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MAINS 365

SUMMARY

Environment

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CONTENTS

1. Climate Change 5
1.1 COP28 5
1.1.1 Loss and Damage 6
1.2. India and Climate Action 6
1.2.1 Green Credit Program 7
1.2.2 Carbon Credits Trading Scheme (CCTS), 2023 8
1.3 Climate Change Impacts 10
1.3.1 Impact on Vulnerable Sections 10
1.3.2 Impact on Health 11
1.4. Mitigation and Adaptation 12
1.4.1 Greenwashing 12
1.4.2 Sector specific Decarbonization 13
1.4.3 Short-Lived Climate Pollutants (SLCPs) 14
1.4.4 Climate Engineering 15
1.5 Carbon Border Adjustment Mechanism 16
2. Air Pollution. 18
2.1. Cloud Seeding 18
2.2 National Clean Air Programme (NCAP) 19
3. Water and Land Degradation 20
3.1 The Water (Prevention and Control of Pollution) Amendment Act, 2024 . 20
3.2 Urban Water Crisis in India. Urban Water Crisis in India 21
3.3 Water for Prosperity and Peace . 22
3.4 Namami Gange Programme (NGP) 22
3.5 Water Trading 23
3.6 Land Degradation 24
4. Sustainable Development 26
4.1. Localisation of Sustainable Development Goals 26
4.2 Unregulated Tourism in the Indian Himalayan Region (IHR) 27
4.3 Sustainable Finance 27
4.4 Mission LiFE 29
4.5 Sustainable Agriculture 30
4.5.1 Coastal Aquaculture Authority (Amendment) Act, 2023 30
4.5.2 Organic Farming in India. . 30
4.5.3 Climate resilient farming . 31
4.6 Waste Management. 32
4.6.1 Plastic Waste Management (Amendment) Rules, 2024 (PMW Rules 2024) 32
4.6.2 Battery Waste Management (Amendment) Rules, 2024 . 33
4.6.3 Sewage Management in India 34
4.6.4 Waste to Wealth 35
4.7 Plant Genetic Resources for Food and Agriculture (PGRFA). 37
4.8 Miscellaneous 38
4.8.1 Green Buildings 38
4.8.2 Environmental Movements in India 39
5. Renewable Energy and Alternative Energy Resources 42
5.1 Renewable Energy in India 42
5.2 Solar Rooftop Power 42
5.3 International Solar Alliance 43
5.4 Ethanol blending in India 45

5.4.1 Sustainable Alternative towards Affordable Transportation (SATAT) . . . 46
5.5 Energy Transition in India 47
5.5.1 Critical Energy Transition Minerals 48
6. Conservation efforts 49
6.1 Definition of Forest 49
6.2 Community Forest Governance . 49
6.3 Wildlife Conservation and Protection 50
6.3.1 Project Tiger 50
6.3.2 The Wildlife (Protection) Amendment Act, 2022. . . . 51
6.3.3 Human-Wildlife Conflict . . 52
6.3.4 Wildlife Crime 53
6.3.5 COP 14 to the Conservation of Migratory Species of Wild Animals 54
6.3.6 Coral Bleaching 55
6.3.7 UNESCO World Heritage Sites 56
6.4 Wetland Conservation in India . . 57
7. Disaster Management 58
7.1 Infrastructure Resilience 58
7.2 Heatwave Management in India 58
7.3 Earthquake Management in India 59
7.4 Landslide Management in India . 60
7.5 Crowd Disaster Management in India 61
7.6 Fire Safety Regulations in India . . 62
7.7 Forest Fires in India 63
7.8 Industrial Safety. 64
7.9 Oil Spills 64
7.10 Dam Safety in India 65
7.11 Environmental Cost of War. . . . 66
8. Geography 68
8.1 India Meteorological Department (IMD) 68
8.2 El-Nino - Monsoon Link 69
8.3 Triple Dip La-Nina. 70

Dear Students,

In the competitive landscape of the UPSC Mains examination, the **significance of integrating data, facts, examples and government initiatives** into your answers cannot be overstated.

These elements serve as the backbone of a compelling and persuasive response, **elevating your answer from a generic narrative to a well-substantiated argument.**

To support you, we have **distilled essential information from the VisionIAS Mains 365 resources** which are renowned for their comprehensive coverage of current affairs. This document pr**ovides a concentrated source of high-quality data, facts, examples and government initiatives.**

The layout of this document is designed for **quick reference and easy integration into your answer.**

Leveraging this distilled information will help you **craft comprehensive, informative, and compelling answers** essential for securing higher marks.

1. Climate Change

1.1 COP28

Why in the news?

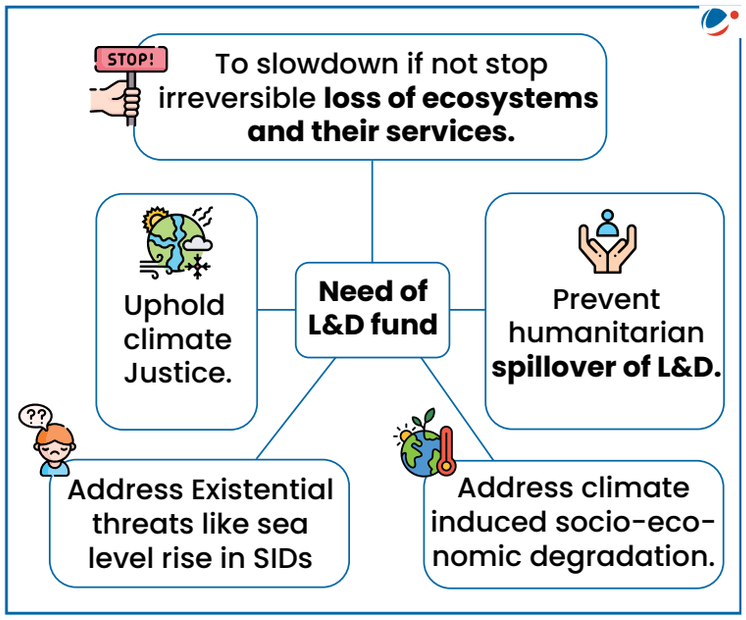
28th COP of the UNFCCC was held in Dubai (UAE) and adopted the final document called **UAE Consensus**

Key Outcomes

Major decisions	Pledges/Declarations	Initiatives
◇ **Global Goal on Adaptation-UAE Framework** for Global Climate Resilience adopted. ◇ Conclusion of **First Global Stocktake of the Paris Agreement.** ◇ Operationalization of **Loss and damage fund.**	◇ Global Renewables and Energy Efficiency Pledge (India not a signatory) ◇ Declaration on a **Global Climate Finance Framework** ◇ Global Cooling Pledge ◇ Oil and Gas De-carbonization Charter, etc.	◇ Global Green Credit Initiative by India ◇ Gender-Responsive Just Transitions and Climate Action Partnership; etc.

Issues	Way forward
◇ **No agreement on rules for global carbon market.** ◇ **Insufficient climate finances** for adaptation purpose. ◇ Promotion of marine geo-engineering technologies **ignores environmental harm** ◇ **Green-washing and oil-and-gas lobby** influence concerns ◇ India's concern » Refusal to sign **COP28 Declaration on Climate and Health** (growing demands for medical services) » Emphasis on **"equity and justice"** in UN climate negotiations. » Refused to sign Green energy pledge, **as cuts must be on all fossil fuel, not just Coal.**	◇ Developed countries should **aim for USD 100 billion/year** climate mitigation by 2025. ◇ **Precautionary principle** is crucial for geo-engineering technologies. ◇ Relying on financial mechanisms like **GEF for capacity-building support.**

1.1.1 Loss and Damage



Why in the news?

The loss and damage fund was officially operationalized.

Loss and damage (L&D) fund

- Refers to compensation for climate change impacts by **rich industrialized nations to poor nations.**
  - L&D refers to impacts of climate change that cannot be adapted to and cause permanent losses.
- **Based at the World Bank** but managed by an **independent secretariat.**
- First announced at **COP27 in Egypt (2022).**
  - Warsaw International Mechanism was established at COP19 **(Warsaw, Poland)** to address L&D in developing countries.
- **India supports the fund** but suggested not to limit it to Small Island and least developed nations.

Challenges	Way forward
◇ Lack of a **universally agreed definition.** ◇ **Poor data availability and processes** for systematic L&D information collection. ◇ **Low pledges** compared to annual funding requirements. ◇ **Low technical capacity,** especially in developing countries, for scientific modelling L&D. ◇ **Difficulty quantifying** nontangible L&D like non-economic losses.	◇ Build on **COP28 UAE consensus on definition.** ◇ **Focus on climate change resilience** through flood defenses, etc. ◇ **Implement mitigation and adaptation** actions for L&D. ◇ Incorporate **L&D in national and international climate action policy.**

1.2. India and Climate Action

India's Climate targets

- **Quantitative targets under Nationally Determined Contributions (NDCs) submitted to UNFCCC**
- **To reduce Emissions Intensity of its GDP by 45**% by 2030, from 2005 level.
- To **achieve about 50% cumulative electric**
- **Panchamrita targets announced at COP 26-Glasgow**
- Achieve target of **net zero by 2070.**
- Increase **non fossil energy** capacity **to 500 GW by 2030.**

power installed capacity **from non-fossil fuel**-based energy resources by 2030. ◇ To **create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent** through additional forest and tree cover by 2030	◇ Meet **50% energy requirements from renewable sources by 2030.** ◇ Reduce **carbon intensity** of economy by **less than 45% by 2030.** ◇ Reduce total projected carbon emissions by **one billion tonnes till 2030.**

Achievements/Progress	◇ **Reduced the emission intensity vis-à-vis its GDP by 33% between 2005 and 2019** ◇ **Achieved 45.5% (203 GW) (June 2024, Ministry of Power)**

Challenges	Initiatives
◇ **Low targets:** E.g., **Panchamrita target of Net zero was not included in NDCs.** ◇ Slow pace of **decommissioning coal-based plants.** ◇ **High GHG emissions:** Among the top 5 methane emitters ◇ **High dependence on import** for renewable energy components ◇ **Institutional bottlenecks** like manpower shortage, etc. ◇ **Lack of sector specific mitigation obligations.**	◇ **National Action plan on Climate Change (NAPCC)** ◇ **Policies:** National Wind Solar hybrid policy, National biofuel Policy, etc. ◇ **Schemes:** PM-KUSUM, Solar rooftop programme, etc ◇ **Tax concessions and incentives** such as PLI scheme for renewable sector. ◇ **Net Zero target by 2030 by Indian Railways.** ◇ **International:** International Solar Alliances (ISA), etc.

1.2.1 Green Credit Program

Why in the news?

