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CURRENT AFFAIRS

Argasia Education PVT. Ltd. (GST NO.-09AAPCAI478E1ZH)
Address: Basement C59 Noida, opposite to Priyagold Building gate, Sector 02, Pocket I, Noida, Uttar Pradesh, 201301, CONTACT NO:-8448440231

Date –31 Aug 2024

ENERGY POLICY INSTITUTE AT THE UNIVERSITY OF CHICAGO (EPIC) AND AIR QULAITY INDEX 2024

SYLLABUS MAPPING:

GS-3 -Biodiversity &Environment: **Energy Policy Institute at the University of Chicago (EPIC) and Air qulaity index 2024**

FOR PRELIMS:

What is energy policy institute at the university of chiacago in context of AQI? What is energy policy institute at the university of chiacago in context of AQI?

FOR MAINS:

How do the 2024 findings from the Air Quality Life Index (AQLI) highlight the relationship between air pollution and life expectancy, and what implications do these findings have for global public health policies and environmental regulations?

RECENT CONTEXT:

The is an important metric developed by the Energy Policy Institute at the University of Chicago (EPIC) to measure the impact of air pollution on life expectancy. The AQLI provides an estimate of how much air pollution shortens life expectancy in different regions,permanently reducing global PM2.5 air pollution to meet the World Health Organization (WHO) guideline would add 2.3 years onto average human life expectancy or a combined 17.8 billion life years saved For 2024, the AQLI will likely continue to offer insights into global and regional air quality trends, highlighting areas where air pollution is most severe and its effects on public health. It typically includes data on various countries, cities, and regions, showing improvements or deteriorations in air quality and their corresponding impacts on life expectancy.

“By converting air pollution concentrations into tangible terms—its impact on life expectancy—the AQLI establishes particulate air pollution as the single greatest threat to human health globally.” – Michael Greenstone, EPIC

SPECIFICALLY,THE AQLI STANDS APART FROM MOST WORK IN THIS SPACE IN A FEW IMPORTANT RESPECTS:

- The research underlying the AQLI is based on pollution data at the very high concentrations that prevail in many parts of the world today. Previous work has relied on extrapolations of associational evidence from the low levels in the United States or on extrapolations from cigarette studies.
- The causal nature of the AQLI’s underlying research allows it to isolate the effect of air pollution from other factors that impact health. In contrast,previous efforts to summarize the health effects of air

pollution have relied on associational studies that are prone to confounding the effects of air pollution with other determinants of human health.

- The AQLI delivers estimates of the loss of life expectancy for the average person. Other approaches report the number of people who die prematurely due to air pollution, leaving unanswered how much their life was cut short or if they were more predisposed to be impacted from it (e.g. elderly or sick).

ENERGY POLICY INSTITUTE AT THE UNIVERSITY OF CHICAGO (EPIC)

OVERVIEW

The **Energy Policy Institute at the University of Chicago (EPIC)** is a leading institution dedicated to researching and analyzing energy policy and environmental issues. One of its significant contributions is the **Air Quality Life Index (AQLI)**, which measures the impact of air pollution on life expectancy.

Key Points for 2024

1. **PURPOSE OF AQLI:**
   - **Impact Assessment:** The AQLI translates levels of particulate matter (PM2.5) into estimates of lost life expectancy. It provides a clear, quantifiable measure of how air pollution affects public health.
   - **Policy Guidance:** The AQLI helps guide policy by highlighting the health benefits of improving air quality and identifying regions where intervention is most needed.
2. **METHODOLOGY:**
   - **Data Collection:** The AQLI uses data on PM2.5 concentrations, which are known to be harmful to health. This data is integrated with epidemiological research to estimate reductions in life expectancy.
   - **Analysis:** The index translates current air pollution levels into the number of years of life expectancy lost due to poor air quality.
3. **2024 FINDINGS:**
   - **Global Trends:** In 2024, the AQLI reveals ongoing global challenges related to air pollution, with some regions experiencing significant reductions in life expectancy due to high levels of PM2.5.
   - **Regional Insights:** Specific regions, such as South Asia and parts of East Asia, continue to face severe impacts, with life expectancy reduced by several years in heavily polluted areas.
   - **Improvements and Challenges:** While there have been improvements in air quality in some areas due to stricter regulations and cleaner technologies, many regions still struggle with high pollution levels.

WHAT IS THE AIR QUALITY LIFE INDEX (AQLI)?

