proactive measures can reduce their impact. As we continue to grapple with climate change and environmental degradation, understanding and addressing landslide risks remain critical.
- As we grapple with these natural phenomena, it's essential to prioritise research, early warning systems, and sustainable land-use practices. By doing so, we can reduce the impact of landslides and protect vulnerable communities.

SPECIFIC HEAT WAVE THRESHOLDS

Context

- Recently, Uttar Pradesh became the **first state in India** to establish specific heat wave thresholds for all 75 of its districts.

Understanding Specific Heat Wave Thresholds

- Heat waves are becoming increasingly common and severe due to climate change, making it crucial to understand the specific thresholds that define these extreme weather events.

Defining Heat Waves

- A heat wave is a period of abnormally high temperatures, significantly higher than the usual for a particular region. The India Meteorological Department (IMD) has set specific criteria to declare a heat wave:
  - **Plains**: A heat wave is declared if the maximum temperature reaches at least 40°C.
  - **Hilly Regions:** A heat wave is declared if the maximum temperature reaches at least 30°C.
  - **Coastal Areas:** A heat wave is declared if the maximum temperature reaches at least 37°C, with a departure from normal of 4.5°C or more.
- Additionally, the IMD classifies heat waves based on the departure from normal temperatures:
  - **Heat Wave:** Departure from normal is 4.5°C to 6.4°C.
  - **Severe Heat Wave:** Departure from normal is more than 6.4°C.

District-Specific Heat Wave Alerts in Uttar Pradesh

- Recognising the limitations of a one-size-fits-all approach, Uttar Pradesh has pioneered district-specific heat wave thresholds which allows for more precise and timely alerts, tailored to the unique climatic conditions of each district.
- Uttar Pradesh has introduced a **three-tier alert system:**
  - **Yellow Alert:** Temperatures ranging from 36.47°C to 40.58°C.
  - **Orange Alert:** Temperatures ranging from 39.08°C to 43.30°C.
  - **Red Alert:** Temperatures ranging from 41.48°C to 45.34°C.
- It empowers local authorities to activate heat action plans and provide timely medical support, thereby enhancing public safety and optimising responses to rising temperatures.

Importance of Specific Heat Wave Thresholds

- **Public Health:** Timely alerts and action plans can prevent heat-related illnesses and fatalities.
- **Agricultural Practices:** Farmers can adjust their practices to mitigate the impact of extreme heat on crops.
- **Urban Planning:** Cities can implement measures to reduce heat island effects and protect vulnerable populations.

Conclusion

- As climate change continues to exacerbate the frequency and intensity of heat waves, understanding and implementing specific heat wave thresholds becomes increasingly important.
- The efforts by the IMD and the innovative approach by Uttar Pradesh serve as models for other regions to enhance their heat wave preparedness and response strategies.

FUTURES TRADING IN WEATHER COMMODITIES

Context

- Futures trading in weather commodities may help farmers hedge climate-related risks.

About

- Futures trading in weather commodities is **an innovative financial instrument** that allows businesses and investors **to hedge against the financial risks** associated with adverse weather conditions.
- This market has gained traction due to the increasing unpredictability of weather patterns and their significant impact on various sectors, including agriculture, energy, and tourism.

Understanding Weather Derivatives

- Weather derivatives are **financial contracts** that derive their value from **weather-related variables** such as **temperature, rainfall, snowfall, and wind speed.**
- These derivatives are used to mitigate the risks posed by weather fluctuations.
- For instance, an energy company might use weather derivatives to hedge against the risk of a mild winter reducing the demand for heating.

Types of Weather Derivatives

- **Futures Contracts:** These are standardised contracts traded on exchanges like the CME Group. They allow parties to buy or sell a specific quantity of a weather-related index at a predetermined price on a future date.
- **Options:** These give the holder the right, but not the obligation, to buy or sell a weather derivative at a specified price before a certain date.
- **Swaps:** These involve the exchange of cash flows between two parties based on weather indices.

Applications of Weather Derivatives

- **Agriculture**: Farmers can use weather derivatives to protect against the risk of poor crop yields due to adverse weather conditions such as droughts or excessive rainfall.
- **Energy Sector:** Utility companies can hedge against the risk of fluctuating energy demand due to temperature variations.
- **Event Management:** Companies organising outdoor events can use weather derivatives to mitigate the financial impact of unfavourable weather conditions.

Market Participants

- **Hedgers**: These are businesses that use weather derivatives to protect against financial losses due to adverse weather.

- **Speculators**: Investors who seek to profit from predicting weather patterns.
- **Insurance Companies:** They use weather derivatives to manage the risks associated with weather-related claims.

Regulation and Oversight

- In India, the **regulation of weather derivatives** falls under the purview of the **Securities and Exchange Board of India (SEBI).**
- Additionally, the **India Meteorological Department (IMD)** provides crucial weather data that underpins these financial instruments.