MoEFCC notified rules for **Green Credit Program (GCP) 2023.**

About Green Credit

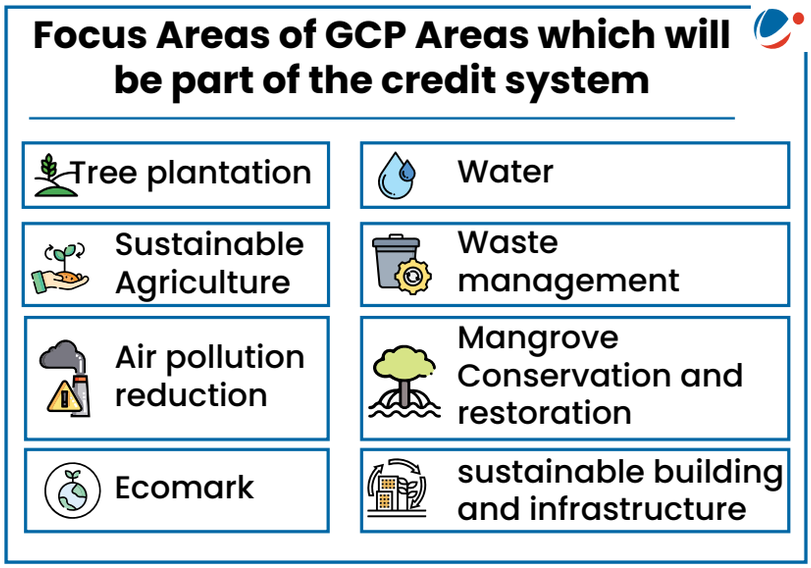
A single incentive unit for a specific activity, promoting environmental benefits, can be traded on a dedicated exchange, similar to carbon credits.

Green Credit	Carbon Credit
◇ Under **GCP** operating under **Environment (Protection) Act, 1986.**	◇ Under **Carbon Credit Trading Scheme** operating under **Energy Conservation Act, 2001.**

◇ Provides advantages to **individuals and communities.**	◇ Primarily **benefit industries and corporations.**
Green credit activities may qualify for carbon credits, but not vice versa.	

About GCP

- **A market-based mechanism to incentivise environment positive actions by different stakeholders.**
  - » GCP **shall be based on voluntary participation.**
- **Aim:** Aligned with **'LiFE' initiative and encourages industry.**
- **Established** under **"The Environment (Protection) Act, 1986"** with MoEFCC as Nodal Agency.
- **Governance Structure:** Inter-ministerial Steering Committee and **Indian Council of Forestry Research and Education** as GCP Administrator.



Key Highlights of rules

- **Forest Departments of State/ UT must identify degraded land parcels for green cover enhancement.**
  - » Focus on **eco-restoration of degraded forests** in GCP plantation.
- **Tree planting based on site characteristics.**
- **Eco-restoration activities include shrub, herb, grass plantation, soil and moisture conservation.**
- ICFRE mandates **tree plantation within two years.**
- **Other rules:** Include preference to indigenous species, high-quality seedling plantation, and seedling retention.

Concerns

- Difficulties in calculating and standardizing measurable outcomes.
- Long-term feasibility of credits.

1.2.2 Carbon Credits Trading Scheme (CCTS), 2023

Why in the news?

Ministry of Power announced reforms in CCTS.

About CCTS,2023

- **CCTS aims to develop the Indian Carbon Market framework,** under **the Energy**

Conservation Act, of 2001.

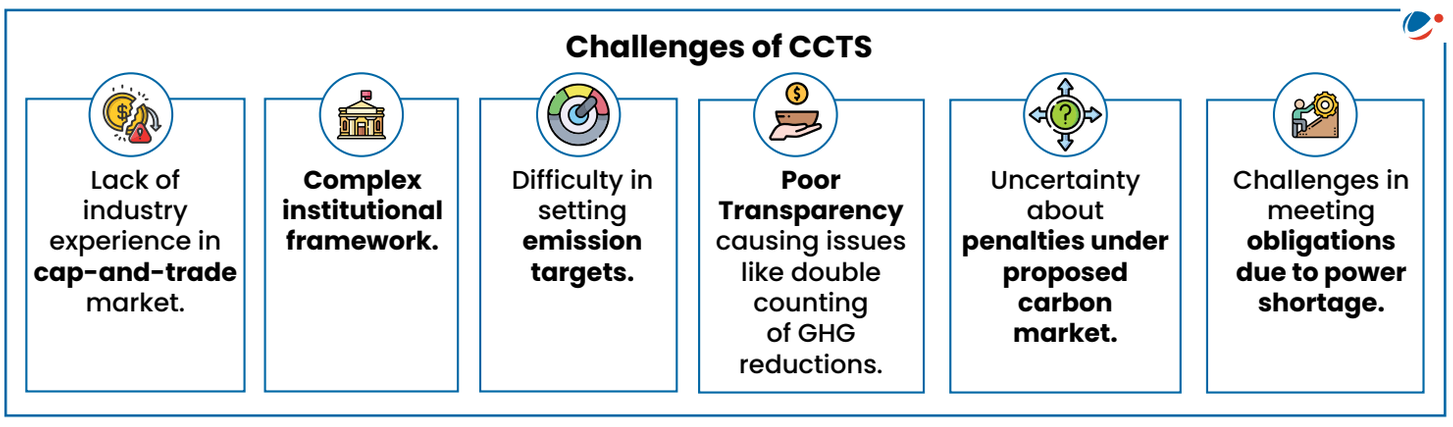
- Aims to establish a **carbon credit trading market.**
  - **Tradable permit** that equals one tonne of carbon dioxide removed, reduced, or sequestered from the atmosphere.
- **Key Features**
  - Specifies the structure of the Indian Carbon Market.
  - **Creation of accredited carbon verification agencies.**
  - Compliance Mechanism determined by the Ministry of Power.
  - **Institutional framework:**
    - **New National Steering Committee** for Governance and monitoring
    - **Bureau of Energy Efficiency** as the administrator.
    - **Central Electricity Regulatory Commission** for trading matters.
    - **Grid Controller of India Limited** for entity registry.

Major reforms

- **Bureau of Energy Efficiency** develops standards and registers projects under an **offset mechanism.**
- BEE "validates" carbon credits, not just "verification."
- Allows **'non-obligated entities'** to register decarbonization projects and generate carbon credits.

Significance

- **Deepen** Indian carbon credit market.
- Eliminate need for **overseas standards agencies.**
- **Foreign decarbonisation projects** might choose India for certification.



Way forward

- Establish **transparent,** well-defined methodology.
- Develop **fungibility provision for unit trading** to attract voluntary buyers.
- **Streamline and strengthen** institutional structure**.**

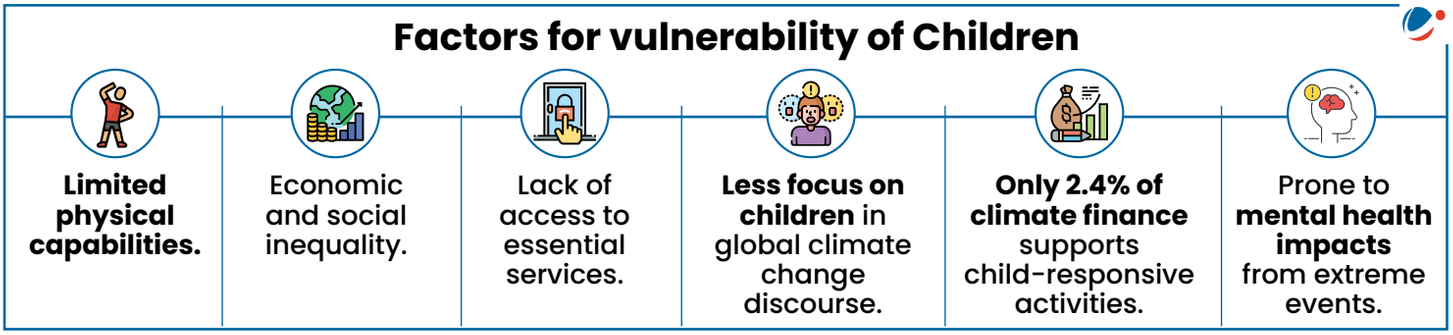
1.3 Climate Change Impacts

1.3.1 Impact on Vulnerable Sections

On Children

Impact ('Children Displaced in A Changing Climate' Report by UNICEF)

- **6.7 million children displaced** in India (Between 2016-2021).
- ~ 1 billion children exposed to high or extremely **high-water stress.**
- 20% of girls and 5% of boys in Ethiopia **miss school to fetch water.**



Way Forward/Mitigation: UNICEF's 'Children Displaced in A Changing Climate' 3P-Approach.

- **Protect child**-critical services for shock-responsiveness, portability, and inclusivity.
- Prepare by improving adaptive capacities, resilience, and participation.
- **Prioritize** children and young people in climate, humanitarian, and development policy, action, and investments.

On Women

Impacts

- Face higher food poverty than boys.
- **Threatens women's livelihood** e.g., women making up 43% of agricultural labor in developing countries.
- Only **2% of gender-tagged** international adaptation finance is gender-responsive.
- **Societal norms and caregiving responsibilities** hinder women's mobility during disasters.
  - **UNDP-Women and children are 14 times more likely to die during disasters.**
- **80% of people** displaced by climate change are **women.**

Role in Climate Action	Way Forward
◇ Utilising **women's traditional knowledge** and experience. ◇ Women act as **first responders** ◇ Improve **Climate investments** ◇ **Positive linkage** between women's political leadership and action to tackle climate change.	◇ **Address Gender-Specific Impacts.** ◇ Implement **dedicated financing mechanisms.** ◇ Promote gender-responsive technology. ◇ **Integrate gender perspectives into mitigation and adaptation** actions through gender-aware, **gender-sensitive, gender-responsive, and gender-transformative policies.**

On Elderly Population

Impact

- Increased susceptibility to **heat-related illnesses and mortality.**
  - **70% rise in heat-related deaths among over 65 in two decades.**
- **Increased social isolation** due to family migration and displacement.
- **Economic hardship and loss of essential resources** due to extreme weather events.

Way forward

- **Increase awareness** through targeted educational programs and outreach efforts.
- Provide seniors with **targeted resources** such as accessible infrastructure, transportation options, etc.

On Rural Poor

Impact

- **Economic Impact:** Poor households lose 5% of total income annually due to heat stress.
- Cause **property damage, livelihood loss, and economic setbacks.**
- **Increased healthcare costs** and reduced earning potential.

Mitigation

- **Climate Justice** by mobilizing fund through Green Climate Fund.
- Empowering local communities through **WWF's conservation strategies.**
- Implementing **UN's climate finance recommendations** for marginalized groups.

