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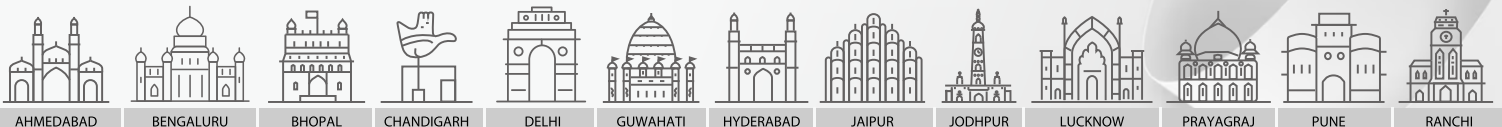
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Climate Change

Key outcomes of CoP 28

- ◇ Mobilization of **\$83.9 billion** in climate finance.
- ◇ **Global Green Credit Initiative (GGCI)** by India.
- ◇ **Adoption of First Global Stocktake of the Paris Agreement**
- ◇ **Global Goal on Adaptation-UAE Framework** for Global Climate Resilience.
- ◇ **Officially operationalized the Loss and Damage Fund**

Loss and Damage (L&D) fund

- ◇ The fund aims to provide financial assistance to nations most vulnerable and impacted by the effects of climate change.
- ◇ Fund 1st **announced during COP27 in Sharm el-Sheikh (Egypt)** in 2022.
- ◇ Based with World Bank
- ◇ India is a **strong supporter**.

India and Climate Action

- ◇ **Targets under NDCs submitted to UNFCCC**
 - ◆ **Reduce Emissions Intensity of its GDP by 45%** by 2030, from 2005 level.
 - ◆ **Achieve about 50% cumulative electric power** installed capacity **from non-fossil fuel**-based energy resources by 2030.
- ◇ **Achievements/Progress**
 - ◆ **Reduced the emission intensity vis-à-vis it's GDP by 33% between 2005 and 2019.** (India's National statement at UNFCC COP 28)
 - ◆ **Achieved 45.5% of installed electricity capacity from non-fossil fuel** sources. (June 2024, Ministry of Power)
 - ◆ **Recent Initiatives:** Green Credit Program, Carbon Credit Trading Scheme

Climate Equality

- ◇ Globally, richest **10% account for nearly half (48%) of emissions.** (Emission gap report 2023)
- ◇ **M.K. Ranjitsinh and Others v. Union of India and Others:** Recognized right to be free from adverse effects of climate change under **Articles 14 and 21.**

Impact of Climate Change on Vulnerable Sections

- ◇ **Children: 6.7 million Children displaced in India** alone (2016-2021) due to weather-related events. (UNICEF)
- ◇ **Women: Only 2% of gender-tagged international adaptation finance** is gender-responsive. (Adaptation Gap Report).
- ◇ **Elderly: Heat-related deaths** among **those over 65 risen by 70%** in 2 decades. (WHO)
- ◇ **Rural Poor: Poor households lose 5% of their total income due to heat stress** relative to better-off in an average year.

Impact of Climate Change on Health

- ◆ **Exposure to extreme weather events:** 189 million people.

Impact of Climate Change on Indian subcontinent

- ◆ **Rise in average temperature in India:** 0.7°C (1901-2018)
- ◆ **Increase in Frequency of daily precipitation extremes (>150 mm per day):** 75% (1950-2015)
- ◆ **Sea-level rise in North Indian Ocean:** 3.3 mm per year (1993-2017).

Emission trends

- ◆ **Global (Emission Gap Report 2023)**
 - ◆ **Increase in Global GHG emissions:** 1.2 % from 2021 to 2022.
 - ◆ **Global warming estimated to be limited to 3°C** if current policies continue.
- ◆ **India**
 - ◆ Only **contributed 5% of warming to date** (Emission Gap Report-2023).
 - ◆ **2022 share in global CO2 emissions:** 8%. (**3rd highest globally**).
 - ◆ **Per capita carbon emissions:** Still very low at 2 tonnes per person per year in 2021 (Global average 4.7 tonnes).
- ◆ **Initiatives**
 - ◆ **Global:** Global Methane Pledge, Powering Past Coal Alliance, Just Energy Transition Partnerships (JETPs), Mission Innovation, etc.
 - ◆ **Indian:** Panchamrit Target declared in COP 26 (Net-Zero emissions by 2070), National Action Plan on Climate Change (NAPCC), etc.