Conclusion

- Futures trading in weather commodities represents a significant advancement in financial risk management.
- By allowing businesses to hedge against the uncertainties of weather, these instruments contribute to greater economic stability and resilience.
- As climate change continues to introduce more variability into weather patterns, the importance of weather derivatives is likely to grow, offering a valuable tool for managing weather-related risks.

REJUVENATING WATER BODIES IN INDIA

Context

- Over the years, water bodies in India have suffered from pollution, encroachment, and neglect, and they need rejuvenation with support from government and local authorities.

Importance of Water Bodies

- Water bodies play a crucial role in maintaining ecological balance, supporting

biodiversity, and providing water for agriculture, industry, and domestic use.
  - Rivers are the lifelines of ecosystems and human civilisations.
- They act as natural reservoirs, help in groundwater recharge, and mitigate the effects of floods and droughts.
- However, due to rapid urbanisation, industrialization, and pollution, many rivers have become severely degraded. The degradation of these water bodies has led to severe water scarcity, affecting millions of people across the country.
- River rejuvenation is essential to restore these vital water bodies to their natural state.

River Rejuvenation Techniques

Pollution Control and Waste Management

- **Industrial Effluent Treatment:** Ensuring that industries treat their wastewater before discharging it into rivers.
- **Sewage Treatment Plants (STPs):** Establishing and upgrading STPs to handle domestic sewage effectively.
- **Solid Waste Management:** Implementing proper waste disposal systems to prevent solid waste from entering river systems.

Riparian Buffer Zones

- **Filtering Pollutants:** Plants and trees absorb pollutants before they reach the river.
- **Preventing Erosion:** Roots stabilise the soil, reducing erosion and sedimentation in rivers.
- **Enhancing Biodiversity:** These zones provide habitats for various species, promoting ecological balance.

Restoration of Natural Flow

- **Removing Obstructions:** Dams and weirs that disrupt the natural flow should be modified or removed.

○ **Reconnecting Floodplains:** Allowing rivers to access their floodplains during high flows helps in groundwater recharge and reduces flood risks.

Community Involvement and Awareness

○ **Awareness Campaigns:** Educating people about the importance of rivers and how they can contribute to their conservation.

○ **Participatory Planning:** Involving communities in planning and decision-making processes for river restoration projects.

Innovative Technologies

○ **Bioremediation**: Using microorganisms to break down pollutants in the water.

○ **Phytoremediation**: Utilising plants to absorb and detoxify contaminants.

○ **Constructed Wetlands:** Creating artificial wetlands to treat wastewater naturally.

Policy and Regulatory Measures

● **Water Quality Standards:** Setting and enforcing standards for water quality to ensure rivers remain clean.

● **Polluter Pays Principle:** Holding polluters accountable for the damage they cause to river ecosystems.

● **Integrated Water Resource Management (IWRM):** Coordinating the management of water, land, and related resources to maximise economic and social welfare without compromising the sustainability of vital ecosystems6.

Related Initiatives

● The **Jal Shakti Abhiyan** aims on rainwater harvesting, rejuvenation of water bodies, reuse of treated wastewater, and intensive afforestation. This **mission-mode campaign** aims to create awareness and encourage community participation in water conservation efforts.

● **Namami Gange Programme**: It includes projects for sewage treatment, riverfront development, afforestation, and public awareness campaigns. The success of this program is crucial for the overall health of the river and the millions of people who depend on it.

Central and States Initiatives

● India has **three Central schemes and at least 9 initiatives by state and district administrations** to create and rejuvenate water bodies such as lakes, ponds, and irrigation tanks. Additionally, there are numerous local initiatives focused on the revival of surface water bodies.

Central Scheme

● **Repair, Renovation and Restoration:** Aims for comprehensive improvement and restoration of waterbodies to increase storage capacity through community participation and self-supporting systems

● **AMRUT 2.0:** Promotes **circular economy of water** through development of city water balance plans, focusing on reuse of treated sewage, rejuvenation of water bodies.

● **Mission Amrit Sarovar:** Objective is to conserve water for the future by developing/rejuvenating 75 Amrit Sarovars (ponds) with at least 0.4 hectare in each district of the country.

Rajasthan

● **Mukhyamantri Jal Swavlamban Abhiyan:** Ensures sustainable drinking water sources in rural areas through restoration of dysfunctional ponds and digging of new ponds.

Maharashtra

● **Gaalmukt Dharan Gaalyukt Shivar:** Desilting water bodies through local

participation to improve irrigation, provide drinking water for livestock, and groundwater replenishment.

Karnataka

- **Amruth Nagarothana:** A comprehensive lake development plan with components such as water quality monitoring, mobile apps for grievance redressal

Puducherry

- **Nam Neer:** Restoration plan for traditional water bodies in Karaikal district through community participation to ensure sustainable water supply.