1.3.2 Impact on Health

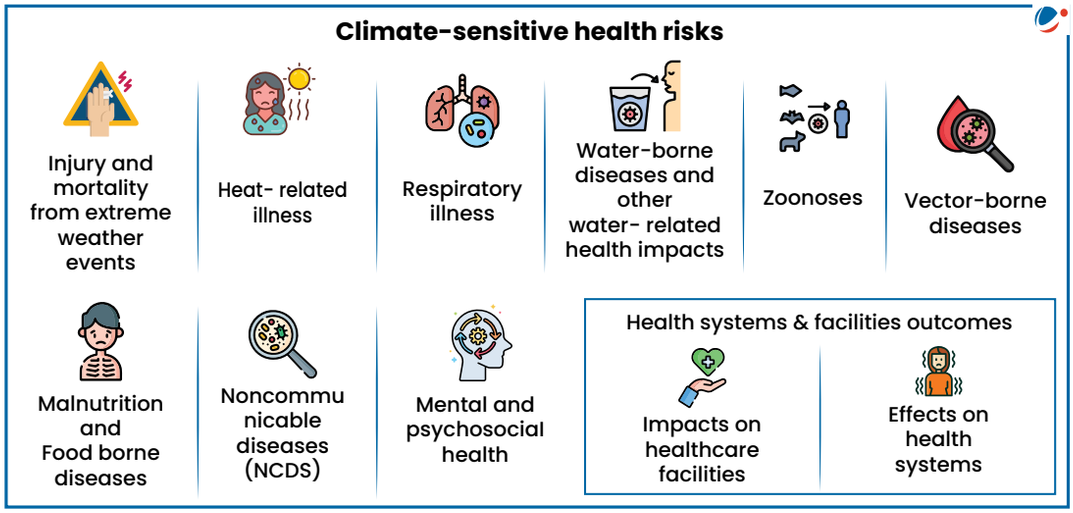
Impact

- **Extreme Heat: Potential income loss $863 billion** due to reduced labor capacity in 2022.
- Annual rise in pollution-related morbidities: **9 million deaths.**
- **Exposure to extreme weather events:** 189 million people.

Constraints

- **Financing gap** for climate change impact of health.
- **Low income countries** are highly vulnerable as they have poor infrastructure etc.
- **Underutilisation of climate information** in health actors.

- **Other issues:** Research and knowledge gaps, lack of access to sufficient local meteorological observations; Insufficient human and institutional capacity, etc.



Steps taken

- **Global: COP28 UAE Declaration** on Climate and Health unveiled(India yet to sign); **Annual World Health Summit** in Berlin, Germany.; **WHO initiatives**-Alliance for Transformative Action on Climate and Health (ATACH).
- **India: National Action Plan on Climate Change and Human Health; Environmental health surveillance; National Health Mission funds** for Green/Low carbon emission measures; **Indian Public Health Standards 2022.**

Way Forward

- **One health approach**
- **Build climate-resilient, low-carbon sustainable** health systems.
  - » Develops in-country capacities for **local knowledge improvement.**
  - » **Mandates collaboration** between health and meteorological actors.
  - » **Raised awareness** about climate information importance.

1.4. Mitigation and Adaptation

1.4.1 Greenwashing

Why in the news?

Draft Guidelines on **Prevention and Regulation of Greenwashing** issued under **Consumer Protection Act, 2019.**

Green washing

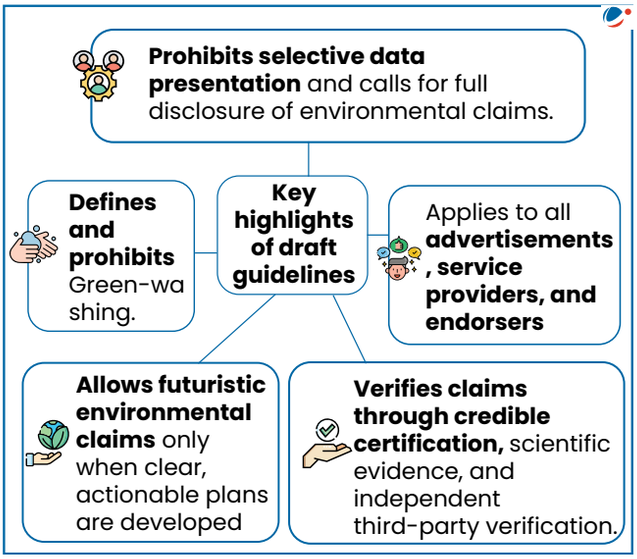
- It involves **making a product or policy seem more environmentally friendly** or less damaging than it is in reality.
- **Types of Green-washing:** Greenhushing; Greenrinsing; Greenlabeling; Greenlighting; Greenshifting; Greencrowding.

Need

- **Erosion of public trust** due to deceptive marketing and false sustainability claims.
  - » E.g.,-Volkswagen for manipulating emission tests in its Clean Diesel cars.
- Delays genuine solutions due to false environmental claims.
- **Impact on Innovation**

Initiatives

- **India:** Bureau of Indian Standards developed IS/ISO 14024:1999; **Consumer Protection Act, 2019 regulates consumer rights violations and misleading advertisements; Advertising Standards Council of India** guidelines; **SEBI's Business Responsibility and Sustainability Reporting** norms and green bond dos/don'ts.
- **Global:** UN's High-Level Expert Group on Net-Zero Emissions Commitments of Non-State Entities; Green-washing TechSprint etc.



Way-Forward

- **Annual publication** of greenhouse gas emissions and **Third-Party certification.**
- **Utilization of AI, NLP, Machine Learning** for green-washing.
- **Cross-border collaboration** among stakeholders.

1.4.2 Sector specific Decarbonization

Transport Sector

Emission from India's Transport Sector

- **14% of energy-related** CO2 emissions.
- **3rd most** GHG-emitting sector.
- **Emission growth of 375%** between 1990-2019

India's Initiatives

- **Targets:** 45% rail freight mode share by 2030; 30% EV market share by 2030.
- **Bharat Stage VI** Emission Standards.
- **20% ethanol blend** in petrol by 2025.
- **FAME India and PM-eBus Sewa** Scheme.

Challenges

- **Issue in Adoption:** High cost of new technologies and charging infrastructure; Consumer hesitancy due to high cost, safety concerns.
- **Low focus on fuel standards.**
- **Fossil fuel's share is still high** (43% of total installed capacity).

Way Forward

- **Avoid, Shift, Improve Strategy:**
  - Transition to **sustainable mobility** to reduce energy consumption.
  - Transition to clean energy in transport sector to cover remaining demand.
  - **Large-scale transport transformation** to ensure carbon neutrality by 2050.
- **Strategic investments and innovative financial solutions** for accelerated transition to 100% zero-emission vehicles.

Agrifood systems

Emissions

- Contribute to 1/3rd of global GHGs

Initiatives

- National Mission for Sustainable

◇ India among Top 3 emitters of agrifood emissions.	Agriculture ◇ Paramparagat Krishi Vikas Yojana ◇ Gobardhan scheme.
Challenges ◇ **Low project level financing** (only 4.3%) ◇ **High fossil fuel usage** (At least 15% of global fossil fuels use annually).	**Recommendations** ◇ Annual investments must **increase to $260 billion a year** to halve emissions by 2030 and **reach Net Zero emissions by 2050.** ◇ **Repurposing harmful subsidies.** ◇ **Use Innovative mitigation** technologies like **chemical methane inhibitors, feed additives from red seaweed,** etc.

Shipping Industry

Emission (UNCTAD's Review of Maritime Transport 2023 Report) ◇ International Shipping emissions increased by **20% in the last decade.** ◇ Shipping industry accounts for **nearly 3% of global GHG emissions.**	**Initiatives** ◇ International Maritime Organization aims for **net-zero GHG emissions by 2050.** ◇ Implementing measures such as the **Energy Efficiency Existing Ship Index, MARPOL Treaty, Hong Kong International Convention, and Harit Nauka Initiative.**
Challenges ◇ **Only 1.2% of global fleet** uses alternative fuels. ◇ **High Cost of retrofitting** existing fleet.	**Recommendations: UNCTAD's 2023 review recommends** ◇ **Fuel transition** and equitable decarbonisation process. ◇ **Assessment of alternative fuels** and vessel designs. ◇ **Reform and investment** in port efficiency and performance.

1.4.3 Short-Lived Climate Pollutants (SLCPs)

Why in the news?

Climate and Clean Air Coalition's (CCAC) annual meeting took place in Nairobi, Kenya.

About CCAC

- Only global alliance for **reducing short-lived climate pollutants (SLCP).**
- **India** joined in 2019.
- **Key outcomes:** Launch of Clean Air Flagship, CCAC Technology and Economic Assessment Panel.

SLCP

- Climate forcers that remains in atmosphere for short period than carbon dioxide but have greater impact.

Impact

- **2nd largest contributor** to human-caused climate warming, contributing up to 45% of global warming.
- Impacts human health like causes Asthma.
- **Influences weather patterns,** affecting cloud formation.
- **Accelerates ice melt** due to black carbon deposition.
- **On Agriculture**- E.g., Tropospheric ozone harms vegetation by damaging leaves.