Greenwashing

- ◆ **Making a product or policy seem more environmentally friendly** or less damaging than it is in reality.
- ◆ **Types:** Greenhushing, Greenrinsing, Greenlabeling, Greenlighting etc.
- ◆ **Example:** In 2015, Volkswagen used **software to manipulate emission tests in its Clean Diesel cars**.
- ◆ **Initiatives in India:** Standard for eco-labelling of products and services by BIS; Consumer Protection Act, 2019; SEBI's BRSR norms.

Climate Finance

- ◆ **Current Needs**
 - ◆ **Global:** At **least USD 4-6 trillion per year** for global transformation to a low-carbon economy. (Emission Gap Report 2022)
 - ◆ **India:**
 - › Up to **6-8 trillion USD** during 2015-2030 to implement the actions required to transform the current energy systems.
 - › **~USD 10 trillion to achieve net-zero by 2070.**

◆ **Initiatives**

- › **Global:** Loss and Damage Fund; Green Climate Fund (GCF); Global Environment Facility (GEF); Clean Technology Fund (CTF)
- › **India:** National Adaptation Fund for Climate Change (NAFCC); sovereign green bonds

 **Sector Specific Decarbonisation in India**

◇ **Transport Sector**

- ◆ **14% share** in energy-related CO2 emissions.
- ◆ **3rd** most greenhouse-gas-emitting sector in India.
- ◆ **Initiatives:** Bharat Stage VI Emission Standards; Ethanol Blending in Petrol to reach 20% by 2025; FAME; National Green Hydrogen Mission.

◇ **Agrifood systems**

- ◆ Contributes to **18% GHG emissions in India (2019)**
- ◆ **India among top 3 emitters** of agrifood emission.
- ◆ **Initiatives:** National Mission for Sustainable Agriculture (NMSA); Gobardhan scheme etc.

◇ **Shipping Industry**

- ◆ Accounts for **nearly 3% of global GHG emissions.** (UNCTAD's Review of Maritime Transport 2023 report)
- ◆ **Initiatives:** IMO's Energy Efficiency Existing Ship Index (EEXI); The MARPOL Treaty; Hong Kong International Convention; Harit Nauka Initiative

 **Short Lived Pollutants (SLPs)**

- ◇ **Substances:** Black Carbon, Methane, Tropospheric Ozone, Hydrofluorocarbons, etc.
- ◇ **Impact:** **2nd largest contributor** to human-caused climate warming after CO2, **contributing up to 45% of global warming.**
- ◇ **Initiative:** Climate and Clean Air Coalition's (CCAC), only global alliance to reduce SLPs.

 **Climate Engineering**

- ◇ It is the intentional large-scale intervention in the Earth's climate system to counter climate change.
- ◇ **Methods:** Carbon Dioxide Removal (CDR) and Solar Radiation Modification (SRM).
- ◇ **Initiatives:** **Climate modelling research program** in geoengineering at IISc; **Major Research and Development Program (MRDP)** by DST.

 **Climate Change and Cryosphere**

- ◇ **Significance:**
 - ◆ Estimated 30% of **world's undiscovered conventional natural gas resources.**
 - ◆ 80% of the world's fresh water is in the form of glaciers, ice sheets, etc.
- ◇ **Impact of climate change:**
 - ◆ In case by 2°C rise, Himalayas **expected to lose 50 % of today's ice.**
 - ◆ Arctic **heating up more than 2 times as fast** as rest of world.
- ◇ **Initiatives:** Himalayan Monitoring Assessment Programmed (HIMAP); National Mission for Sustaining Himalayan Ecosystem.

Ozone hole

- ◇ Ozone holes **grew larger and thinner over Antarctica**. (2020–22)
- ◇ **Initiatives:** Vienna Convention; Montreal Protocol; Kigali Amendment; India cooling Action Plan (ICAP); Ozone cell in MoEFCC.
- ◇ **India's achievements (Montreal Protocol): Exceeded 35% HCFC** (Hydrochlorofluorocarbons) **phase-out goal** and **eliminated HCFC 141b. (UNDP)**.