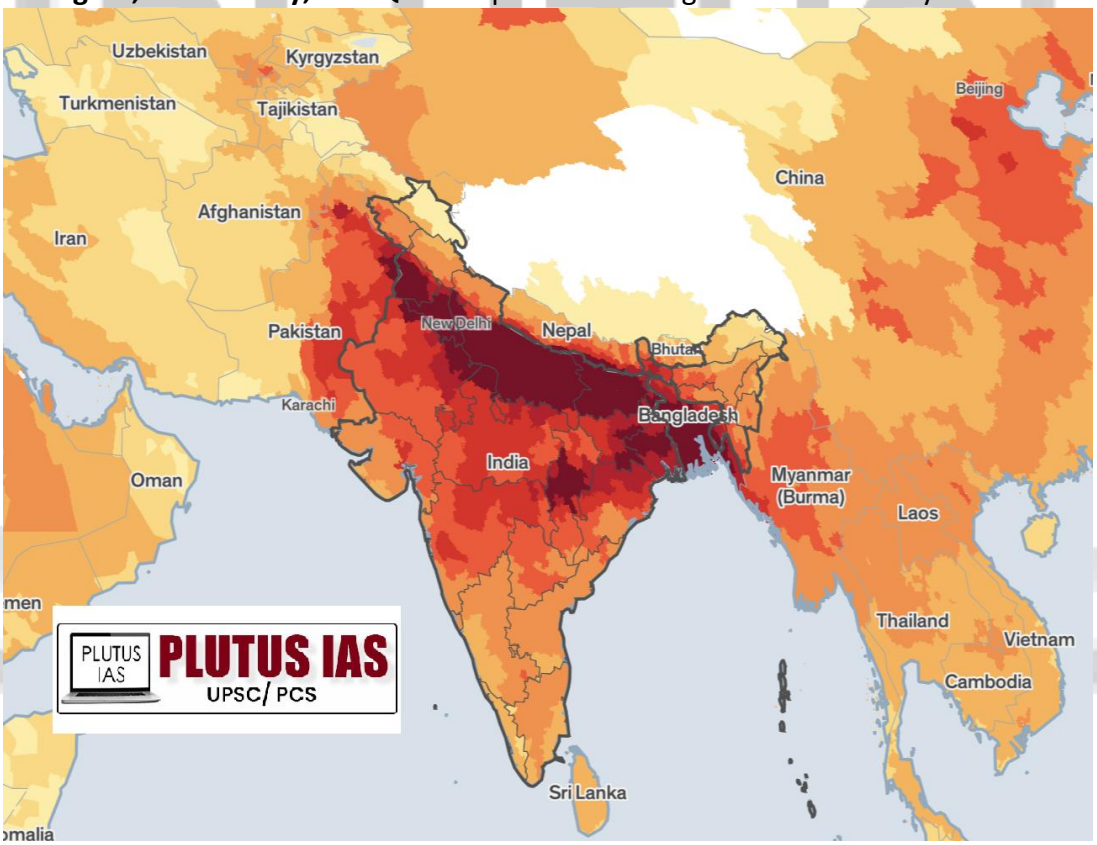
- The AQLI is a **pollution index** that translates th**e effect of particulate air pollution** into its impact on life expectancy.
- The Index then **combines the** relationship between long-term **human exposure to air pollution and life expectancy** to provide the true cost of particulate pollution in communities around the world.
- The Index also illustrates how **air pollution policies** can **increase life expectancy** when they meet the **WHO's guideline** for what is considered a safe level of exposure, existing national air quality standards, or user-defined air quality levels.

ABOUT THE AIR QUALITY LIFE INDEX (AQLI)?

- India is the world's second most polluted country. Fine particulate air pollution (PM2.5) shortens an average Indian's life expectancy by 5.3 years, relative to what it would be if the World Health Organization (WHO) guideline of 5 $\mu g/m^3$ was met.[1] Some areas of India fare much worse than average, with air pollution shortening lives by 11.9 years in the National Capital Territory of Delhi, the most polluted city in the world.

Global Scenario:

- **US, China, Europe:** The **United States, Europe, and China** have implemented stringent policies,leading to significant reductions in pollution levels.
- In **China**, air pollution has decreased by **41% since 2014** and extended the life of Chinese by **2 years.**
- The **US** has reduced pollution by **67.2%** since 1970, extending the average lifespan by **1.5 years.**
- Despite this improvement, **South Asia** remains the world's **most polluted** region, accounting for **45% of global life years lost** due to high pollution.
- **Bangladesh,India,Nepal,and Pakistan are among the most polluted countries globally.**
- In **Myanmar,**air pollution is reducing life expectancy by **2.9 years.**
- **Africa:** Air pollution in Central and West Africa has remained **largely unchanged** in 2022.
- The region's average **PM2.5 concentration is 22.2** micrograms per cubic meter (µg/m3), **4.4 times higher** than the WHO guideline.
- However,**Nigeria,Rwanda and Ghana** have recently implemented air quality regulations and standards.
- **West Asia: Middle East and North Africa (MENA)** region has emerged as a new pollution hotspot,reducing life expectancy by an average of **1.3 years** across the region.
- **Qatar and Iraq** are the most polluted countries in the region.
- Cities like **Bogotá, Mexico City, and Quito** implement driving restrictions in city.



HOW CAN WE CONTROL AIR POLLUTION?

- **Prevention:** Adopt pollution prevention approaches to **reduce, eliminate, or prevent** pollution at its source.
- Examples are to use less toxic raw materials or **fuels**, use a less-polluting industrial process, and to improve the efficiency of the process. E.g., **BSVI engine.**
- **Adoption of Clean Air Technology:** Air pollution prevention and control technologies can help in controlling air pollution.

- It includes **wet scrubbers,** fabric filters (baghouses),**electrostatic precipitators,** condensers, absorbers, adsorbers, and **biological degradation.**
- **Economic Incentives:** Economic incentives such as **emissions trading** and emissions caps can be used for polluting industries.
- **Scrapping Old Vehicles:** Scrapping of the current **End-of-life vehicles (ELVs)** burden of the country will lead to **15-20% reduction** in emissions due to **vehicular pollution.**
- **Work-from-Home:** To combat air pollution, the government may promote **work-from-home policies** during high pollution days like winters.
- **Artificial Rain:** It can **wash away** pollutants that are suspended in the air,such as particulate matter (PM),nitrogen oxides (NOx),and sulphur dioxide (SO2).
- **Behavioural Change:** Promoting the use of **public transportation,walking, and cycling** can reduce the number of individual vehicles on the road,leading to lower emissions and lower air pollution.

GOVERNMENT INITIATIVES TAKEN FOR CONTROLLING AIR POLLUTION

REGULATORY MEASURES:

- **Emission Standards:** Governments often set limits on emissions from vehicles, industrial processes, and power plants. For example, the U.S. Environmental Protection Agency (EPA) enforces standards for pollutants like sulfur dioxide (SO_2), nitrogen oxides (NOx), and particulate matter (PM2.5).
- **Air Quality Standards:** Regulatory bodies establish air quality standards to protect public health. For instance, the World Health Organization (WHO) and various national agencies have set guidelines for acceptable levels of pollutants.
- **Clean Air Acts:** Many countries have comprehensive legislation aimed at reducing air pollution. For example, the Clean Air Act in the United States mandates regulatory measures to control air pollution and improve air quality.