Short-lived climate pollutants (SLCPs)

SUBSTANCE	ANTHROPOGENIC SOURCES	LIFETIME IN ATMOSPHERE
CO_2 **Black carbon (soot)**	Fossil Fuels, Industrial Production, Agricultural and Waste Burning	4-12 days
CH_4 **Methane (CH4)**	Agriculture, Fossil fuels, landfills, open dumps, and wastewater	12 years
O3 **Tropospheric (or ground-level) ozone (03)**	**Secondary pollutant formed** by the interaction of sunlight with volatile organic compounds (VOCs) and nitrogen oxides (NOX)	few hours to a few weeks
F, C, H, H, H **Hydrofluorocarbons (HFCs)**	Refrigeration, air-conditioning, insulating foams and aerosol propellants	15 years

Sector-wise Solutions

- Promote **farm-scale anaerobic digestion** in agriculture.
- **Pre-mining de-gasification** and recover methane from coal mine ventilation air.
- **Turn biodegradable municipal waste** into compost or bioenergy.
- Replace traditional cooking with **clean-burning.**

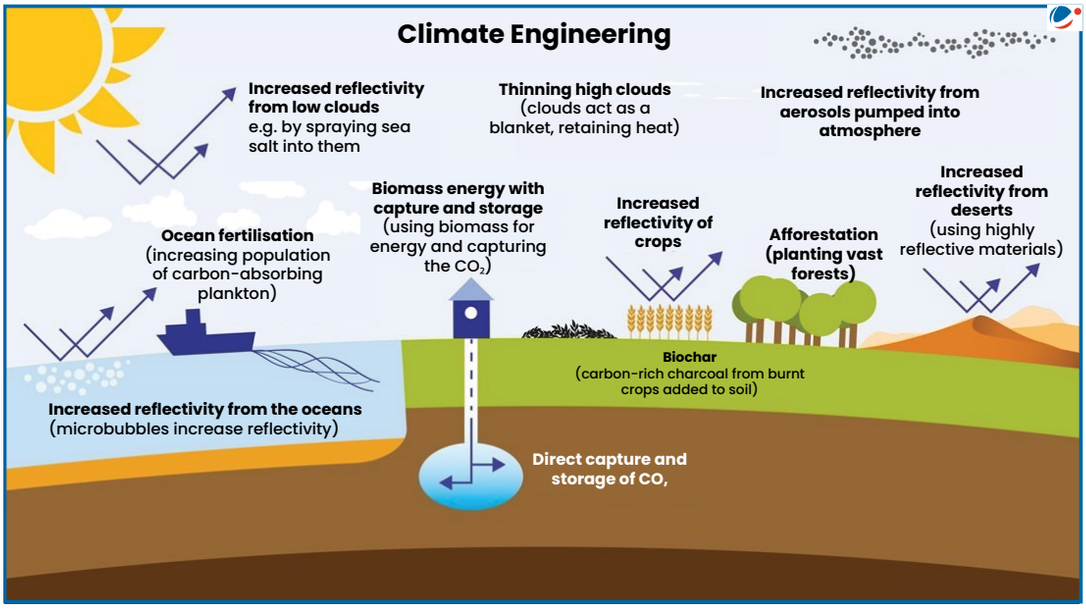
1.4.4 Climate Engineering

Why in the news?

UNESCO released first report on the ethics of climate engineering.

Climate Engineering

- Aims to address global warming by directly intervening in the climate system.
- **Methods:** Carbon Dioxide Removal and Solar Radiation Modification.



- **Significance:** Mimics natural processes, reduces urgency of reducing carbon emissions, addresses climate policy gap.

India's Initiatives

- DST supports **climate modelling research at IISc.**
- Launched **Major Research and Development Program (MRDP)**
- **Indian Institute of Tropical Meteorology** develops Earth system model for solar geo-engineering simulations.

Potential Risks	UNESCO's Recommendations
Environmental: May impair ecosystem self-regulation, adversely impact ozone layer, rainfall, crop production, ocean acidification. **Economic:** High cost, can exacerbate global inequalities. **Ethical:** Organized irresponsibility, low transparency, violates distributive justice. **Moral hazard:** Provides an excuse to not reduce fossil fuel use.	**Introduce legislation regulating climate action** and banning weaponization of climate engineering techniques. **Participation and inclusiveness** of marginalized groups. **Promote open collaboration and constant monitoring** of climate actions. **Strengthen institutional, technological, and ethical capacities** in climate action.

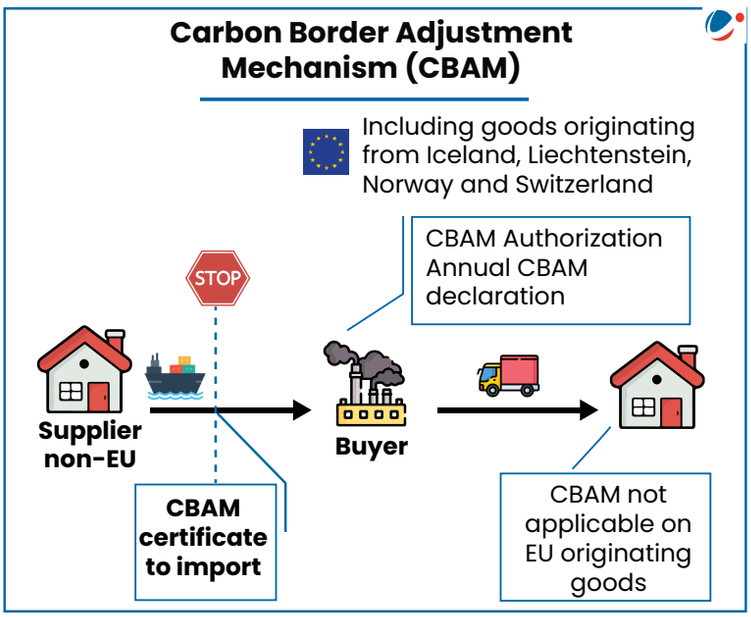
1.5 Carbon Border Adjustment Mechanism

Why in the news?

Green energy will help industry deal with EU's Carbon Border Adjustment Mechanism (CBAM) as per Ministry of Commerce and Industry.

About CBAM

- A policy instrument to **price carbon emitted from carbon-intensive goods** entering the EU.
- Complies with **WTO rules.**
- Functions like a **non-tariff barrier for Indian exports.**
- **Potential impact on India's exports,** with 27% of exports worth USD 8.2 billion going to the EU in 2022.



India's Approach to deal with CBAM

- Adoption of **low-carbon technologies** and production methods.
- Promotion of decarbonization through **Green Hydrogen** and **Solar Missions.**
- **Negotiation with EU** to exclude MSMEs.

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Quick Facts

Quick Facts: Mains 365 is perfect for those final moments before the exam when you need to quickly revise key facts, and examples. Whether it's a key statistic, an important fact, or a critical piece of data, Quick Facts ensures that you have high-impact information at your fingertips, ready to use during the exam.

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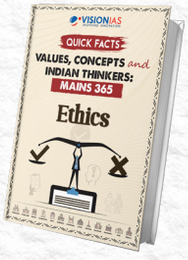
Quick Facts: Mains 365 **Environment**



Scan to Read

Quick Facts: Mains 365 **Ethics (Values and Indian Thinkers)**

AHMEDABAD BENGALURU BHOPAL CHANDIGARH DELHI GUWAHATI HYDERABAD JAIPUR JODHPUR LUCKNOW PRAYAGRAJ PUNE RANCHI

2. Air Pollution

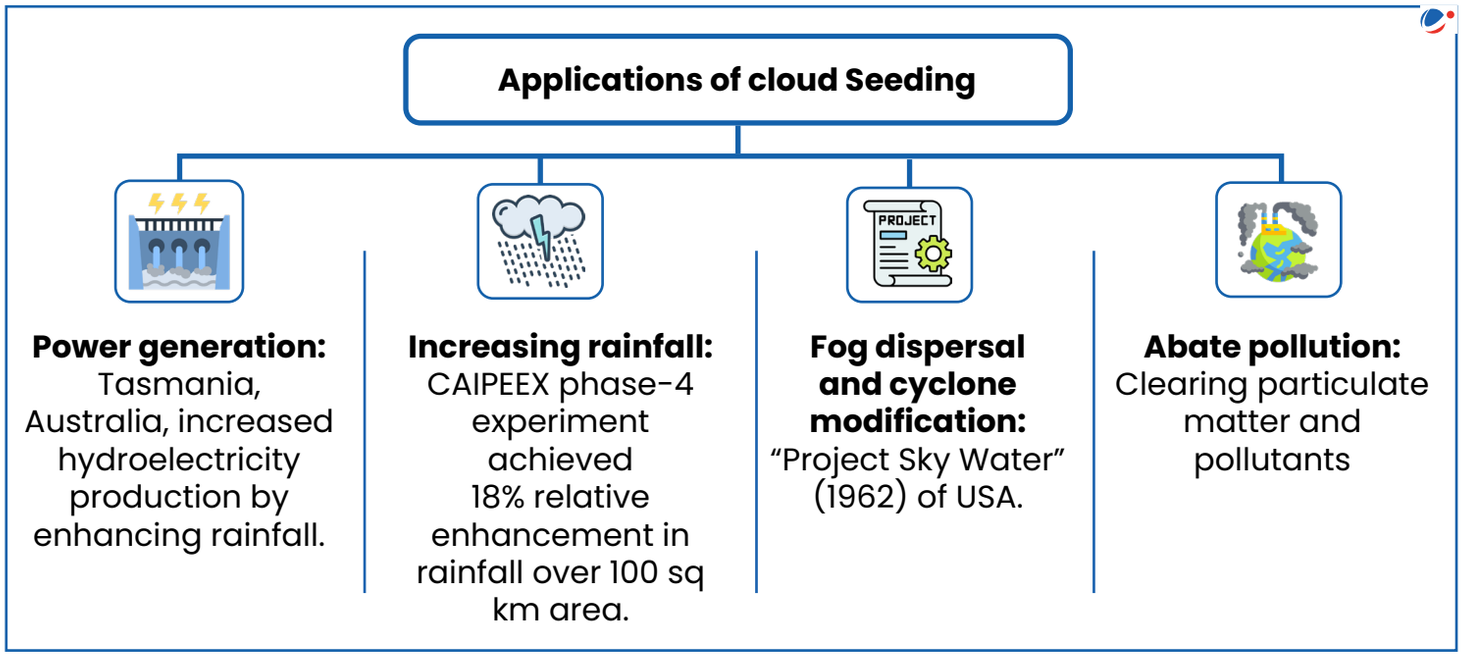
2.1. Cloud Seeding

Why in the news?

Researchers discussed the possibility of **using cloud seeding to tackle Delhi's air pollution.**

About Cloud Seeding

- **A weather modification technique** to enhance precipitation.
- Uses chemicals like silver iodide, potassium iodide,etc.
- **Conditions**
  - Requires **deep clouds** with **suitable temperature** (-10-12 degrees Celsius).
  - Clouds should cover **at least 50% of target area**
  - Requires **relative humidity over 75%.**
  - Clouds should hold **super-cooled liquid water**



Issues

- Potential **toxicity to aquatic life.**
- **Ethical and legal issues:** Water rights, human intervention.
- **Other issues:** Abnormal weather, high cost

Conclusion

Collaboration between scientists, policymakers, and the public is underway to establish clear guidelines, ethical standards, and regulatory frameworks for cloud seeding projects.

How Cloud Seeding Works

1. Silver iodide is released by a plane or ground-based generator
2. Silver iodide particles reach the targeted cloud
3. Silver iodide aids in the formation of ice crystals
4. Now too heavy to remain in the air, the ice crystals then fall, often melting on their way down to form rain

2.2 National Clean Air Programme (NCAP)

Why in the news?

NCAP launched in 2019, completes 5 years.

NCAP Overview

- **Aim:** To improve air quality in 131 cities in 24 states.
  - » Identifies cities exceeding National Ambient Air Quality Standards for 5 consecutive years.
- **Targets:** Achieve reductions up to 40% of PM10 and PM2.5 concentrations by 2025-26, base year 2017.
- **Implemented by:** CPCB at national level, with City Action Plans implemented by state and municipal bodies.
- **Swachh Vayu Survekshan** ranks cities based on air quality improvement.
- **Launched PRANA** to monitor NCAP implementation.