Carbon Farming

- ◇ Carbon farming practices are management practices that are known to sequester carbon and/or reduce GHG emissions.
- ◇ **Potential:** Agricultural soils can **absorb 3–8 billion tonnes of CO₂-equivalent** every year.

Carbon Border Adjustment Mechanism (EU)

- ◇ **Fair price on the carbon emitted during the production of carbon-intensive goods** entering EU.
- ◇ **Impact on India:** In 2022, India's **27% exports of iron, steel, and aluminium products** went to EU.



Air Pollution

Urban Air Pollution in India

- ◇ **Air pollution in India** (2023 World Air Quality report, IQAir)
 - ◆ **Ranked 3rd globally in air pollution**
 - ◆ **Annual average PM2.5 concentrations:** 54.4 µg/m³ (>10 times of WHO recommended annual guideline level of 5 µg/m³)
 - ◆ **9 out of 10 World's most polluted cities in India** (Begusarai, Guwahati, Delhi in Top 3)

National Clean Air Programme

- ◇ **Target:** Achieve reductions up to **40%** of PM10 and PM2.5 concentrations by **2025–26**, base year **2017**.
- ◇ **Progress made by NCAP in last 5 years**
 - ◆ **27 out of 49** cities showed improvement in **PM 2.5**.
 - ◆ **24 out of 46** cities showed improvement in **PM 10**.



Water and Land Degradation

Water (Prevention and control of Pollution) Act, 1974

Key Amendments

- ◆ **Central government to prescribe** manner of nomination, terms and conditions of service of Chairperson, State Pollution Control Board.
- ◆ **Decriminalises several violations**, and instead **imposes penalties**.
- ◆ **Adjudicating officers** to determine penalties, appointed by Centre.
- ◆ Penalties collected in **Environment Protection Fund** under EPA, 1986.

Water for Prosperity and Peace

- ◆ **Around 80% of jobs are water-dependent.**
- ◆ **Society's Peace and Social Stability increases** with **decrease in inequalities** in allocation of water resources and access to water supply and sanitation.

Extreme Water Stress

Current Situation

- ◆ **25 countries, including** India, faces extremely high-water stress. [World Resources Institute (WRI)]

Impacts (WRI Data)

- ◆ **31% of global GDP** will be exposed to **high water stress by 2050**.
- ◆ **60% of world's irrigated agriculture** faces extremely high-water stress.

Urban Water Crisis in India

- ◆ By **2030 India's water demand** would **double** due to rapid urbanization (UN Report).
- ◆ India has **18% of world's population**, but **only 4%** of world's water resources.

Ground Water in India

- ◆ India is **world's largest user** of groundwater (uses 25% of all groundwater extracted every year globally)
- ◆ **Indo-Gangetic basin** in India has already **passed the groundwater depletion tipping point**. (Interconnected Disaster Risks Report 2023)
- ◆ **Initiatives:** National Aquifer Mapping & Management Programme (NAQUIM); Jal Kranti Abhiyan; Atal Bhujal Yojana (2020)

Namami Gange

Challenge:

- ◆ **Only 232 projects** (out of 409 projects) made operational (till Dec. 2022).
- ◆ **Installed waste treatment plants** capable of treating only **20% of estimated sewage** in 5 major States along the river
- ◆ **Achievement:** Out of 1072 Grossly Polluting Industries (GPIs) 885 brought under **CPCB's Online Continuous Effluent Monitoring Stations (OCEMS)**.

Water Trading for reuse for treated wastewater

- ◆ Only about **40% of urban wastewater is treated** in India.
- ◆ India is a large **virtual net exporter of water**

Outcomes COP 5 Minamata Convention

- ◆ **Limit of 15 mg/kg concentration of mercury** set as threshold for wastes contaminated with mercury.