TECHNOLOGICAL ADVANCEMENTS:

- **Promoting Clean Energy:** Governments encourage the use of renewable energy sources such as wind, solar, and hydroelectric power to reduce reliance on fossil fuels, which are major sources of air pollution.
- **Vehicle Emission Controls:** Implementation of stricter emission standards for vehicles, such as those mandated by the Euro standards in Europe or the Corporate Average Fuel Economy (CAFE) standards in the U.S., helps reduce pollutants from transportation.
- **Pollution Control Technologies:** Investment in technologies like scrubbers, catalytic converters, and filters helps industries and power plants reduce their emissions.

PUBLIC AWARENESS AND EDUCATION:

- **Public Campaigns:** Governments and NGOs run awareness campaigns to educate the public about the health impacts of air pollution and ways to reduce personal contributions, such as using public transportation or reducing energy consumption.
- **Air Quality Index (AQI):** Many countries have systems to provide real-time air quality information to the public, helping people make informed decisions about outdoor activities.

RECENT INITIATIVES AND INNOVATIONS:

- **Air Quality Monitoring Networks:** Expansion of air quality monitoring networks provides more comprehensive data on pollution levels and helps target interventions more effectively.
- **Green Technology Incentives:** Some governments offer subsidies or incentives for the adoption of green technologies, such as electric vehicles and solar panels.
- **Legislation for Low-Emission Zones:** Establishing low-emission zones in cities restricts access to vehicles that exceed certain emission limits, improving urban air quality.

WHAT ARE THE GOVERNMENT INITIATIVES TAKEN FOR CONTROLLING AIR POLLUTION?

SYSTEM OF AIR QUALITY AND WEATHER FORECASTING AND RESEARCH (SAFAR) PORTAL

- SAFAR, or System of Air Quality and Weather Forecasting and Research, is an initiative developed by the Indian Ministry of Earth Sciences (MoES) to provide real-time air quality monitoring and forecasting in India. Here's a concise overview of SAFAR:

Purpose and Function

- **Air Quality Monitoring:** SAFAR continuously monitors air quality across various Indian cities, providing real-time data on pollutants such as PM2.5, PM10, NO2, SO2, CO, and ozone.
- **Forecasting:** The system forecasts air quality and weather conditions up to three days in advance, helping citizens and authorities prepare for and respond to pollution events.
- **Public Information:** SAFAR provides accessible information through its website and mobile app, including Air Quality Index (AQI) values, health advisories, and pollution forecasts.

COMPONENTS

- **Monitoring Stations:** SAFAR includes a network of air quality monitoring stations strategically placed across major cities in India. These stations collect data on various pollutants and meteorological parameters.
- **Data Integration:** The system integrates air quality data with weather forecasts to provide a comprehensive view of pollution trends and potential impacts.
- **Mobile and Web Platforms:** SAFAR offers tools for the public to access real-time air quality information, forecasts, and health recommendations.

IMPACT AND BENEFITS

- **Public Health:** By providing timely information on air quality, SAFAR helps individuals make informed decisions about outdoor activities and take precautions to protect their health.
- **Policy Support:** The data generated by SAFAR supports policymakers and environmental agencies in designing and implementing air quality management strategies.

NATIONAL AIR QUALITY MONITORING PROGRAMME (NAMP)

The **National Air Quality Monitoring Programme (NAMP)** is an initiative by the Indian government aimed at assessing and managing air quality across India. Here's a concise summary:

Purpose and Objectives

- **Air Quality Assessment:** NAMP monitors and assesses the levels of air pollutants in various cities and regions to gauge air quality and its impact on health and the environment.
- **Data Collection and Analysis:** The program collects data on key pollutants, such as PM2.5, PM10, NO2, SO2, CO, and ozone, to analyze trends and patterns in air quality.
- **Policy and Planning Support:** The data supports environmental policies, regulatory measures, and urban planning to mitigate air pollution and improve air quality.

Components

- **Monitoring Stations:** NAMP operates a network of air quality monitoring stations across cities and towns in India, which measure pollution levels in real time.
- **Data Reporting:** The program provides regular reports and updates on air quality, including the Air Quality Index (AQI), which helps inform the public and policymakers.
- **Coordination:** NAMP is coordinated by the Central Pollution Control Board (CPCB) in collaboration with various state pollution control boards and other agencies.

Impact and Benefits

- **Public Awareness:** By providing real-time air quality data, NAMP helps raise awareness among the public about pollution levels and health risks.

- **Regulatory Measures:** The program's data aids in enforcing air quality standards and developing strategies to reduce pollution.
- **Research and Development:** NAMP supports research on air quality trends, pollution sources, and their effects, contributing to better environmental management and policy-making.

GRADED RESPONSE ACTION PLAN (FOR DELHI)

The **Graded Response Action Plan (GRAP)** for Delhi is a framework designed to address air pollution in a systematic and tiered manner, depending on the severity of pollution levels. Here's a brief overview:

PURPOSE

- **To Manage Air Quality:** GRAP provides a structured approach to tackle air pollution by implementing specific actions based on the Air Quality Index (AQI) levels.
- **To Mitigate Health Impacts:** The plan aims to protect public health by reducing exposure to harmful air pollutants during high pollution episodes.

Key Components

- **Action Levels:** GRAP categorizes air pollution into various levels, from "Moderate" to "Severe" and "Severe Plus," with corresponding actions required for each level.
- **Emergency Measures:** For extreme pollution levels, GRAP prescribes emergency measures like restricting construction activities, increasing public transportation, and enforcing stricter vehicle emission standards.
- **Implementation Agencies:** The plan is implemented by various government agencies, including the Delhi Pollution Control Committee (DPCC), the Central Pollution Control Board (CPCB), and local municipal authorities.