Tamil Nadu

- **Kudimaramathu:** Revives and maintains irrigation tanks through participatory management mechanisms such as water-user associations.

- **Anaithu Grama Anna Marumalarchi Thittam:** Revives rural ponds not covered under other schemes. Revived ponds must have channels, bathing ghats, retaining wall and a baby pond

- **TN Irrigated Agriculture Modernization Project:** The World Bank-funded project aims to strengthen water structures across sub-basins to improve irrigation infrastructure

- **Oor Kudi Oorani Kappom:** Makes communities in Tiruvallur district responsible for upkeep of waterbodies. Revival of waterbodies through corporates and government partnerships

- **Nellai Neervalam:** Community participation inTirunelveli district to revive old traditional water structures. The initiative has also mapped major water bodies in the state.

Community and Private Sector Efforts

- Local communities, NGOs, and private organisations have been actively involved in various initiatives.
  - For instance, the **Art of Living Foundation** has been working on the rejuvenation of rivers like **Kumudavathi, Vedavathi, and Palar in Karnataka**. Their approach includes erosion control measures, groundwater recharge, and afforestation, which have shown positive results.

Conclusion

- Rejuvenating water bodies in India is not just about restoring water sources; it is about ensuring a sustainable future for the country. The combined efforts of the government, private sector, and communities are paving the way for a water-secure India.

- By valuing and conserving our water bodies, we can create a resilient and prosperous nation for generations to come.

PRIORITY AREAS IN UNION BUDGET 2024-25

Context

- The Union Budget 2024-25 set out a list of **nine priority areas**, including *farmer productivity, employment and urban development.* However, since 2019, key welfare schemes for farmer support have seen little to no increase in funding.
  - This trend persists in the 2024 allocations for some of these schemes.

Priority Areas in Union Budget 2024-25

Agriculture and Allied Sectors

- **Introduction of High-Yielding Varieties:** Release of 109 high-yielding, climate-

resilient varieties across 32 field and horticulture crops.

○ **Natural Farming:** One crore farmers will be introduced to natural farming practices over the next two years.

○ **Support for Pulses and Oilseeds:** Strengthening production, storage, and marketing to achieve self-sufficiency.

Employment and Skilling

○ **PM's Package of Schemes:** An outlay of ₹2 lakh crore to facilitate employment and skilling opportunities for 4.1 crore youth over five years.

○ **Internship Opportunities:** A comprehensive scheme to provide internships in 500 top companies to one crore youth in five years.

Inclusive Human Resource Development and Social Justice

○ **Women-Led Development:** Allocation of over ₹3 lakh crore for schemes benefiting women and girls.

○ **Rural Development:** Provision of ₹2.66 lakh crore for rural development, including rural infrastructure.

Manufacturing and Services

○ **Support for MSMEs:** Enhanced support for Micro, Small, and Medium Enterprises (MSMEs) to drive growth and innovation.

Urban Development

○ **PM Awas Yojana Urban 2.0:** Addressing housing needs of one crore urban poor and middle-class families with an investment of ₹10 lakh crore.

○ **Phase IV of PMGSY:** Providing all-weather connectivity to 25,000 rural habitations.

Energy Security

○ **Expansion of Space Economy:** Aiming to expand the space economy by five times in the next ten years with a venture capital fund of ₹1,000 crore.

Infrastructure

○ **Railway Corridor Programmes:** Implementation of major railway corridor programmes under PM Gati Shakti to improve logistics efficiency.

Innovation, Research, and Development

○ **Anusandhan National Research Fund:** Establishment of a national research fund to support innovation.

Next Generation Reforms

○ **Corporate Tax Reforms:** Reduction of corporate tax on foreign companies from 40% to 35% to attract investments.

Key Takeaways

● **MoEF&CC:** Budget for pollution control doubles, but support dips for four other schemes, compared to 2019.

● **Ministry of Health and Family Welfare:** Budget for health insurance scheme rises; dips for scheme to set up quality public healthcare in six years.

● **Ministry of Rural Development:** Funds for flagship schemes up, but MGNREGS remains stagnant this year.

● **Ministry of Housing and Urban Affairs:** Housing, sanitation schemes see nearly fourfold rise in allocation

● **Ministry of Home Affairs:** Despite widespread weather disasters, budget for disaster management plummets

● **Ministry of Agriculture and Farmers Welfare:** Market Intervention Scheme and Price Support Scheme see huge drop since 2019.

● **Ministry of Heavy Industries:** Shift in focus to boost domestic production of electric vehicle components

● **Ministry of Jal Shakti:** Consistent rise in funds for Jal Jeevan Mission, National Ganga Plan

NATIONAL CLEAN AIR PROGRAMME (NCAP)

Context

- India's flagship clean air programme must move on from PM10 and focus on curbing PM2.5 to effectively control emissions from industry, transport, burning of waste and solid fuels.