Land Degradation

Current Situation

- ◆ **India: Degraded land:** ~29.7 per cent. (ISRO Atlas, 2021)
- ◆ **World: 50% of plain's topsoil** lost **via erosion** over last 150 years. (WWF report)

Targets

- ◆ **Global:** Voluntary commitments to restore degraded land reached **one billion hectares by 2030** (Land Degradation Neutrality Target Setting Programme)
- ◆ **India:** Restore 26 million hectares by 2030 (LDN target)



Sustainable Development

Progress in Sustainable Development Goals

Challenges

- ◆ Asia Pacific **would not achieve all 17 SDGs before 2062**. (SDG Progress Report, 2024)
- ◆ **Regional variation: More than 20 points variation** in scores between Andhra Pradesh and Punjab. (SDG India Index, 2023-24)

Best Practices

- ◆ **MYAC (One Million Youth Actions Challenge)** by **One UN Climate Change Learning Partnership**;
- ◆ **ENACT partnership** (launched in CoP27) to environmental issues through **Nature-based Solutions (NbS)**.

Localisation of SDGs

Examples of Best Practices

- ◆ **Bihar:** Viksit Bihar ke 7 Nischay
- ◆ **Bhopal:** India's **first city-level Voluntary Local Review (VLR)** of SDGs

Sustainable Tourism

- ◆ **Tourism sector's Share in World's Carbon Emissions:** 8%
- ◆ **Over- Tourism in Indian Himalayan Region:** 100 million tourists every year
- ◆ **Initiatives:** National Strategy for Sustainable Tourism (NSST), 2022; Global Sustainable Tourism Council (GSTC)


Sustainable Finance

- ◇ Global need of **USD 3 trillion** over next decade to **finance green growth** (NITI Ayog report)
- ◇ **Initiatives: Addis Ababa Action Agenda** (SDG Summit 2023 by UNGA in 2030); **Sovereign Green Bonds**.


Mission LiFE

- ◇ Launched by India at **UNFCCC COP26 in 2021**.
- ◇ **Targets:**
 - ◆ At least **one billion Indians and other global citizens** to take individual and collective action for environmental preservation in 2022 to 2027.
 - ◆ At least **80% of all villages and urban local bodies** to become environment-friendly by 2028.


Circular Economy

- ◇ **Current Situation: Only 7.2%** of the global economy is circular with a declining trend (Circularity Gap report 2023)
- ◇ **Initiatives:** National Resource Efficiency Policy (NREP), 2019, Extended Producer Responsibility (EPR); Swachh Bharat Mission, etc.


Coastal Aquaculture Authority (Amendment) Act, 2023

- ◇ **Broaden the definition of “coastal aquaculture”.**
- ◇ Registration granted under the Act to prevail as **valid permission under CRZ Notification**.
- ◇ **Permitting certain aquaculture activities** in CRZ areas like hatcheries.
- ◇ **Prevent use of antibiotics.**


Organic Farming

- ◇ India has world’s **highest number of organic farmers** (Economic Survey 2022-23)
- ◇ **Sikkim** became the world’s 1st 100% organic state.
- ◇ **Initiatives:** FSSAI Jaivik Bharat logo; **PM PRANAM**; Pramparagat Krishi Vikas Yojana etc.


Climate Resilient Farming

- ◇ **Impact of Climate change on Agriculture:** Projected decline in **yields of rainfed rice, wheat by 2050** and **shift in crop zones** like of Apple.
- ◇ **Agriculture sector emissions in India:** 14%
 - ◆ **Major share of GHG emissions:** Enteric fermentation (54.6%), rice cultivation (17.5%), and fertilizer in agricultural soils (19.1%), etc.


Agroforestry

- ◇ **Extent in India: 8.65%** of total geographical area. (NITI Aayog GROW report)
- ◇ **Initiatives:** Sub-Mission on Agroforestry (Har Medh par Ped) Scheme launched in 2016-17; National Agroforestry Policy, 2014 etc.

Plastic Waste Management in India

◆ Plastic waste in India

- ◆ **Per capita plastic waste generation doubled** over the **last 5 years**. (CPCB's annual report in 2020-21)
- ◆ **Ranked 3rd** globally in generation of **single-use plastic (SUP) waste** (Plastic Waste Makers Index 2019)

Plastic Waste Management (Amendment) Rules, 2024

◆ Key amendments

- ◆ **Local body mandated** to undertake an annual **assessment of plastic waste generated**.
- ◆ **Centralised Portal for Registration**.
- ◆ **Expansion of scope of EPR to Producers, Importers and Brand Owners** who introduce any **plastic packaging**.