Actions by Pollution Level

- **Moderate to Poor:** Measures include improving traffic management, controlling dust, and promoting cleaner fuels.
- **Very Poor:** Includes actions like increasing the frequency of mechanical road sweeping and controlling industrial emissions.
- **Severe:** Implements stricter measures such as banning construction activities, restricting vehicle use, and enforcing stricter emission norms.
- **Severe Plus (Emergency):** Includes emergency measures like closure of schools, work-from-home directives, and stopping non-essential construction and industrial activities.

GOALS AND BENEFITS

- **Reduce Pollution:** The plan aims to quickly reduce pollution levels during severe episodes.
- **Protect Health:** By implementing timely measures, GRAP helps minimize health risks associated with poor air quality.
- **Improve Air Quality Management:** Provides a framework for effective and responsive air quality management.

CONSLUSION:

EPIC's AQLI for 2024 provides critical data that connects air quality to life expectancy, supporting informed decision-making and action to combat air pollution. The ongoing work of EPIC underscores the importance of addressing air quality issues to improve public health and quality of life globally.Meeting WHO guidelines could significantly enhance life expectancy and overall public health nationwide.

PRELIMS QUESTION:

Q.As of 2024, which pollutant is primarily used in the AQLI to estimate reductions in life expectancy

- A) Carbon Dioxide (CO_2)
- B) Nitrogen Dioxide (NO_2)
- C) Particulate Matter ($PM_{2.5}$)
- D) Sulfur Dioxide (SO_2)

Answer: C

MAINS QUESTION:

Q. Air pollution is a significant public health challenge in India, impacting life expectancy and quality of life. Suggest additional strategies to achieve sustainable air quality improvement.

Ritik singh

Understanding Tropical Cyclone Asna: Mechanism, Impact, and NDMA Guidelines for Preparedness

Why in the News?

The IMD has forecasted 'very heavy' rainfall in Gujarat for tomorrow and has issued a red alert for coastal Karnataka due to Cyclone Asna. This cyclone, an unusual occurrence for August over the Arabian Sea, is expected to bring significant rain to both Gujarat and coastal Karnataka.

What is a Cyclone?

Cyclones are a recurring natural hazard in India, often resulting in significant loss of life and property. Globally, the term Tropical Cyclone (TC) or simply 'Cyclone' is used to describe tropical weather systems where winds reach or surpass 34 knots (62 km/h). These systems are characterized by intense low-pressure areas and are among the most severe weather events in tropical regions.

IMD: key facts and figures about the tropical cyclones

Rank: Tropical cyclones are the second-most dangerous natural hazard, after earthquakes.
Disasters: Over the past 50 years, tropical cyclones have been responsible for 1,945 disasters.
Casualties: More than 779,324 people have lost their lives due to tropical cyclones in the last 50 years.
Economic Losses: Tropical cyclones have caused approximately USD 1.4 trillion in economic losses since 1970.
Daily Impact: On average, tropical cyclones and related hazards have caused 43 deaths and USD 78 million in damages every day over the past 50 years.
Diameter: The typical diameter of a tropical cyclone ranges from 200 to 500 km but can extend up to 1,000 km.
Population Growth: The population in tropical cyclone-prone regions has increased by 200% over the past 50 years.

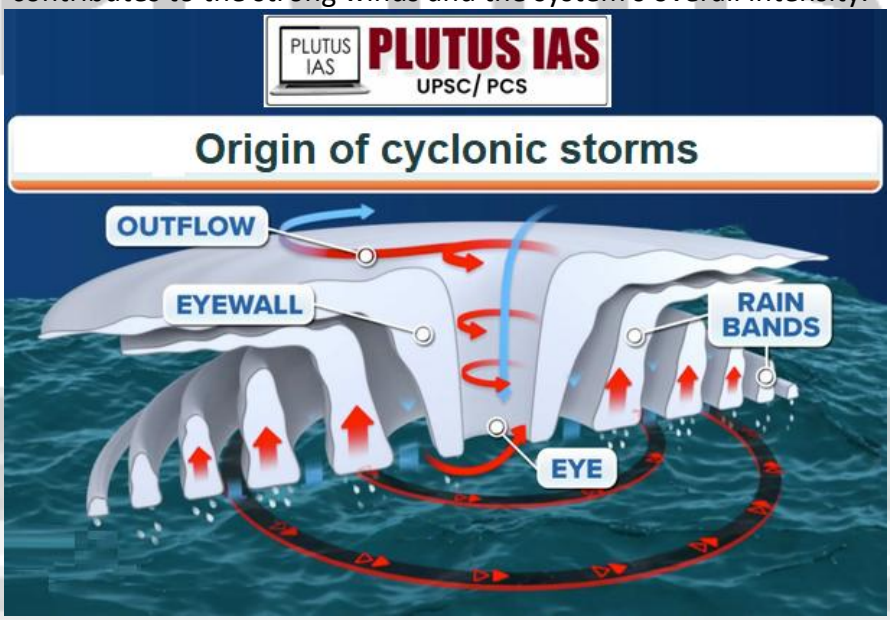
Classification:

Cyclones are categorized into two main types

1. Extra-Tropical Cyclones: Also known as temperate cyclones, these occur in temperate zones and high-latitude regions. They can even originate in Polar Regions. These cyclones are associated with frontal systems and are driven by temperature contrasts between air masses.
2. Tropical Cyclones: These cyclones develop over tropical or subtropical waters between the Tropics of Capricorn and Cancer. They form from organized surface wind circulation and are powered by heat from the sea. According to the World Meteorological Organization (WMO, 1976), a tropical cyclone is characterized by winds exceeding gale force (minimum of 34 knots or 63 km/h).