About the National Clean Air Programme (NCAP)

- Air pollution is a critical environmental issue affecting millions of lives in India. To address this, the **MoEFCC launched the National Clean Air Programme (NCAP)** in 2019.
- It aims to systematically reduce air pollution levels across the country, focusing on 131 non-attainment cities where air quality standards have consistently been violated.

Objectives and Targets

- The **primary objective** of the NCAP is to achieve a **20-30% reduction in Particulate Matter** (PM10 and PM2.5) concentrations **by 2024**, using 2017 as the base year.
  - It is revised and now NCAP seeks up to **40% reduction in particulate concentration by 2025-26** in these cities compared to the **base year 2019– 20.**
- The programme envisions a collaborative approach involving various stakeholders, including central and state governments, local bodies, and the public.
- Under NCAP, the CPCB established city-specific targets for 82 cities in 2019-20 to reduce PM10 levels by 3-15% from 2021-26, aiming for an overall reduction of up to 40 % by 2026.

Key Components

- **City-Specific Action Plans:** Each non-attainment city has developed a tailored action plan addressing local sources of pollution.
  - These plans include measures such as improving public transportation, promoting the use of cleaner fuels, and enhancing green cover.
- **Monitoring and Assessment:** The NCAP emphasises the importance of robust air quality monitoring.
  - The CPCB has expanded the national network of air quality monitoring stations, ensuring real-time data collection and dissemination.
- **Public Awareness and Participation:** Public engagement is crucial for the success of the NCAP. The programme includes initiatives to raise awareness about air pollution and encourage community participation in pollution control activities.
- **Research and Development:** The NCAP supports research on air pollution and its health impacts.
  - It promotes the development of innovative technologies for pollution control and management.
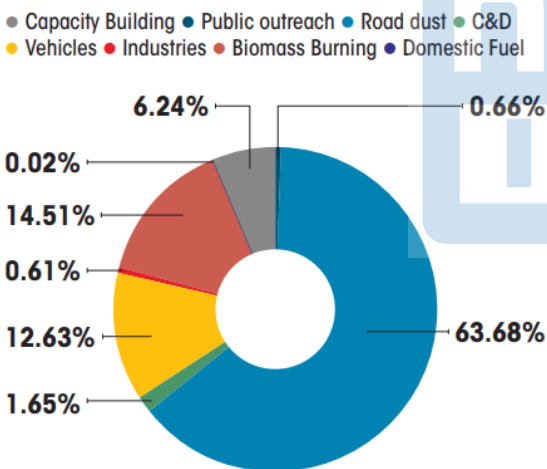
Funding

- It is the **first performance linked funding programme** for improving air quality. Cities have to demonstrate improvement in air quality to access funds under NCAP. There are **three key approaches** to this fund flow:
  - **Fund allocated by MoEF&CC** to 82 cities under the NCAP programme;
  - **Direct funding from the 15th Finance Commission grant** to the 42 cities and seven urban agglomerations with a population of more than one million (also called the Million-Plus Cities Challenge Fund); and

- ○ **Accounting of the convergence funding**, which is alignment of separate funds for sectoral schemes to deliver on clean air objectives.
- Additionally, 49 cities under the 15th Finance Commission air quality grant have an annual target to reduce PM10 levels by 15% and increase the number of good air quality days (when air quality index is below 200).
- While NCAP funding is channelised through state pollution control boards to the departments concerned, the 15th Finance Commission funding is routed through state finance ministries to urban local bodies.

Performance Assessment of NCAP

Misplaced focus

Management of road dust takes the biggest chunk of funds utilised by 131 cities under the National Clean Air Programme

- ● Capacity Building ● Public outreach ● Road dust ● C&D
- ● Vehicles ● Industries ● Biomass Burning ● Domestic Fuel

6.24% — 0.66%
0.02%
14.51%
0.61%
12.63% — 63.68%
1.65%

Source: Portal for Regulation of Air-pollution in Non-Attainment cities (PRANA)-Minutes for 15th meeting of Implementation Committee for National Clean Air Programme,accessed on November 24, 2023

- **Evolving Metrics:** Initially, the focus was on PM10 reduction, but there is a **growing consensus that PM2.5 should be the primary metric** due to its severe health impacts.
- **Performance Variability:** The effectiveness of NCAP has varied significantly across cities. Some cities have shown substantial improvements, while others, like Delhi and Noida, have utilised less than 40% of the allocated funds.
- **Evaluation Criteria:** The evaluation framework has evolved over the years. Initially, 40% of the weightage was given to developing clean air action plans, and 60% to enhancing pollution monitoring and implementing city-specific plans.
  - ○ Later, the focus shifted entirely to PM10 reduction targets.

Achievements and Challenges

- Since its inception, the NCAP has made significant progress. Several cities have reported improvements in air quality, with notable reductions in PM10 levels.
  - ○ For instance, Mumbai achieved a 34% reduction in PM10 levels in 2021-22 compared to the base year.
- However, challenges remain. The effectiveness of the NCAP depends on the consistent implementation of action plans and the cooperation of all stakeholders.
- Additionally, addressing pollution from diverse sources such as industry, transportation, and agriculture requires coordinated efforts and sustained funding.