E-waste management in India

- ◆ **Status: 16.01 lakh tonnes** total e-waste generated (2021-22)
- ◆ **Global rank: 3rd largest e-waste generator** (Global E-Waste Monitor 2024 report)
- ◆ **Challenge: Only ~33%** of total e-waste generated, collected and processed.

Sewage Management in India

- ◆ **Estimated sewage generation from Class I cities and Class II towns:** > 33,000 Million Litres per Day (MLD)
- ◆ **Challenges:** Only **23%** of treatment capacity meets the consented parameters of SPCBs.

Green Buildings

- ◆ **Consume 25% less energy** than traditional buildings
- ◆ **Initiatives:** Energy Conservation Building Code (ECBC) (2007 revised in 2017); Eco-Niwas Samhita 2018 by Ministry of Power; GRIHA by TERI.

Examples Environmental Movements in India

- ◆ **Chipko movement (1973)**, Uttarakhand
- ◆ **Silent Valley Movement (1973)**, Kerala
- ◆ **Appiko movement (1983)**, Karnataka



Renewable Energy and Alternative Energy Resources

Renewable Energy in India

Targets

- ◆ **Achieve 50% cumulative electric power installed** by 2030 from renewables. (INDC)
- ◆ Non-fossil fuel energy capacity of **500 GW by 2030. (Panchamrita)**
- ◆ **Progress: Installed Capacity** (Power Ministry, June 2024)-
 - ◆ **Renewable energy source** (Incl. Hydro): 195 GW (43.7% in total)
 - ◆ **Non-Fossil Fuel:** 203 GW (45.5% in total)

Solar Energy in India

- ◆ **Installed solar energy capacity:** 85 GW (Power Ministry, June 2024)
- ◆ **Potential:** 748 Giga Watt peak (National Institute of Solar Energy).
- ◆ **Global rank in Solar Power capacity:** 5th
- ◆ **Initiatives:** Grid Connected Solar Rooftop Programme; Solar Park Scheme; PM Surya Ghar Muft Bijli Yojana; **International Solar Alliance** (ISA) etc.

International Solar Alliance

Aim

- ◆ Mobilise **USD 1,000 billion** of investments in solar energy solutions by 2030.
- ◆ Delivering **energy access to 1,000 million people.**
- ◆ **Installation of 1,000 GW of solar energy capacity.**

Hydrogen Energy in India

- ◆ **Targets:** Green hydrogen production capacity of at least **5 MMT (Million Metric Tonne) per annum.** (National Green Hydrogen Mission)
- ◆ **Steps taken:** National Green Hydrogen Mission; Hydrogen-based Fuel-Cell Electric Vehicle (FCEV) buses in Leh.

Tidal Energy

- ◆ **Estimated potential of tidal and wave energy in India:** **12455 MW** and **41300 MW**, respectively

Ethanol Blending in India

- ◆ **Target:** 20% ethanol blending in petrol by 2025 (Updated) and 5% biodiesel blending in diesel by 2030.
- ◆ **Achievement:** 10% ethanol blending in Petrol by June 2022.
- ◆ **Initiatives:** PM JI-VAN Yojana, Ethanol blending Program (EBP) etc.

Energy Transition in India

- ◆ Refers to shifting energy production away from sources that release a lot of greenhouse gases
- ◆ **Achievements: Installed RE Capacity** increased from **76.37 GW in 2014 to 195 GW (including hydro)** in (June 2024)

Electric Vehicles

- ◆ **Benefits over conventional vehicles:** Zero tailpipe emissions; High-energy conversion rates of electric motors Delete, exceeding 90%.
- ◆ **Initiatives:** FAME India Scheme; GST on EVs has been reduced from 12% to 5% etc.



Conservation Efforts

Forest Conservation in India

- ◆ **Targets:**
 - ◆ **INDC:** To create an additional **carbon sink of 2.5 to 3 billion tonnes** of CO₂ by 2050.
 - ◆ **National Forest Policy of India, 1988:** To have a **minimum of 1/3rd of the total geographical area** of the country under forest and tree cover
- ◆ **Total forest and tree cover in India: 24.62%** of total geographic area (**Increase** of 0.28% from 2019) (India State of Forest Report 2021)
- ◆ **Loss:** India **lost 3.3% of tree cover** due to deforestation from 2001 to 2022. (Global Forest Watch)
- ◆ **Initiatives:** Forest Conservation (Amendment) Act, 2023; **Nagar Van Yojana**; Green India Mission etc.