Distinct features of Tropical cyclone:

1. Eye: The calm, clear centre of a tropical cyclone, where winds are relatively light and skies are mostly clear. This is a low-pressure area with ascending air.
2. Eye Wall: The ring of towering thunderstorms surrounding the eye. It contains the cyclone's most intense winds and heaviest rainfall.
3. Spiral Bands: These are bands of clouds and thunderstorms that spiral outwards from the eye. They can extend over large areas and produce heavy rain and strong winds.
4. Cyclone's Rotation: Tropical cyclones rotate in a cyclonic manner due to the Earth's rotation, with a counterclockwise rotation in the Northern Hemisphere and a clockwise rotation in the Southern Hemisphere.
5. Low-Pressure Centre: The core of a tropical cyclone is a region of very low atmospheric pressure, which contributes to the strong winds and the system's overall intensity.



6. Strong Winds: Tropical cyclones are characterized by sustained winds that exceed 34 knots (62 km/h). The most intense winds are located in the eye wall.
7. Heavy Rainfall: Cyclones can produce extremely heavy rainfall, leading to flooding in affected areas.
8. Storm Surge: A rise in sea level caused by strong winds and low pressure, leading to coastal flooding and erosion.

Essential Conditions for Tropical Cyclone Formation:

1. Warm Sea Surface Temperature: Sea surface temperatures (SST) must be at least 26.5°C (about 80°F) to provide the necessary heat and moisture. These warm waters increase the evaporation rate, which provides the moisture needed for cloud formation and intensification of the cyclone.

2. Low Vertical Wind Shear: Minimal difference in wind speed and direction between different levels of the atmosphere. This Low wind shear allows the cyclone to maintain its structure and prevents the storm from being torn apart.

3. High Humidity: High humidity in the lower to mid-levels of the atmosphere. High moisture content supports the development of deep convection and cloud formation, contributing to the cyclone's strength.

4. Presence of a Pre-existing Weather Disturbance: An initial low-pressure area or disturbance in the atmosphere. This pre-existing disturbance acts as a trigger for cyclone formation by creating a region of low pressure around which the system can develop.

5. Coriolis Force: Sufficient Coriolis force to induce rotation. The Coriolis effect, caused by the Earth's rotation, is necessary for the cyclone's rotation and to organize the system into a cyclonic structure.

Formation and Development of Tropical Cyclones

The development of tropical cyclones occurs in three main stages:

1. Formation and Initial Development

Warm Sea Surface: Tropical cyclones begin over warm ocean waters, typically with temperatures above 26°C (79°F) to a depth of about 60 meters. This warmth causes significant evaporation and transfer of water vapor into the atmosphere.

Atmospheric Instability: The warm, moist air rises from the ocean surface, creating atmospheric instability. This leads to the formation of towering cumulus clouds through convection. As the air rises, it cools and condenses, forming large cloud formations and thunderstorms.

2. Mature Tropical Cyclones

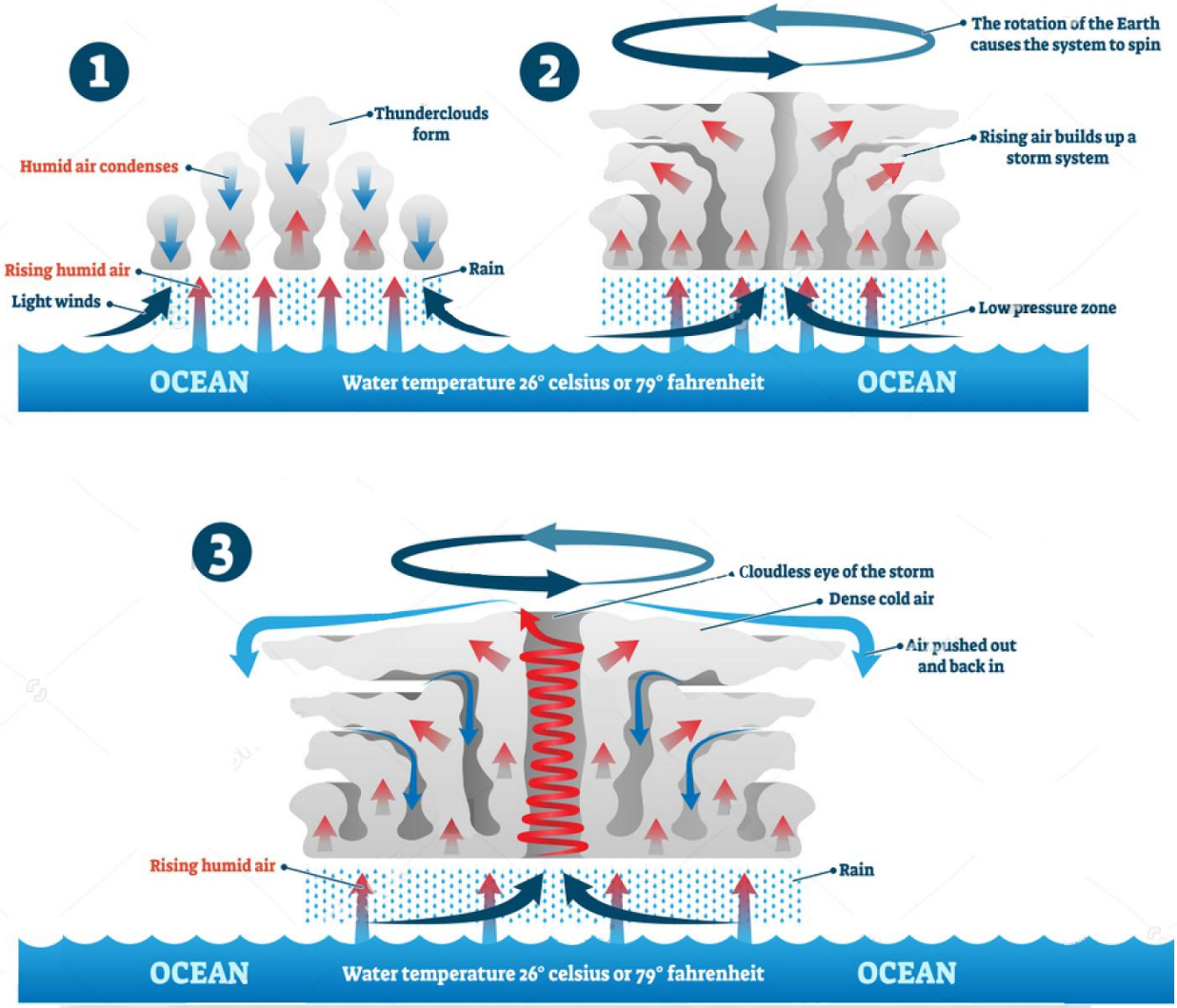
Intensification: As the cyclone matures, vigorous thunderstorms develop. The rising air spreads out horizontally at the tropopause level, creating a high-pressure area above the storm. This causes downward motion and warming of the air, creating a warm "eye" in the center of the cyclone.