DEVELOPED INDIA BY 2047: A VISION FOR THE FUTURE

Context

- The **Union Budget 2024-25** has a distinct objective: to set the foundation for developed India by 2047, when the country marks its **100th year of Independence.**

About

- As India approaches its centenary of independence in 2047, the nation stands at a pivotal juncture. The vision of a developed India by 2047, often referred to as 'Viksit Bharat' is a comprehensive and

ambitious roadmap that aims to transform the country into a global powerhouse.

● It encompasses various sectors, including the economy, infrastructure, technology, and social development, ensuring inclusive growth and sustainability.

Developed Country

● The term 'Developed Country' *(aka Advanced Country)* doesn't have a single accepted definition. It stands out for its high quality of life, robust economy, and advanced technological infrastructure. These nations have typically surpassed the initial stages of industrialization and agrarian economies.

● The **United Nations Development Programme (UNDP)** has a threshold of the **75th percentile in Human Development Index (HDI)** distribution to be classified as a developed country, whereas the **World Bank** classifies countries whose **Gross National Income (GNI)** per capita is above $13,845 as *'high-income countries'.*

Key Features

● **Economic Prosperity:** Developed countries boast impressive economic metrics. These often include a high GDP and GNP per capita. Essentially, their citizens enjoy a relatively comfortable standard of living.

● **Industrialisation and Infrastructure:** Developed nations have well-established infrastructure—think efficient transportation networks, modern airports, and reliable electricity grids. Their cities showcase towering skyscrapers, bustling commercial centres, and well-maintained roads.

● **Quality of Life:** Access to quality education, healthcare, and public services is widespread. Citizens benefit from robust social safety nets, ensuring a decent quality of life for all.

● **Environmental Stewardship:** Developed countries prioritise environmental protection. Recycling programs, clean energy initiatives, and strict adherence to civic norms.

● **Technological Advancements:** Cutting-edge technology permeates daily life. From seamless digital services to advanced research institutions, these nations lead the way.

Economic Growth and Development

● India has laid out a detailed blueprint to accelerate economic growth. The focus is on enhancing key sectors such as **agriculture, commerce, infrastructure, industry, and technology**.

● By promoting digital economy and fintech, technology-enabled development, and energy transition, India aims to create a robust and resilient economy.

● The goal is to complement macro-economic growth with micro-economic welfare, ensuring that the benefits of development reach every citizen.

World Bank's flagship 'World Development Report 2024: Middle Income Trap'

● It refers to a **situation** where countries, **after achieving a certain level of economic development and income**, find themselves stuck in a rut — **unable to make the leap to becoming high-income nations.**

  ○ It occurs when a nation's growth stalls after reaching a certain income level, preventing it from transitioning to high-income status.

● As countries grow wealthier, they often encounter a critical juncture — usually when their annual GDP per person reaches

about 10% of the United States' GDP per capita (which is roughly equivalent to $8,000 today).

● It lies squarely in the middle of what the **World Bank classifies as 'middle-income'** countries, and manifests when these nations struggle to sustain rapid growth and innovation, leading to stagnation in their economic progress.

Numbers

● As of 2023, **India** was classified as a middle-income country, with an annual GDP **per capita ranging from $1,136 to $13,845**.

● The critical threshold for most countries is around 10% of annual U.S. GDP per person, currently equivalent **to approximately $8,000**.

● Since 1990, only 34 middle-income economies have successfully transitioned to high-income status, often due to factors like EU integration or newfound oil reserves.

Infrastructure and Urban Development

● Infrastructure development is a cornerstone of the vision for a developed India. The government plans to invest heavily in modern infrastructure, bridging the gap between urban and rural areas.

● It includes the creation of smart cities, improved transportation networks, and sustainable urban planning. The aim is to provide world-class facilities and services to all citizens, reducing the urban-rural divide.

Technological Advancements

● India's journey towards becoming a developed nation is heavily reliant on technological advancements. The government is committed to fostering

innovation and research in science and technology.

● It includes promoting startups, enhancing digital infrastructure, and investing in cutting-edge technologies such as artificial intelligence, blockchain, and quantum computing.

● By becoming a technology-driven and knowledge-based economy, India aims to position itself as a global leader in innovation.

Social Development and Inclusivity

● A developed India by 2047 envisions a society where every citizen has access to quality education, healthcare, and employment opportunities.

● The government is focusing on women's development, skill development, and youth empowerment.

● Initiatives like 'Sabka Saath, Sabka Vikas, Sabka Vishwas, and Sabka Prayas' emphasise collective efforts and teamwork to achieve inclusive growth.

● Special attention is being given to marginalised communities to ensure that no one is left behind in the development process.