Wildlife Conservation in India

- ◆ **Constitutional framework:** Article 48A under DPSP; Article 51(g) under Fundamental Duties; Under Concurrent List (7th Schedule).
- ◆ **Legislative Measures:** Wild Life (Protection) Act, 1972, Forest Conservation Act, 1980
- ◆ **Initiatives:** Species Recovery Programme; Project Tiger; Project Cheetah; etc.

Coral Bleaching

- ◆ **2023-2024 had the fourth global mass coral bleaching event.** (US National Oceanic and Atmospheric Administration)
- ◆ **Bleaching in India:** Live coral in **Gulf of Mannar** Decreased from over 37% to 27.3%. (2005- 2021)
- ◆ **Initiatives:** Biorock technology; Coastal Zone Regulation Notifications; International Coral Reef Initiative (ICRI); etc.

Project Tiger

- ◆ **Achievements**
 - ◆ **Increase in Number of tigers:** 3,682, from 2967 in 2018. (Status of Tigers, co-predators and Prey in India-2022 report)
 - ◆ **Increase in Number of tiger reserves:** 55 in 2024, from 9 in 1973
 - ◆ **23 CA|TS accredited tiger reserves in India**

Human Wildlife Conflict

- ◆ **Key Fact: 1,510 deaths** recorded in the country due to animal attacks in 2022 (Accidental Deaths & Suicides in India 2022)
- ◆ **Initiatives:** Advisory for management of man-animal conflict; Species specific guidelines; National wildlife Action Plan (2017-2035)

Wetland conservation

- ◆ **Extent in India: 7 lakh wetlands** covering **4.86%** of total geographic area
- ◆ **Loss: 2 out of 5 wetlands** lost in India in last 3 decades. (Wetlands International)
- ◆ **Initiatives in India:** Wetland (Conservation and Management) Rules 2017; Centre for Wetland Conservation and Management (CWCM); Party to Ramsar Convention; 12 Blue Flag Beaches in India etc.
- ◆ **Examples of sites in India:** Yashwant Sagar (Madhya Pradesh), Tampara Lake (Odisha), Pichavaram Mangrove (Tamil Nadu), Thane Creek (Maharashtra) etc.

Mangroves Conservation

- ◆ **Total Mangrove Cover in India:** 4,992 sq Km (ISFR, 2021)
- ◆ **Threat of extinction: 50% of the mangrove ecosystems examined classified as vulnerable, endangered, or critically endangered** (IUCN Red List of Mangroves Ecosystems)
- ◆ **Initiatives:** MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes); Sustainable Aquaculture In Mangrove Ecosystem (SAIME) etc.



Disaster Management

Infrastructure Resilience

- ◆ **Potential impact of climate change:** Global average annual loss (AAL) in infrastructure sectors of about 14 % of GDP.
- ◆ **Initiatives:** Nature-based Infrastructure Solutions; Global Infrastructure Risk Model and Resilience Index (GIRI).

Heatwaves

- ◆ **Vulnerability: 4% of districts and 7% of population** are highly vulnerable.
- ◆ **Impact:** Over 10,000 people lost their lives due to heatwaves between 2000-2020 (IMD).
- ◆ **Initiatives:** Color code impact-based heat wave warning; Heat Action Plans (IMD).

Earthquake

- ◆ **Vulnerability: 59% of Indian landmass** classified as earthquake-prone
- ◆ **Examples:** Morocco, Taiwan, Afghanistan
- ◆ **Initiatives:** Earthquake Risk Assessment and Mapping; Earthquake Early Warning System (EWS)

Glacial Lakes Outburst Floods

- ◇ **Vulnerability:** >9 million people in High Mountain Asia (HMA) are vulnerable.
- ◇ **Examples:** Kedarnath (2013), Chamoli (2021) and Sikkim (2023)

Landslides

- ◇ **Vulnerability:** 13.17% of India's geographical area
- ◇ **Examples:** Joshimath, Silkyara-Barkot tunnel, Uttarakhand
- ◇ **Initiatives:** National Landslide Susceptibility Mapping (NLSM) Programme; Landslide Atlas of India by National Remote Sensing Centre of ISRO.