Eye Formation: The eye of a mature tropical cyclone can take several shapes, including circular, concentric, or elliptical. The key feature of a mature cyclone is its concentric pattern of highly turbulent, giant cumulus thundercloud bands that encircle the eye.

3. Modification and Decay

Weakening: A cyclone starts to weaken when it loses its source of warm, moist air, which typically happens after landfall or when it moves over cooler waters. As the central low pressure and internal warmth decrease, the cyclone's winds and overall intensity diminish.

Continued Threat: Even as a cyclone weakens, it can still pose significant risks to life and property due to continued heavy rainfall, storm surges, and strong winds.



INDIA AND TROPICAL CYCLONE:

The Indian subcontinent is highly vulnerable to tropical cyclones due to its extensive coastline and climatic conditions.

Geographical Exposure: India, with its 8,041-kilometer coastline, is exposed to about 10% of the world's tropical cyclones. The majority of these cyclones form in the Bay of Bengal and affect the East Coast of India.

Frequency and Distribution: On average, five to six tropical cyclones develop each year, with two or three reaching severe intensity. Cyclones are more common in the Bay of Bengal compared to the Arabian Sea, with a ratio of approximately 4:1. Historically, from 1891 to 1990, the East coast of India experienced 262 cyclones (92 of which were severe) in a 50-kilometer-wide strip. In contrast, the West Coast saw 33 cyclones, with 19 being severe.

Seasonality: Cyclones in India typically occur during two main periods: May-June and October-November. Severe cyclones in the North Indian Ocean exhibit a bi-modal pattern, with a primary peak in November and a secondary peak in May.

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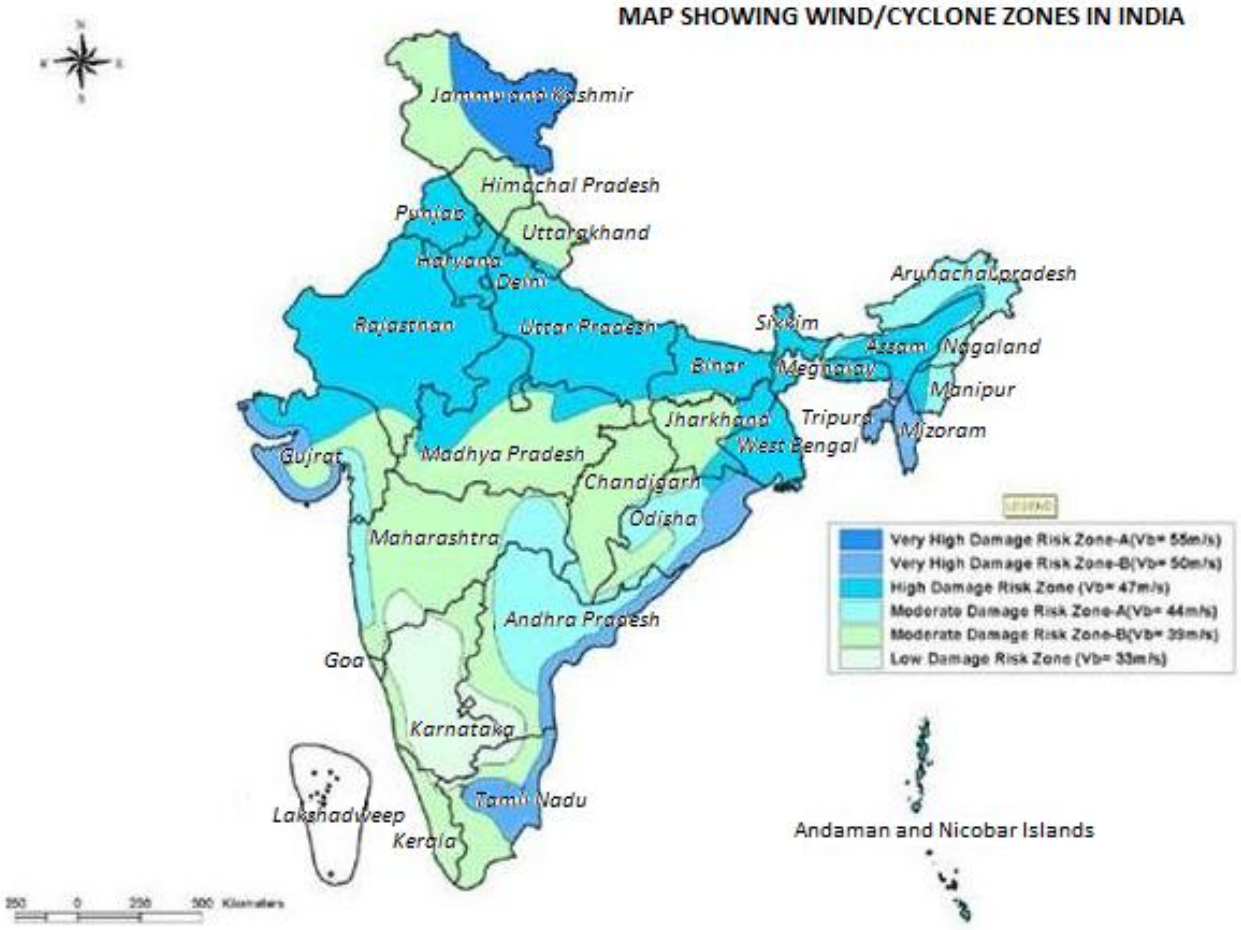