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.**

Challenges	Way Forward
◇ **Insufficient air quality monitors** (only 931 vs targeted 1500 by 2024).	◇ **Adopt standardized** air quality monitoring method.
◇ **Poor data capture** due to substandard monitoring stations.	◇ Coordinate government **fiscal response.**
◇ **Less than 50% utilization of NCAP funds.**	◇ Provide legal mandates for compliance.
◇ **Lack of clear state-level fiscal and funding strategy.**	◇ Catalyze **private sector action** and improve stakeholder cooperation.

3. Water and Land Degradation

3.1 The Water (Prevention and Control of Pollution) Amendment Act, 2024

Why in the news?

Parliament recently passed the Water (Prevention and Control of Pollution) Amendment Act, 2024.

More on the news

- Water (Prevention and Control of Pollution) Act 1974 Amendment
- **Applicable** in Himachal Pradesh, Rajasthan, and Union territories.
- Water is a **state subject, Article 252** allows Parliament to legislate on matters lacking legislative power.

Key Amendments (Water Amendment Act, 2024)

Key Aspects	Water Act, 1974	Water Amendment Act, 2024
Chairman of SPCB	◇ **Nominated by the State government.**	◇ **Central government** to prescribe manner of nomination, terms and conditions of service.
Consent exemptions for establishing industries	State Government may **"exempt certain categories of industrial plants"** and empowered to issue guidelines on matters relating to grant, establishment of any industry, etc.	◇ **Central government, in consultation with the CPCB** ◇ **Central government may issue guidelines**
Penalty for offences	◇ **Imprisonment of up to Six years** for discharge of polluting matter.	◇ Act **decriminalises** several violations, and instead imposes penalties of ₹10,000-₹15 lakh.
Offences by government departments	The head of a department will be deemed guilty for offences	Head of a department will be required to pay penalty equal to one month of their basic salary if the department violates any provision of the Act.

Other changes:

- **Penalty for Tampering with Monitoring Devices.**
- Central government to appoint **Adjudicating officers** for penalty determination.
- Penalties credited to **Environment Protection Fund.**
- **Appeal:** To National Green Tribunal after depositing 10% of penalty.

Significance of Amendments

			
Discriminalization for Trust-Based Governance and ease of living and business operations	Reduced Regulatory Burden	Streamlined Appointment Processes	Balancing Development and Environment Protection

- **Criticism of Amendments:** Penalties ineffective due to logistical and cultural challenges; Ignorance of climate and water crisis; Negative impact on future economy; Federalism affected due to limited state powers.
- **Conclusion:** Stakeholder engagement and training programs for Pollution Control Boards are crucial for refining amendments and addressing environmental concerns, as well as enhancing effective enforcement of regulations.

3.2 Urban Water Crisis in India. Urban Water Crisis in India

Why in the news?

Bengaluru city witnessed its worst water crisis in decades.

Water Crisis Overview

- Refers to **inadequate access** to clean, safe water.
- Climate change and drought conditions are causing water scarcity, referred to as **'Day Zero'.**

Key Initiatives

- **National Water Mission** for integrated water development.
- **Urban River Management Plans (URMPs)** project approved by NMCG for 60 cities.
- **"Women for Water, Water for Women"** campaign launched during Jal Diwali.
- **"Catch the Rain"** campaign by Jal Shakti Abhiyan.

Reasons for Urban Water Crisis

- **High demand** due to rapid urbanization.
- **Limited resources** with 18% of world's population living in India.
- **Poor groundwater** recharge due to unplanned concretization.
- **Pollution of water bodies** like Bellandur Lake.
- **Over-extraction** of groundwater, affecting 48% of urban water supply.
- **Poor water supply infrastructure** including distribution networks, treatment plants, and storage facilities.

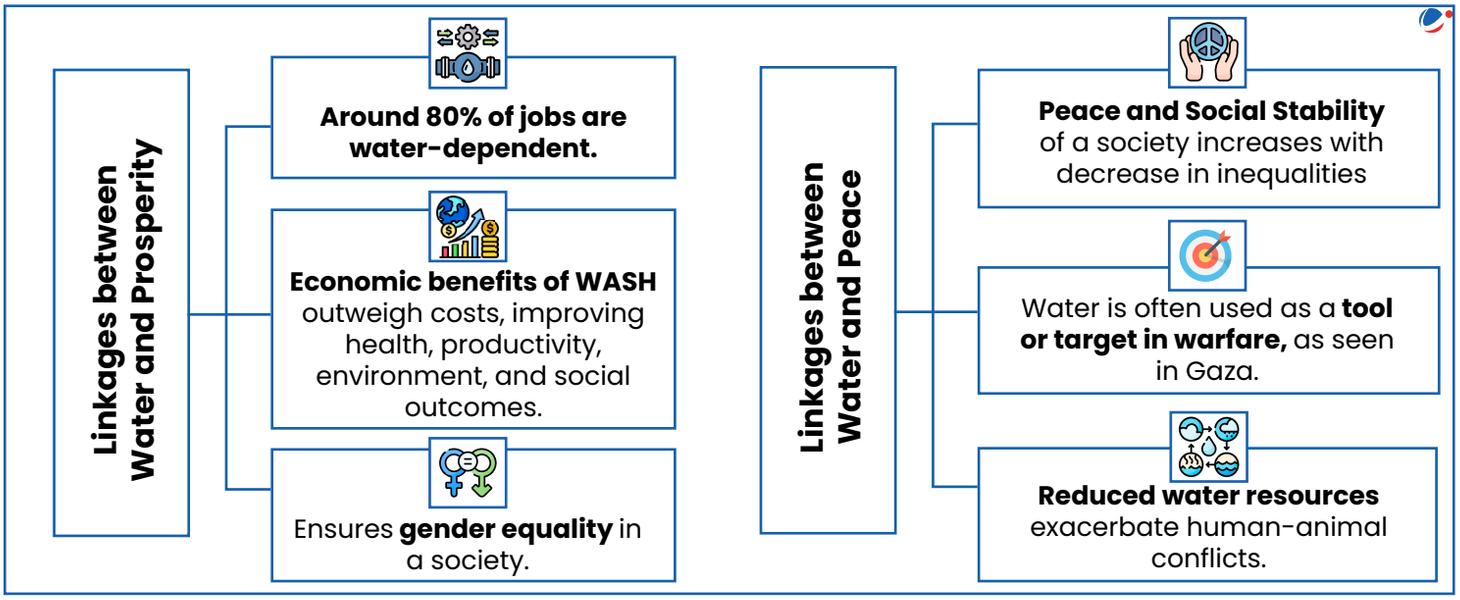
Way forward

- **Nature-based solutions:** Green-blue infrastructure and wetlands restoration.
- Promotion of **sustainable water management techniques** like Shallow Aquifer Management.
- **Community-based solutions** like community education campaigns in Orange County, California.
- **City to City learning in water governance.**
- **Leveraging the private sector.**

3.3 Water for Prosperity and Peace

Why in the news?:

"UN World Water Development Report: Water for Prosperity and Peace" report was released by the UNESCO World Water Assessment Programme (WWAP) on behalf of the UN-Water.



Challenges	Way forward
◇ Middle- and lower-income countries need water for **economic growth.** ◇ Water pollution evolves with **country's development.** ◇ Only **32/153 countries have operational arrangements** for trans-boundary waters. ◇ Increased water consumption with **new age technologies.**	◇ Focus on **responsible water governance.** ◇ **Leverage WASH** as a 'politically neutral' service system. ◇ **Decouple** water from industrial productivity. ◇ Promote **trans-boundary water management.** ◇ Shift from volumetric water sharing to **resource outcomes sharing.**

3.4 Namami Gange Programme (NGP)

◇ **About NGP: Integrated Conservation Mission** to achieve the twin objectives **of effective abatement of pollution, conservation, and rejuvenation of River Ganga.**

Type: Central Sector Scheme
Duration: Till March 2026
Implementing Agency: National Mission for Clean Ganga (NMCG) and state counterparts—State Programme Management Groups.
Major States covered: Uttarakhand, UP, Jharkhand, Bihar and West Bengal.

Achievements	885 out of 1072 Grossly Polluting Industries (GPIs) brought under **CPCB's Online Continuous Effluent Monitoring Stations (OCEMS).**
	Median value of **Dissolved Oxygen** (indicator of river health) within acceptable limits as per 2022 survey.

Challenges	Way forward
◇ **Slow pace:** only 232 out of 409 projects made operational. ◇ **Low capacity: Waste treatment** plants of treating just 20% of estimated sewage in 5 major states. ◇ **High cost:** of installation and maintenance, ◇ **Poor financial management:** Only 14,745 cr of allocated funds released by NMCG to State Governments, and other agencies till June 2023. ◇ **Multiple authorities** at national and state levels.	◇ **Verification of existing and planned STPs** by independent agencies. ◇ **New and innovative ways to generate sufficient revenues for** operation and maintenance (O&M) ◇ **Restore local storages** (ponds, lakes, wetlands) ◇ **Mapping and updating of land records**

3.5 Water Trading

Why in the news?

Recently, NITI Aayog released a document on **water trading mechanisms to promote the reuse of treated wastewater.**

About Water Trading

◇ A **water market mechanism** that considers **water as a commodity rather than public good which** can be **traded.**

Need for reuse of treated wastewater through water trading

- **Tackling Urban water Pollution** (about 40% of urban wastewater is treated in India)
- **Unequal Spatial distribution** (80% rainfall during the four months of the year).
- **National Water Policy, 2002 and 2012** emphasizing on public-private partnership
- **Tackling water scarcity** (80% people living under water stress lived in Asia, UN World Water Report, 2023)
- **Overuse of water in Indian Agriculture** as India is a large virtual net export of water.

Challenges	Way forward
◇ **Fixing appropriate price** of treated **wastewater** ◇ **Storage** of wastewater generated due to fluctuating **demand.** ◇ **Identification/creation of demand** to make water/treated wastewater a tradable commodity. ◇ **Disruption of supply** due to maintenance of plant, disruption in sewage network, etc. ◇ In India, water is neither considered a commodity **nor possesses any significant economic value.**	◇ **Formation of Independent Regulatory Authority (IRAs)** with statutory powers to determine **water allocation and pricing of treated wastewater.** ◇ **Creating a trading platform and fixing the reuse target.** ◇ **Identification of Industrial Clusters, Municipal/Residential units, Agriculture lands,** where the treated wastewater could be reused. ◇ **Preparation of site-specific plans for reuse** using GIS tools.