Crowd Disaster Management

- ◇ **Examples:** Collapse of a platform at Delhi's Kalkaji Temple (2024); Morbi Bridge Collapse (2022); Seoul crowd tragedy (2022)
- ◇ **Initiatives:** Police Act of 1861; Disaster Management Act, 2005; **NIDM's Crowd Management Strategies and arrangement.**

Fire Safety

- ◇ **Fire accidents:** 7,435 people killed in over 7,500 fire accidents in India in 2022. (NCRB)
- ◇ **Recent Examples:** Gaming zone in Rajkot (Gujarat); Firecracker factory in Harda (Madhya Pradesh) and a private hospital in Delhi
- ◇ **Existing Regulation:** Fire service is a State subject; National Building Code; Model Building Bye Laws 2016 etc.

Forest Fires

- ◇ **Vulnerability:** 22% area falls under highly and extremely fire prone category.
- ◇ **Examples:** Uttarakhand (2024); Australian bushfire (2019).
- ◇ **Initiatives:** New National Forest Policy (1988); National Action Plan on Forest Fire (NAPFF)

Industrial Safety

- ◇ **Example:** Chennai ammonia gas leak (2024); Chasnala Mining Disaster (1975); Bhopal Gas Tragedy (1984)
- ◇ **Initiatives in India:** Civil Liability for Nuclear Damage Act 2010, OSH Code, 2020, PLIA, 1991, National Policy on Safety, Health and Environment at Workplace.

Oil Spills

- ◇ **Examples:** Ennore Oil Spill, Tamil Nadu; Nagapattinam Oil Spill, Tamil Nadu
- ◇ **Initiatives:**
 - ◇ **National:** National Oil Spill Disaster Contingency Plan (1996), Merchant Shipping Act, 1958
 - ◇ **International:** International Convention on Civil Liability for Bunker Oil Pollution Damage (2001), International Convention for the Prevention of Pollution from Ships or MARPOL (India is a signatory)

Dam Safety

- ◇ **Vulnerability:**
 - ◆ **India is the 3rd largest** dam Owing nation after USA and China.
 - ◆ **80% of dams** in India are over 25 years old.
- ◇ **Examples of dam failure:** Banqiao dam China; Machchhu Dam, Gujarat; Derna dam, Libya; Chungthang Dam, Sikkim.
- ◇ **Initiatives in India:** National Register of Large Dams (NRLD). DRIP, DHARMA, Dam Safety Act, 2021

Environmental cost of War

- ◇ **Measures**
 - ◆ **Geneva Convention** imposes restrictions on warfare methods damaging environment.
 - ◆ **Stockholm Conference (1972):** Prohibits the use of all weapons of mass destruction.
 - ◆ **Rome Statutes - Article 12 establishes** responsibility of states
 - ◆ **UN Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD)**



Geography

India Meteorological Department (IMD)

- ◇ **Achievements**
 - ◆ **39 Doppler Weather Radars (DWRs)** in India to monitor **severe weather events (till 2023)**.
 - ◆ **Appreciation from the United Nations** for early warning services
 - ◆ **Significant improvement in forecast accuracy** of severe weather events by **40-50% (last 5 years)**.

El-Nino - Monsoon Link

- ◇ **El Niño Southern Oscillation (ENSO) & Indian monsoon:**
 - ◆ El Niño suppresses monsoon rainfall.
 - ◆ La Niña enhances monsoon rainfall.
- ◇ **El Nino impact on Monsoon**
 - ◆ Causes **weakening of walker circulation**
 - ◆ **Weakening of the pressure gradient** between Indian Ocean and Pacific Ocean
 - ◆ Shift in **Jet Stream influences the movement of weather systems**.

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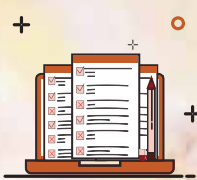
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1
AIR

Aditya Srivastava

16

in TOP 20 Selections in CSE 2023

from various programs of Vision IAS



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AIR
**Animesh
Pradhan**



5
AIR
Ruhani



6
AIR
**Srishti
Dabas**



7
AIR
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9
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10
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39
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