Environmental Sustainability

● Recognising the impact of climate change, the vision for 2047 includes a strong focus on green growth.

● The government has set ambitious targets for renewable energy, aiming to meet 50% of its energy requirements from renewable sources by 2030 and achieve **net-zero carbon emissions by 2070.**

● Initiatives like the **Panchamrit policy** highlight the commitment to reducing carbon emissions and promoting sustainable practices across all sectors.

Governance and Policy Reforms

- Effective governance and policy reforms are crucial to realising the vision of a developed India. The government is working towards creating a transparent, accountable, and efficient administrative framework.

- It includes reducing bureaucratic red tape, enhancing ease of doing business, and ensuring that policies are citizen-centric.

- The aim is to create an environment where businesses can thrive, and citizens can enjoy a high quality of life.

Conclusion

- The vision of a developed India by 2047 is not just a dream but a well-defined roadmap that requires collective efforts from all stakeholders.

- By focusing on economic growth, infrastructure development, technological advancements, social inclusivity, environmental sustainability, and effective governance, India is poised to take a quantum leap in its development journey.

- As the nation moves forward, the spirit of 'Amrit Kaal' will guide its path, ensuring that the aspirations of a billion people are realised.

PRELIMS

HUNGER CRISES IN NORTH DARFUR REGION

Context

- Recently, the Famine Review Committee of the **Integrated Food Security Phase Classification (IPC)**, a tool developed by the **FAO**, said that the **North Darfur region** was confirmed to be under famine.

About

- The **North Darfur region of Sudan** is currently facing one of the most severe hunger crises in recent history. This crisis, driven by a combination of **conflict, displacement, and restricted humanitarian access,** has resulted in **famine conditions** in several areas, including the Zamzam camp, which shelters over 400,000 displaced people.

Roots of the Crisis

- The **ongoing civil war in Sudan**, which began in April 2023, has exacerbated the already fragile situation in North Darfur.
- The conflict has led to widespread violence, displacement, and a breakdown of essential services.
- As a result, millions of people are now facing severe food insecurity.
- The war has disrupted agricultural activities, leading to a significant decline in food production and availability.

SEINE RIVER

Context

- Concern over the water quality of the Seine river in Paris derailed triathlon events of the recent Olympic Games in France.

About the Seine River

- It originates in the **Langres plateau in Burgundy region of northeastern France**, near Dijon and flows northwest through Paris **to the English Channel.** Major tributaries include the **Aube, Marne, and Oise rivers.**
- The Seine river divides **Paris, the capital city of France,** into the Left Bank and the Right Bank, each with its own unique character.
- It is lined with some of the most famous landmarks in the world, including the Eiffel Tower, Notre-Dame Cathedral, and the Louvre Museum. The **riverbanks, known as the 'Quais' are a UNESCO World Heritage site**.

Historical significance

- Vital trade route since Roman times, shaping the development of Paris.
- Inspiration for countless artists, including Impressionist painters like Monet.
- Site of the Notre-Dame Cathedral, a Gothic masterpiece on the Île de la Cité.
- Played a crucial role in the Allied liberation of Paris in WWII.

TYPHOON GAEMI

Context

- Recently, a ship carrying 1,494 tonnes of industrial oil capsized and **sank in Manila Bay in the Philippines**, as the country faced heavy rainfall and winds due to **typhoon Gaemi.**

About the Typhoon Gaemi

- Typhoon Gaemi has been a devastating reminder of the increasing intensity and frequency of extreme weather events due to climate change.

- It wreaked havoc across the **Philippines, Taiwan, and China**, leaving a trail of destruction and highlighting the urgent need for climate action.

Tropical Cyclones

- Tropical cyclones, also known as **hurricanes or typhoons** depending on their location, are intense weather systems characterised by strong winds, heavy rainfall, and low-pressure centres.

Origins and Structure

- Tropical cyclones form over **tropical or subtropical waters.** They consist of a rotating system of clouds and thunderstorms.
- The **low-pressure centre** at the surface is surrounded by a **closed circulation.**
- In the **Northern Hemisphere**, they rotate **counterclockwise.**

Conditions

- **Environmental Conditions:** Tropical cyclones thrive in warm ocean waters (typically above 26.5°C) and require sufficient moisture and instability in the atmosphere.
- **Coriolis Effect:** The Earth's rotation causes the cyclone's spin.
- **Eye:** The calm centre of a hurricane, surrounded by the eyewall—a ring of intense thunderstorms.
- **Landfall:** When a cyclone crosses from the ocean to the land, causing significant impact.

Classification

- **Tropical Depression:** Maximum sustained winds of 38 mph or less.
- **Tropical Storm:** Maximum sustained winds of 39 to 73 mph.
- **Hurricane (Typhoon/Cyclone):** Maximum

sustained winds of 74 mph or higher.