Consequences of tropical cyclones:

Heavy Rainfall and Flooding: Cyclone Fani, which struck the Indian state of Odisha in May 2019, exemplifies the impact of heavy rainfall and flooding. The cyclone brought intense rainfall, leading to severe flooding in several districts. Rivers overflowed, inundating large areas, and damaging homes, infrastructure, and crops. The floodwaters disrupted normal life and created a significant humanitarian crisis in the affected regions.

Strong Winds: Cyclone Amphan, which hit India and Bangladesh in May 2020, caused widespread destruction due to its strong winds. With wind speeds reaching up to 155 km/h (96 mph), the cyclone uprooted trees, damaged buildings, and disrupted power and communication lines. The intense winds were devastating in West Bengal and the Sundarbans region, leading to extensive damage and disruption.

Storm Surge: Cyclone Michaung in 2023, recently highlighted the vulnerability of Tamil Nadu and Andhra Pradesh to tropical cyclones, with significant implications for these coastal regions. A report by Climate Trends reveals that about 2.9 million people in Andhra Pradesh are highly vulnerable to such storms, intensified by the fact that 3.3 million people reside within 5 kilometers of the coastline.

Landslides: Cyclone Yash, which struck eastern India in May 2021, triggered heavy rainfall that caused landslides in the hilly areas of West Bengal and parts of Jharkhand. The landslides resulted in road blockages, damage to infrastructure, and increased challenges for rescue and recovery operations. The heavy rains and unstable terrain exacerbated the impact on these regions.

Economic and Social Impact: Cyclone Ockhi, which affected Tamil Nadu and Kerala in December 2017, had significant economic and social repercussions. The cyclone caused extensive damage to homes, infrastructure, and agricultural lands. The displacement of communities and the destruction of property led to a severe humanitarian crisis.

Environmental Impact: Cyclone Vardah, which struck Chennai and Tamil Nadu in December 2016, had notable ecological impacts. The cyclone caused significant damage to coastal and urban green spaces, including destroying trees and vegetation. The flooding and storm surge associated with the cyclone also led to pollution of water sources, affecting local ecosystems and wildlife.

NDMA guidelines for cyclones:

The National Disaster Management Authority (NDMA) of India provides comprehensive guidelines for managing disasters, including cyclones. These guidelines are designed to mitigate the impact of cyclones and enhance preparedness, response, and recovery efforts.

1. Cyclone Preparedness and Mitigation

a. Early Warning Systems: Establish and maintain robust early warning systems to provide timely and accurate information about cyclone formation and movement.

b. Public Awareness and Education: Conduct public awareness campaigns and educational programs to inform communities about cyclone risks and safety measures.

c. Infrastructure Resilience: Improve the resilience of infrastructure to withstand cyclone impacts, including strengthening buildings, roads, and coastal defenses.

d. Community-Based Preparedness: Develop and implement community-based preparedness plans, including evacuation plans and shelter arrangements.

2. Cyclone Response and Management

a. Emergency Operations Centers (EOCs): Activate EOCs at the state and district levels to coordinate response efforts during a cyclone.

b. Evacuation and Shelter Management: Implement evacuation plans to safely move people from vulnerable areas to designated shelters.

c. Search and Rescue Operations: Conduct search and rescue operations to assist affected individuals and communities.

d. Relief and Rehabilitation: Provide immediate relief supplies, including food, water, medical aid, and other essentials to affected populations.

3. Post-Cyclone Recovery and Reconstruction

a. Damage Assessment: Conduct thorough damage assessments to evaluate the impact of the cyclone on infrastructure, properties, and livelihoods.

b. Reconstruction and Rehabilitation: Develop and implement reconstruction plans to rebuild affected areas, focusing on resilience and sustainable development.

c. Financial Support and Insurance: Facilitate financial support and insurance mechanisms for individuals and businesses affected by the cyclone.

d. Review and Improvement: Review and analyze the response and recovery efforts to identify lessons learned and areas for improvement.

4. Coordination and Collaboration

a. Multi-Agency Coordination: Ensure coordination among various government agencies, NGOs, and community organizations involved in disaster management.

b. International Cooperation: Engage in international cooperation and exchange of best practices for cyclone management.

Strategic Measures for Enhancing Cyclone Preparedness and Mitigation

To enhance cyclone preparedness and mitigate their impact, several strategic measures have been proposed by various committees and organizations in India:

Upgrading Forecasting Capabilities and Infrastructure: Establishing advanced weather radars and satellite systems to improve cyclone prediction accuracy is crucial. This recommendation was emphasized by the Goswami Committee (2004), which also advocated for enhancing early warning systems to ensure timely alerts. The National Disaster Management Plan (NDMP) (2009) and the National Disaster Management Authority (NDMA) Guidelines further stressed the need for improved forecasting and communication systems to effectively reach vulnerable populations.