World's Best Practices in Water Trading: Australia (Murray Darling Basin) **Spain** (Water market exchanges)**; South Africa** (enables reallocation of existing water rights).

3.6 Land Degradation

◇ **About:** It is the **reduction in the capability of the land to produce benefits** from a particular land use under a specified form of land management (FAO, 1999).

Current situation	Targets
◇ **India:** ~29.7 per cent degraded land (ISRO Atlas, 2021). » **21 tonnes/ha/yr** potential soil loss. **(IIT-Delhi Study)** ◇ **World:** » **75%** of the **original carbon stock** of world's cultivated soils lost. » **LDN target** to restore degraded land reached **one billion hectares by 2030.**	◇ **India: Land Degradation Neutrality target:** Committed to restore 26 million hectares by 2030. ◇ **Global:** » **Global Land Initiative: halve** land degradation by **2040 by G 20.** » **Bonn Challenge** to **restore 150 million** hectares of degraded and deforested land by **2020** and **350 million hectares** by **2030.**

Significance of conserving soil				
 **Supports Agriculture and Forestry**	 **Highly efficient carbon sinks:** After oceans, world's soils are the second largest carbon pool on Earth	 **Supports biodiversity:** Plays host to some **25% of our planet's biodiversity**	 Contribute to **water, nutrient and nitrogen cycling**	 Foundation of **basic ecosystem functions** and helps **regulate Earth's temperature.**

Initiatives

- **Global:** Legally binding **United Nations Convention to Combat Desertification (UNCCD):** and its Flagship initiatives-**LDN targets for 2030, Land Degradation Neutrality Fund (LDN Fund).**
- **India: National Action Plan on Climate Change (NAPCC); Desertification and Land Degradation Atlas** of India; **Integrated Watershed Management program etc.**

Challenges	Way forward
- **Rapid land use change for developmental** activities; **Illegal logging, encroachment** of land and **unregulated livestock** grazing and fodder collection. - **Limited knowledge and High capital cost** of restoration program. - **Other:** Extreme **weather conditions,** Excessive Use **of fertilizers and pesticides,** etc.	- Enhancing restoration target to **1.5 billion hectares of global land by 2030** to achieve a **land-degradation-neutral (LND) world.** - **Utilizing Local and indigenous knowledge.** - **Restorative agronomic practices** like natural farming, agroforestry etc. - **Converting wastelands** to productive agroforestry zones - **Regulate soil pollution** as per international agreements/standards like: **Stockholm Convention** and **Basel Convention** etc.

4. Sustainable Development

4.1. Localisation of Sustainable Development Goals

Why in the News?

UN-Habitat released **"Smart Cities Mission, India: Localising Sustainable Development Goals (SDGs)"** Report in collaboration with **Ministry of Housing and Urban Affairs.**

About Localization of SDGs

- It is the process of taking into account **sub-national contexts** in achievement of SDGs.

Benefits of SDG Localisation

Cooperative and Competitive Federalism: healthy competition at sub-national level.

Localised Solutions: as opposed to one-size fits all.

Improved State Capacity: At all levels of Government.

Efforts taken for SDGs localisation

- **'SDG India Index'** by NITI Aayog to monitor the progress of SDGs in states and UTs.

Some Examples of SDG localisation

Bihar	**Viksit Bihar ke 7 Nischay,** includes schemes on inclusion, entrepreneurship, etc.
Bhopal	India's first city-level **Voluntary Local Review (VLR)** of Sustainable Development Goals (SDGs).
Andhra Pradesh	Navaratnalu**, cluster of 9 flagship programmes for vulnerable communities.**

Challenges	Way forward
- **Limited availability of finance, data and capacities.** - **Lack of policy coherence and coordination** at national and local levels. - **Limited funds** transfer and local resource mobilization. - **Local translation and adaptation** in diverse country like India.	- **Break down the goals and implementation** to sub-national and local levels. - **Provide for proper monitoring and evaluation** through effective partnership. - **Help in learning from the shared experiences** and adapt to the global challenges. - **Create awareness on SDGs** in PRIs and empower rural local bodies.

4.2 Unregulated Tourism in the Indian Himalayan Region (IHR)

Why in the news?

Recently, a Parliamentary Standing Committee has recommended the government to prepare a **practical action plan** with clear timelines to put a check on destructive activities in IHR.

Challenges	Way forward
◇ **Large tourists footfall:** About **100 million tourists/year; expected to increase to 240 million by 2025.** ◇ **Waste generation: 8.395 million tonnes per year (MT/Y) of solid waste** generated in IHR (NITI Aayog, 2018) ◇ **Social-Environmental Impact:** Loss of Forests and biodiversity, changing landscape, erosion of cultural-social fabric.	◇ **Planning, implementation, monitoring,** with local community partnerships. ◇ **Inter-departmental convergence.** ◇ **Designing climate-smart infrastructure.** ◇ **Use of Technology-** E.g. multi-hazard zoning, etc. ◇ **Financial interventions** like **'Green Cess'.** ◇ **Others: Environmental audit** of tourism service providers, **eco-labelling, clear zoning of landscape,** etc.

4.3 Sustainable Finance

Why in the news?

'Sustainable finance: bridging the gap in Asia and the Pacific' report was launched by **United Nation Economic and Social Commission for Asia and the Pacific (ESCAP).**

About Sustainable finance

- It refers to the process of taking **environmental, social and governance (ESG) considerations** into account when making investment decisions in the financial sector.
- **Tools:** Green Deposits; Sovereign Green Bonds; Green and Social impact bonds etc.

Status of Sustainable Finance

- **Developing countries face high financing gap** between **$2.5 trillion and $4 trillion** annually (Financing for Sustainable Development Report 2024 by UNDESA)
- Need of USD 3 trillion over the next decade to **finance green growth** (Reshaping Global Finance Architecture for Sustainable Growth by NITI Ayog)

Reasons for high financing gaps	Recommendations
◇ **Rise in systemic risks,** disaster frequency, COVID 19, etc. ◇ Fall in average **GDP growth rates in developing countries to** 4% annually (2021- 2025). ◇ Median **debt service burden** for Least Developed countries (LDCs) rose to 12% in 2023. ◇ **Other concerns:** Digitization induced risks, rising geopolitical tensions.	◇ **Local-currency financing of energy transition projects,** green and inclusive financial systems incorporating vulnerable sections. ◇ **Concessional financing and risk-sharing** by multilateral development banks, etc. ◇ **International Cooperation** e.g., new approach to blended finance for businesses.

Measures taken

Global: Addis Ababa Action Agenda (SDG Summit 2023 by UNGA in 2030)

India: Task Force on Sustainable Finance by Finance Ministry,

Sovereign Green Bonds (Budget 2022-23)

RBI: Sustainable Finance Group

SEBI: New Sustainability Report under Business Responsibiity and Sustainability Report and Blue Bonds.

4.4 Mission LiFE

Why in the news?

As part of Mission **Mission LiFE ('Lifestyle for Environment'),** MoEF&CC conducted awareness activities.

About Mission LiFE

- **India-led global mass movement** to nudge individual & community to protect environment.
- Launched by India at **UN Climate Change Conference (UNFCCC COP26) in 2021.**
- **3 Phases: Change in Demand- Change in Supply- Change in Policy.**

Targets	Atleast **one billion Indians and other global citizens** to take individual and collective action for environmental preservation in 2022 to 2027.
	Atleast **80% of all villages and urban local bodies** to become environment-friendly by 2028.

Expected Impacts of Implementing LiFE

Energy and emissions: Reduce annual **CO2 emissions of 2 billion tonnes** at the world level by 2030.	**Air pollution:** Around 60% of the **reduction in** sulfur dioxide (SO2) emissions from behavioural changes.	**Job Creation:** Create around 17 million **clean energy jobs** globally by 2030	**Investment:** Stimulate about USD 1.6 trillion in clean energy investments

Challenges	Way forward
Idea of Capitalism encouraging competition and mindless consumption for economic growth.	**Create Accurate and outcome-oriented indicators**
Socio-economic inequity and challenge of choices, e.g., natural fibres more expensive than mass produced fibres.	**Green Nudging citizens**
Infeasibility of one-size fits all approach, e.g., stable and continuous electricity caused shift from LPG to electricity based induction stoves in HP.	**Taking inspiration from cultural and traditional practices** like handwashing and sun-drying of clothes.
Other: Greenwashing; Difficulty in **measuring sustainability; Lack of financial incentives** to invest in clean energy.	**Incentivising adoption of sustainable options** **Integrating Knowledge about sustainable lifestyles** into education programs.

4.5 Sustainable Agriculture

4.5.1 Coastal Aquaculture Authority (Amendment) Act, 2023

Why in the news?

Recently, this **Coastal Aquaculture Authority (Amendment) Act, 2023,** was adopted, which amends the earlier 2005 Act.

Key Features of Amendment

- **Broaden the definition of "coastal aquaculture"** removing the ambiguity between the farm and other verticals of coastal aquaculture.
- **Registration** granted under Coastal Aquaculture Authority Act considered a **valid permission under Coastal Regulation Zone (CRZ) Notification.**
- **Additional role of Coastal Aquaculture Authority:**
  - **fix standards for inputs and discharge** of effluents from aquaculture units,
  - **prohibit the use of certain inputs** to prevent harm to the environment,
  - **Monitor and regulate** units, inputs, and emissions.
- **Permitting certain aquaculture activities** in CRZ areas like hatcheries, etc.
- **Prevent the use of antibiotics** and pharmacologically active substances.
- **Promote biosecurity;** prevent the risk of introduction/spread of harmful organisms.

Significance of Amendments	Issues with the Act
Economic: Ease of doing business; Employment Generation; etc. **Environmental:** Promoting new Environment-friendly coastal aquaculture and Genetically improved and disease-free broodstocks and seeds.	Deficiency in skilled manpower and infrastructure facilities in the **Coastal Aquaculture Authority** (CAG report). **Promoting intensive coastal aquaculture having adverse** impacts on the environment.

4.5.2 Organic Farming in India

Why in the news?

Agricultural and Processed Food Products Export Development Authority (APEDA) created **dedicated organic promotion division.**

About organic farming

- Accomplished **using on-farm agronomic, biological, and mechanical methods** in exclusion of all synthetic off-farm inputs.
- **Benefits of Organic Farming**
  - **Environment:** Carbon sequestration; stimulates biodiversity, etc.
  - **Farmers:** Reduced input cost, resilience to extreme weather events.
  - **Consumers:** Healthier, nutritional quality food.

Extent in India	Highest number of organic farmers **(44.3 lakhs) [Eco Survey 2022-23]**
	6th in terms of certified area globally. (The World of Organic Agriculture Statistics and Emerging Trends 2023).
	Sikkim: world's first 100% organic state.