- **Major Hurricane:** Maximum sustained winds of 111 mph or higher (Category 3, 4, or 5).

Formation Regions

- Tropical cyclones typically form between 5 and 30 degrees North latitude.
- Initially, they move westward due to trade winds.
- Later, atmospheric winds at higher levels may steer them northward or northeastward.

ENCEPHALITIS

Context

- Recently, Gujarat reported more than hundred cases of viral encephalitis, which causes inflammation in the brain.

About the Encephalitis

- It is an inflammation of the brain, and a serious condition that can lead to severe neurological damage or even death.
- It can be **caused** by various infectious agents, including **viruses, bacteria, fungi, and parasites.**
- **Viral encephalitis** is the most common form, with notable viruses including the *Japanese Encephalitis Virus (JEV), West Nile Virus, and Chandipura Virus (CHPV).*
- The **Chandipura virus**, for instance, has been linked to outbreaks in Gujarat, India, causing significant morbidity and mortality.
  - Chandipura virus, aka **Chandipura vesiculovirus (CHPV)**, is an **RNA virus** belonging to the **Rhabdoviridae family,** which also includes the rabies virus.

Symptoms and Diagnosis

- The symptoms of encephalitis can range from mild flu-like symptoms to severe neurological issues. Common symptoms include: *High fever; Severe headache; Confusion or disorientation; Seizures; Sensitivity to light; and Stiff neck.*
- In severe cases, patients may experience ***convulsions, hallucinations, and loss of consciousness.***
- Diagnosis typically involves a combination of clinical evaluation, imaging studies like MRI or CT scans, and laboratory tests to identify the causative agent.

Preventive Measures

- **Vaccination:** Vaccines are available for some types of viral encephalitis, such as Japanese Encephalitis.
- **Vector Control:** Reducing the population of vectors like mosquitoes and sand flies through insecticidal sprays and eliminating breeding sites.
- **Public Awareness:** Educating communities about the importance of hygiene, protective clothing, and avoiding mosquito bites.
- **Early Diagnosis and Treatment:** Prompt medical attention can significantly improve outcomes for those affected.
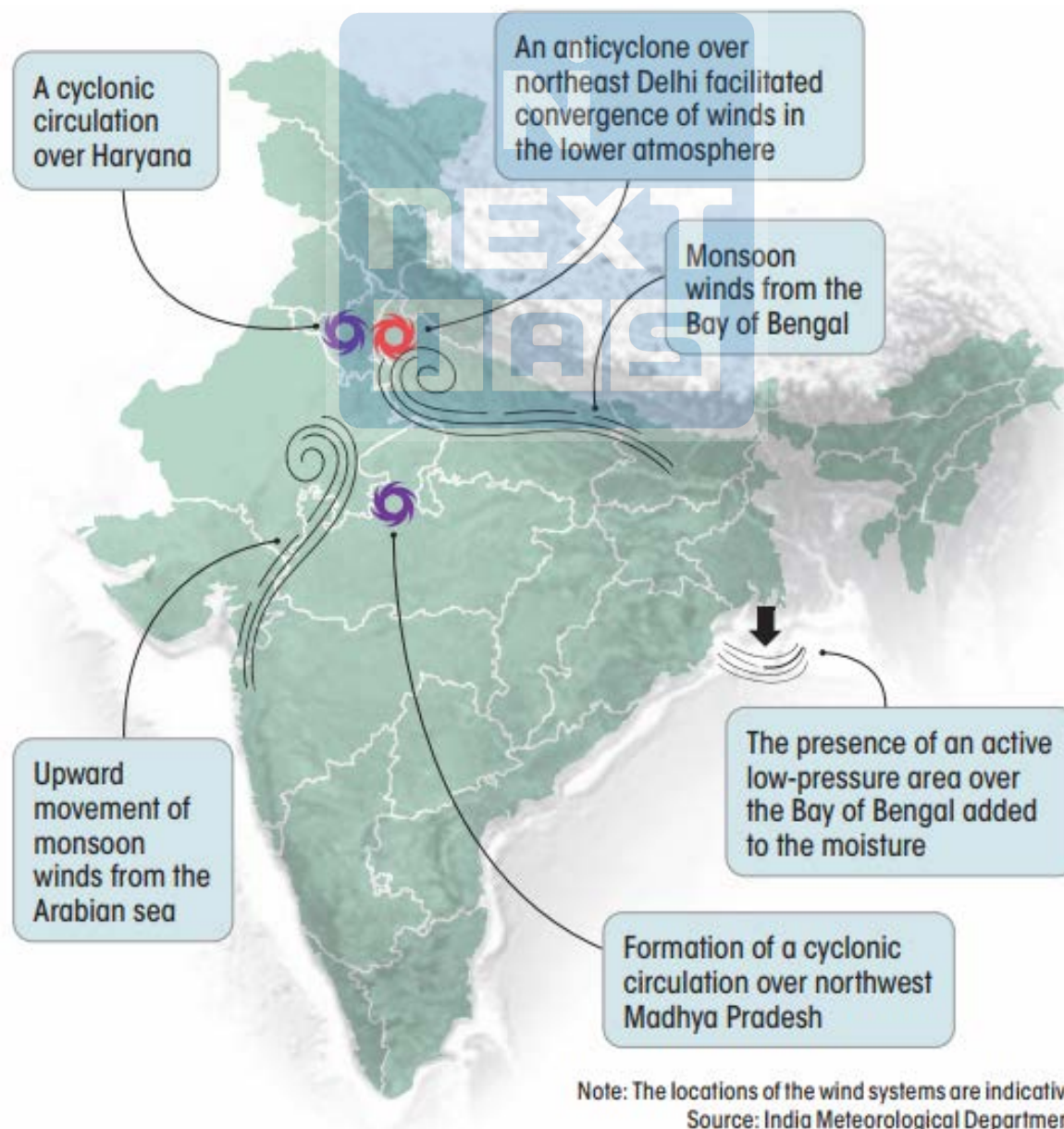
DELHI TORRENTIAL RAINS AND ASSOCIATED WEATHER SYSTEMS