Coastal Zone Management and Protection: Constructing seawalls, embankments, and reforesting mangroves are vital coastal protection measures. The High-Level Committee on Disaster Management in 2016 also called for the development of an integrated coastal zone management plan to address cyclone risks and coastal erosion.

Building Resilient Infrastructure: Promoting cyclone-resistant buildings and critical facilities is essential to reduce damage during cyclones. Recent recommendations from Cyclone Risk Mitigation Measures of 2021 also emphasized the construction of robust coastal defenses and the implementation of cyclone-resilient building codes.

Community-Based Preparedness and Engagement: Developing localized disaster response plans and involving communities in preparedness efforts are critical. The NDMP of 2009 has highlighted the importance of public awareness campaigns and capacity building for effective local response.

Enhanced Training and Capacity Building: Regular training programs and simulation exercises for disaster management professionals and community members are necessary to improve readiness. This need was identified by the NDMA Guidelines and the National Disaster Management Plan (NDMP) (2009), which called for significant capacity building and resource allocation to state and district authorities.

Coordination and Research: Strengthening coordination mechanisms among government agencies, NGOs, and international bodies is crucial for effective cyclone management. The need for enhanced research and development to improve cyclone prediction models, as highlighted by the High-Level Committee on Disaster Management.

Economic Protection and Insurance: Implementing insurance and financial protection schemes to mitigate economic losses from cyclones is recommended. The Cyclone Risk Mitigation Measures (2021) advocated for financial protection to reduce the economic impact on individuals and businesses.

International level cooperation: To reduce the impact of cyclones and disaster management frameworks like the Sendai framework need to be implemented by the countries in full letter and spirit.

PRELIMS QUESTION:

Q. With reference to the formation and management of tropical cyclones, Consider the following statements:

1. Tropical cyclones are exclusive to the Indian subcontinent.
2. Sea Surface Temperature (SST) plays a crucial role in cyclone prediction.
3. The Indian Meteorological Department (IMD) serves as the primary agency for cyclone forecasts and alerts in the Indian Ocean region.
4. The name "Asna" for a cyclone was assigned by Bangladesh.

How many of the above-given statements are correct?

A. Only one

B. Only two
C. Only three
D. All four

ANSWER: B

MAINS QUESTION:

Discuss the obstacles India encounters in effectively addressing the increased risk of tropical cyclones due to global warming, and outline the strategic policies that should be implemented to mitigate their impacts.

(250 words 15 marks)

PRELIMS BITS: THE AGRICULTURE INFRASTRUCTURE FUND.

This article covers "Daily Current Affairs" and the topic details the Agriculture Infrastructure Fund.

SYLLABUS MAPPING:

GS-3: Agriculture: policies related to agriculture development.

FOR PRELIMS:

What is The Agriculture Infrastructure Fund? What are the policies related to Agriculture?

FOR MAINS:

What are the issues with Indian Agriculture? What advantages does the Agriculture Infrastructure Fund offer?

WHY IN THE NEWS?

The Union Cabinet has approved the progressive expansion of the Agriculture Infrastructure Fund, a Central Sector Scheme. This expansion will greatly bolster and enhance agricultural infrastructure across the country, offering substantial support to the farming community. Initially launched in 2020 with a budget of ₹1 lakh crore, the Agriculture Infrastructure Fund is designed to provide comprehensive financial assistance to farmers.

OBJECTIVE:

The Agriculture Infrastructure Fund launched in July 2020, aims to improve agricultural infrastructure by providing financial support for post-harvest management projects and community farming assets. This includes facilities such as warehouses, cold chains, processing centers, and smart agriculture infrastructure.

KEY FEATURES:

Financing: Loans up to ₹2 crores per project are available with a 3% annual interest subvention for up to 7 years.

Eligible Entities: Agri entrepreneurs, farmers, cooperatives, Farmer Producer Organizations (FPOs), start-ups, and state agencies.

Coverage: Projects in post-harvest management, supply chain services, organic input production, and other agricultural infrastructure are eligible.

Operational Period: The scheme runs from 2020-21 to 2032-33, with loan disbursements completed by the end **of the Financial Year 2025-26.**

Contribution: Borrowers must contribute at least 10% of the project cost.

BENEFITS:

Better Marketing: Enhanced infrastructure helps farmers sell directly to consumers, increasing their income.

Reduced Losses: Investments in logistics and cold storage minimize post-harvest losses.

Improved Sales Timing: Modern systems allow farmers to choose the best time to sell.
Cost Savings: Community assets improve productivity and save costs.
Government Support: Priority sector lending is encouraged for currently viable projects.
Reduced Food Waste: Improved infrastructure helps reduce national food wastage.
Investment Attraction: Viable Public-Private Partnership (PPP) projects can attract investment.
Lower Risk for Lenders: Credit guarantees and interest subventions reduce lender risk and expand their customer base.
Refinance Support: Cooperative banks and Regional Rural Banks (RRBs) benefit from refinance facilities.

ELIGIBILITY:

Institutions: Participating banks and financial institutions will decide on borrowers based on project viability.
SC/ST and Women Entrepreneurs: 24% of grants should support SC/ST entrepreneurs (16% SC, 8% ST) and prioritize loans for women and other weaker sections.
Exclusions: PSUs: Public Sector Undertakings (PSUs) are not directly eligible but can participate in PPP projects.

PRELIMS QUESTION:

Q. Consider the following entities:
1. Agri-entrepreneurs
2. Central-sponsored Public-Private Partnership Projects
3. Individual Farmers
4. Farmer Producers Organizations (FPOs)
5. Multipurpose Cooperative Societies
6. The Rashtriya Chemicals and Fertilizers Limited (RCF)

How many of the above-mentioned entities are eligible for benefits under the Agriculture Infrastructure Fund?
A. Only three
B. Only four
C. Only five
D. All six
ANSWER: C

Munde Dhananjay Navnath