Initiatives taken

- **Certifications: National Programme for Organic Production (NPOP); Participatory Guarantee System of India (PSG-India); FSSAI Jaivik Bharat logo.**
- **PM PRANAM** (Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth) Scheme; **GOBARdhan** etc.
- **Others:** Pramparagat Krishi Vikas Yojana; National project on organic farming, etc.

Challenges for the Organic Farming	Way Forward
High input costs & low yields (18% lower than conventional farming) in the initial years.	**Supplementing** with **other sustainable farming methods.**
Inefficient supply chain for marketing and distribution.	Strengthening **value chain and certification regime.**
Issues with certification process such as lack of standardization, etc.	Enhancing the **number of third party accreditation agencies.**
High price of produce.	**Others:** Production of organic inputs; strengthening value chain of organic products; improving monitoring of certification activities, etc.
Other issues: limited government support etc.	

4.5.3 Climate resilient farming

Why in the News?

Standing Committee on Agriculture, Animal husbandry and Food processing presented 'Promotion of Climate Resilient Farming' Report.

About Climate Resilient Farming

- It is the Incorporation of **adaptation, mitigation and other practices** in agriculture which **increases the capacity of the system to respond to various climate** related disturbances.
- **Significance:**

Significance of Climate resilient farming		
Explicit focus on **addressing climate change** in the agrifood system,	Considering synergies between **productivity, adoption, and mitigation.**	Tailored for diverse **agro-ecological** conditions and **socio-economic contexts.**

Initiatives taken

- **National Innovations in Climate Resilient Agriculture' (NICRA)** by Indian Council of Agricultural Research (ICAR).
- **National Mission for Sustainable Agriculture (NMSA)**
- **Paramparagat Krishi Vikas Yojana.**
- **An Investment forum for advancing Climate Resilient Agrifood systems** in India by NITI Aayog, Ministry of Agriculture and Farmers' Welfare, and FAO.

Impact of Climate Change on Agricuture

- Projected decline in **yields of rainfed rice, wheat by 2050.**
- Beneficial for crops **like cotton, chick pea, due to reduced frosts.**
- **Shift in crop zones** like of Apple and other temperate crops.
- About **1.8-2 million tonnes of annual milk** loss due to heath stress in cattle and buffalo.

Impact of Agriculture on Climate Change

- Agriculture sector emitted about **14% of GHG emissions of India.**
- Major share of GHG emissions due to **enteric fermentation** (54.6%), **rice cultivation** (17.5%), and **fertilizer applied to agricultural soils** (19.1%), etc.

Challenges	Way forward
Collaboration required between diverse stakeholders of diverse backgrounds. **Policies like MSP** favour monoculture, groundwater extraction etc.. **Others:** skill gap in farmers, rainfall dependence, etc.	**Participation of grassroots.** E.g., Climate Resilient Villages model. **Adoption of heat tolerant varieties:** for e.g., HDCSW-18, DBW-187 (wheat varieties) etc. by Punjab farmers. **Technological Interventions like AI, WINDS, etc.** **Environmental Inhibitors** like Methanogenesis, Nitrogen Inhibitors, etc.

4.6 Waste Management

4.6.1 Plastic Waste Management (Amendment) Rules, 2024 (PMW Rules 2024)

Why in the news?

Recently, the government notified the **Plastic Waste Management (Amendment) Rules, 2024 (PMW Rules 2024)** under the **powers conferred** under the **Environment (Protection) Act 1986.**

Key provisions of PWM Rules, 2024

- **Local body mandated to** undertake an annual **assessment of plastic waste generated,** including estimation to waste to be generated in following **five-year period.**
- **Centralised Portal for Registration** of Producers, Importers, Brand-Owners and manufacturers of commodities made from compostable plastic or biodegradable plastic.
- **Local body** to take **necessary measures preventing stocking, distribution, sale and usage of prohibited SUP items** and submit annual report.
- **Producers, Importers and Brand** Owners who introduce any **plastic packaging** shall be **responsible for collection of such plastic packaging**
  - **Also applies** to commodities made from **compostable or biodegradable plastics.**
- **Annual report submission on implementation** to SPCB, PCC, CPCB, Central Government.
- **Other provisions: Changes in Definitions of stakeholders** like importer, seller, producer, manufacturers; **Precise definition of Biodegradable plastics; Certificate from FSSAI in addition** of CPCP by manufactures of compostable or biodegradable plastics; etc.

4.6.2 Battery Waste Management (Amendment) Rules, 2024

Why in the News?

Recently, the Union Ministry of Environment, Forest, and Climate Change made revisions to the Battery Waste Management Rules, 2022.

Need for proper Battery Waste Management

Growth in Battery Use due to electronics, electric vehicles (EVs), renewable energy systems etc. ◇ **933 Gwh, global annual demand for batteries (2021),** expected to grow to **5,100 GWh by 2030.**	Large share of used **Lead Acid Batteries** (>90%) is recycled by **informal recyclers.**	**Environmental Protection from** toxic substances such as **lead, cadmium; promotion of Circular Economy.**	**Impact on Human Health due to improper disposal** like neurological damage, respiratory problems, etc.

Current Governance framework of Battery Waste in India

- MoEF&CC published the **Battery Waste Management Rules, 2022, under** the Environment (Protection) Act 1986.
  - Replaced the Batteries (Management and Handling) Rules, 2001, amended in 2023 and 2024.

- **Key Provisions of the Battery Waste Management Rules, 2022**
  - **Extended Producer Responsibility (EPR)**
  - **Centralized online portal** for exchange of EPR certificates between producers and recyclers.
  - **Mandatory recovery** of the minimum percentage of recovery of materials from waste batteries.
  - **Polluter Pays Principle:** Environmental compensation for non-fulfilment of EPR target.

Key changes introduced by the New Rules

Particulars	Battery Waste Management Rules, 2022	Battery Waste Management (Amendment) Rules, 2024
Provision of Certificate for Waste Battery	◇ EPR certificates generated by CPCB through the **centralised online portal** based on the **recycled or refurbished** quantities. ◇ Assigned certificates can be sold in exchange of waste batteries	◇ **CPCB to** fix the **highest and the lowest price for EPR** certificates.
Imposition of Environmental Compensation	◇ **Committee for Implementation** (CI) constituted by **CPCB**	◇ **CPCB** may consult CI to prepare/ recommend **guidelines** (to be submitted to MoEF&CC).

Way Forward

- **Policy Support** like **licence for handling lithium-ion batteries** separate from electronic waste;
- **Incentivizing manufacturers,** green taxes.
- **Deposit Refund System** incentivizing customers on returning batteries;
- **Separate collection agency** for collection and recycling of batteries.

4.6.3 Sewage Management in India

 **Current Status**	◇ More than **33,000 Million Litres per Day (MLD)** estimated generation from Class I cities and Class II towns with the current treatment capacity of STPs is **just 18.6%.**

Institutional arrangement and initiatives for Sewage Treatment in India

- **Water is a 'State Subject' (7th Schedule, Article 246)**
  - **National Urban Sanitation Policy (2008)** made local governments responsible for 100% safe waste disposal.
- **74th Constitutional Amendment (1993)** decentralized **water supply and sanitation.**

- **Environment (Protection) Act, 1986, Water (Prevention & Control of Pollution), Act 1974, require Industrial units and local bodies to install STPs** and Effluent treatment plants.
- **Other initiatives:** Components of AMRUT, **Smart Cities Mission, Namami Gange, and National River Conservation Plan.**

Challenges	Way forward
◇ **Lack of Capacity in ULBs:** CAG found that **none of the sampled ULBs had a sewage network** in Jharkhand (2016). ◇ **Lopsided implementation: 5 states account for 60% of the total installed treatment capacity.** ◇ **Differences in discharge standards:** 35 parameters for **Surface water body** against 10 for **wastewater for land application.** ◇ **Low Compliance:** Only **23%** of treatment capacity meets SPCBs parameters. ◇ **Other issues:** STPs are highly capital-intensive; No Specific policy at either the Central or state level.	◇ **Setting up of underground STPs in land-scarce cities, e.g., case of China.** ◇ **Implementing Nature-based Solutions (NbS).** ◇ **Other measures:** » **Establishing multiple monitoring points** » **Utilization in Irrigation** » Utilization of treated sewage for **non-potable purposes** like horticulture, irrigation, etc.; ◇ **Defining better and uniform water quality standards.**

4.6.4 Waste to Wealth

Waste to Wealth Techniques	**Biological Processing:** ◇ Composting biodegradable/organic waste to yield bio-fertilizer. ◇ **Biomethanation** (anaerobic fermentation of biodegradable matter) to yield biogas, etc.
	◇ **Thermal or Waste to Energy Processing:** Incineration, Gasification and Pyrolysis for producing electricity/heat/light from Municipal Solid Waste (MSW).
	◇ **Processing for Reuse:** Using Plastic waste in road construction, etc.

Significance

Economic benefits: energy generation, extraction of valuable resources	**Envrionment Protection:** Recycle and promote circular economy.	**Managing high generation of waste,** especially from urban areas.	**Entrepreneurship and job creation.**

Initiatives taken

- **Waste to Wealth Mission under PM-STIAC.**
- Policies and guidelines like- **Solid Waste Management Rules, 2016; Plastic Waste Management Rules, 2022; Construction & demolition waste Management Rules, 2016 etc.**
- **500 new Waste to Wealth plants** under the **GOBARdhan** scheme
- Mandating use of **Plastic Waste in Road Construction.**

Challenges				
Informal and **inefficient** collection	**Limited financial capacity** of Local Bodies for processing	**Lack of reliable data** of waste inventory	**Costly** and **complex** technologies	**Limited Private Participation**

Way Forward			
Segregation at Source and 100% waste collection	**Institutional support**	**Forward** and **Backward** Infrastructure	**Financially strengthening** local bodies

4.7 Plant Genetic Resources for Food and Agriculture (PGRFA)

Why in the News?

Global Symposium on Farmers' Rights (GSFR) organised by the Secretariat of **International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)** of **Food and Agriculture Organization (FAO)** adopted the Delhi Framework on Farmers' Rights.

Key highlights of Delhi Framework

- Creating **functional synergy across different UN instruments.**
- Establish **farmer-managed seed system for traditional varieties**
- **Building farmer-centric partnership opportunities** including South-South, etc.

About PGRFA

- **Raw material that form basis of all crop varieties including seeds and other plant genetic material.**
- Used to **develop new** varieties or **improve the quality and productivity of crops.**
- **Nodal Organisation:** National Bureau of Plant Genetic Resources (NBPGR) (est. 1976).