Context

- Delhi, the bustling capital of India, has recently experienced unprecedented torrential rains, leading to severe flooding and significant disruptions.

Unusual Weather Patterns

- The torrential rains that lashed Delhi were a result of **a rare convergence of multiple weather systems**.
- According to the India Meteorological Department (IMD), **at least six weather systems** combined to produce the heavy rainfall. These included:
- **Monsoon Winds:** The rapid and intense advance of monsoon winds from both the Bay of Bengal and the Arabian Sea played a crucial role.
  - This dual advance occurred after a prolonged stalling of the monsoon troughs over central and northeastern India.

- **Cyclonic Circulations:** Two cyclonic circulations, one over northwest Madhya Pradesh and another over Haryana, contributed to the moisture influx and induced thunderstorms.
- **Western Disturbance:** An upper troposphere trough, known as a western disturbance, brought warm, moist air into the region, further intensifying the rainfall.
- **Low-Pressure Area:** An active low-pressure area over the Bay of Bengal added to the moisture content in the atmosphere.
- **Anticyclone:** At a local level, an anticyclone over northeast Delhi facilitated the convergence of winds in the lower atmosphere, enhancing the rainfall.

Note: The locations of the wind systems are indicative
Source: India Meteorological Department

Climate Change and Future Implications

- Experts suggest that the frequency and intensity of such extreme weather events are likely to increase due to climate change.
- The interaction between monsoon systems and western disturbances, which was once rare, is becoming more common.
- This change is attributed to the strengthening of the subtropical jet stream and other climatic factors.
- As Delhi and other regions brace for more such events, it is crucial to enhance disaster preparedness and implement sustainable urban planning to mitigate the impacts of extreme weather.
- Strengthening infrastructure, improving drainage systems, and raising public awareness are essential steps towards building resilience against future weather-related disasters.

Subjective Questions

1. To what extent have human activities contributed to the increasing frequency and severity of landslides in India? Discuss with relevant examples.
2. How does the development of futures trading in weather commodities impact the risk management strategies of businesses heavily reliant on weather conditions, such as agriculture, energy, and insurance?
3. How does the rejuvenation of water bodies in India impact local communities, both socially and economically? Provide specific examples and evidence to support your answer.
4. Evaluate the effectiveness of the National Clean Air Programme (NCAP) in addressing air pollution in India. Discuss its successes, challenges, and potential improvements.
5. How feasible is the vision of a 'Developed India by 2047'? Discuss the key challenges and opportunities that lie ahead, and outline a strategic roadmap to achieve this ambitious goal.

MCQs

Q.1 Which one of the following international organisations released the *'World Development Report 2024: Middle Income Trap'*?
(a) International Monetary Fund (IMF)
(b) International Finance Corporation (IFC)
(c) World Bank
(d) United Nations Development Programme (UNDP)

Q.2 *North Darfur region*, sometime appeared in the news, is located in:
(a) Saudi Arabia
(b) Venezuela
(c) Nigeria
(d) Sudan

Q.3 *Typhoon Gaemi,* which sometimes appeared in the news, made landfall in which of the following countries?
(a) Philippines
(b) Indonesia
(c) Brunei
(d) Papua New Guinea

Q.4 With reference to the *'Encephalitis'*, consider the following statements:
1. It can be caused by various infectious agents, including viruses, bacteria, fungi, and parasites.
2. Chandipura Virus is viral encephalitis.
Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q.5 Which one of the following recently became the first state in India to establish specific heat wave thresholds for all its districts?

(a) Tamil Nadu
(b) Uttar Pradesh
(c) Maharashtra
(d) Madhya Pradesh

Answer Keys:

1. (c)   2. (d)   3. (a)   4. (c)   5. (b)