Importance of PGRFA

			
Protecting natural resources	Raw material for plant evolution and adaptation	Critical for development of new varieties, ensures health and economic security	Genetic material from food plants in one country can be helpful to other countries as well

About International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

- **Seed treaty, legally binding agreement** adopted in 2001 (31st FAO session).
- Facilitates sharing of **PGR across borders** through **Multilateral System of Access and Benefit-sharing (MLS).**
- International **legal framework** for the **establishment** of **Svalbard Global Seed Vault** in Norway.
- **India is a party** and enacted the **Protection of Plant Varieties and Farmers' Rights Act 2001.**

Threats to PGRFA	Way Forward
Genetic vulnerability due to mono-cropping. **Imbalance between Intellectual Property Rights** provided to breeders of modern plant varieties and rights of farmers. **Other threats:** Pollution, climate change induced variations, etc.	**Comprehensive information retrieval system** for plant genetic resources. Using **in-vitro genebank, Field genebank (Ex-situ) and cryobank,** etc., on farm management and improvement of plant genetic resources.

4.8 Miscellaneous

4.8.1 Green Buildings

Why in the news?

Indian Green Building Council (IGBC) has introduced new green rating tools as part of its Net Zero mission to accelerate the **uptake of green building projects** in country.

About Green Buildings

- **Use of environmentally friendly construction materials,** processes, operation, and maintenance to **reduce the cost of energy and waste management.**
- Different from- **Energy-efficient** (uses less heat) and **Net zero carbon buildings** (achieve zero carbon emission by cutting energy consumption).

Advantages			
Consume 25% less energy	**38% GHGs** contribution from Building/ Construction	**Health benefits:** No use of VOCs	**Global green building materials market** to grow from $422.27 billion in 2023 to $951.15 billion by 2030.

Initiatives taken

- **Energy Conservation Building Code (ECBC)** (2007 revised in 2017) by BEE.
- **Eco-Niwas Samhita 2018 by Ministry of Power; Green Rating for Integrated Habitat Assessment (GRIHA)** by **TERI** and **MNRE**.
- **Leadership in Energy & Environmental Design (LEED)** by U.S. Green Building Council.
- **Star Rating of Commercial Buildings** launched by Ministry of Power.

Challenges in constructing green buildings			
High **initial construction** cost	**Governance issues** (poor building code enforcement, etc.)	**Issues in construction** to specific weather.	**Limited access** to design and skilled worker.

Way forward		
Encourage green buildings through tax incentives	Use of **Green bonds** for green projects needing long term investment.	**Retrofitting** of existing buildings, etc.

4.8.2 Environmental Movements in India

Why in the news?

2023 marked the 50th anniversary of the Chipko movement.

Chipko movement

- **Nonviolent resistance** against forest cutting in Reni village, Chamoli, Uttarakhand.
- **Movement's leaders/activists:** Primarily village women.
- **Major leaders:** Sunderlal Bahuguna, Chandi Prasad Bhatt, Gaura Devi,etc.
- **Renowned for collective mobilization of women,** manifesting Eco-feminism.

Eco-Feminism

- **Philosophical/political movement** examining **connections between ecological concerns and women.**
- **Reasons behind emergence of Eco-feminism:**
  - **Interconnectedness of resource exploitation** and the subjugation of women
  - **Significance of traditional knowledge** often transmitted by women
  - **Women's lived experiences** having close relationship with natural environment.
  - **Contemporary relevance:** Critique of capitalist exploitation, valuing traditional ecological knowledge, recognition of Environmental Justice, etc.

Major Environmental Movements in India

			
Silent Valley Movement (1973), Kerala	**Appiko movement (1983)** led by **Panduranga Hegde** in Karnataka	**Narmada Bachao Andolan (1985) .**	**Others:** Chilika Bachao Andolan, Against Bauxite Mining in Kashipur, Gandhamardan Environment Protection, etc.

Impacts of Environmental Movements in India

- **Leadership to women,** E.g., Gaura Devi.
- **Push to Environmental Policy/Legislation like** Forest Right Act 2006,
- **Legacy of nonviolent protests** including Gandhi's nonviolence and Satyagraha.
- **Protecting cultural identity;** advocated the ideology of 'environmentalism of the poor'

Challenges faced by the Environmental Movement				
Lack of sufficient technical information and data.	**Weak decision making** powers of local self-governments.	**Lack of dialogue** and cooperation.	**Environmental laws** that do not provide for public participation.	Disappearance of traditional belief systems.

Way forward				
People Friendly development plans.	**Enhance public participation** in development by campaigning for laws	**Incorporate Technical data** and knowledge in the movement.	**Linking global and local issues.**	**Individual actions,** eg LiFE.

Indian Customs and tradition for sustainable development

- **Compassionate capitalism:** Gandhiji's Sarvodaya, Indian tradition (equal opportunities to all).
- **Circular economy,** utilizing local materials like bamboo, stones, etc.
- **Sacred groves:** dedicated to local folk deities like Ayyanar and Amman, Vanadevatais.
- **Conservation of Animals** symbolizing vehicles of God.
- **Traditional medicinal systems–** Ayurveda, Siddha, Unani, Sowa-Rigpa, Homeopathy.

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5. Renewable Energy and Alternative Energy Resources

5.1 Renewable Energy in India

Targets	Current Status (Ministry of Power, June 2024)
◇ **Achieve 50% cumulative electric power installed** from renewables by 2030. (INDC) ◇ Non-fossil fuel energy capacity of **500 GW by 2030. (Panchamrita targets)** ◇ **500 GW of renewable energy** installed capacity by 2030. **(Panchamrita targets)**	◇ **Installed Capacity of Renewable energy source** (Incl. Hydro): 195 GW (Power Ministry, June 2024) (43.7% in total) ◇ **Share of different sources in total Installed Capacity:** » **Solar:** 19.2% (85 GW) » **Wind:** 10.5% (46 GW) » **Biomass cogeneration:** 2.3% (10 GW) » **Waste to Energy:** 0.1% (0.5 GW) ◇ Installed Capacity of Non-Fossil Fuel in total installed capacity: 203 GW (45.5% in total) ◇ **Global rankings:** 4th globally in Renewable Energy Installed Capacity, 4th in Wind Power capacity and 5th in Solar Power capacity

5.2 Solar Rooftop Power

Why in the news?

Recently, Union Cabinet has approved - **PM Surya Ghar Muft Bijli Yojana** for installing Rooftop Solar in one crore households nationwide.

PM Surya Ghar Muft Bijli Yojana

- **Ministry:** Ministry of New & Renewable Energy.
- **Aim:** To provide **free electricity up to 300 units every month for one crore households.**
- **Subsidy structure:** Central Financial Assistance for Residential Rooftop Solar (RTS) up to:

Suitable Rooftop Solar Plant Capacity	Subsidy Support
1 – 2 kW	**Rs 30,000 to Rs 60,000/-**
2 – 3 kW	**Rs 60,000 to Rs 78,000/-**
Above 3 kW	**Rs 78,000/-**

- **Collateral-free low-interest loan** products of **~7% for installation of RTS systems up to 3 kW.**
- **Other features of the scheme**

- **Model Solar Village** to be **developed in each district.**
- **Others:** Incentives to Local Bodies; National Portal for households to apply for subsidies; Component for payment security for Renewable Energy Service Company (RESCO).

Significance	◇ **Reduced bills** causing Rs. 15000 crore annual saving by 1 crore families.
	◇ **Source of income** by selling surplus to DISCOMs.
	◇ **Addition of 30 GW of solar capacity** through RTS.
	◇ **720 million tonnes of CO2** equivalent emission reduction.
	◇ **Others:** more EV charging; entrepreneurship; self-reliance in energy sector; etc.

About Rooftop Solar system

- Includes **photovoltaic panels installed on the roof of a building** connected to the main power **supply unit.** Converts sunlight into usable electrical energy.
- **India's Current Rooftop Solar Capacity: 11 GW of installed capacity,** of which **2.7 GW is in the residential sector (Gujarat** leader in rooftop solar installations (82%).

Challenges in Scaling	Way Forward
◇ **Variability/unpredictabiliy** affecting Grid stability and storage. ◇ **High cost:** lack of R&D; import dependence. ◇ **Low DISCOMs participation;** low net metering.	◇ Time bound approval, third-party inspections, improving grid infrastructure, etc.

5.3 International Solar Alliance

Why in News?

India hosts the 6th Session of the International Solar Alliance (ISA) Assembly in New Delhi. Also, Spain became the 99th member of ISA

Key Highlights of 6th session of ISA (Hosted by India in New Delhi)

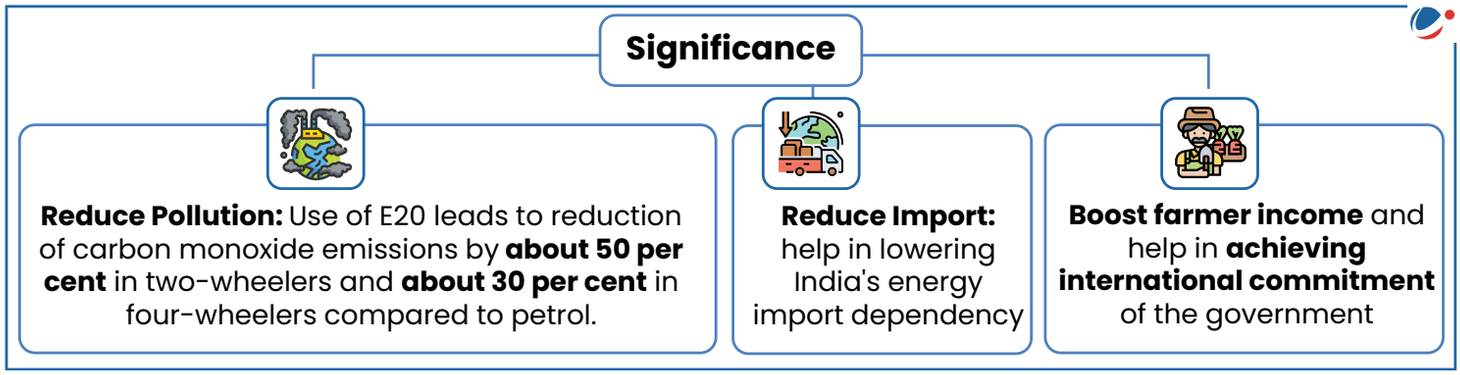
- Spain became **99th member.**
- **Increase in VGF (Viability Gap Funding) cap for solar projects from 10% to 35% of the project cost.**
- **Global Solar Facility** (approved in 2022 to catalyze solar investments in underserved segments and geographies across Africa) **to recieve capital contribution of 35 million USD.**

About ISA

- Treaty-based **intergovernmental organization,** action-oriented, member-driven, collaborative platform for increased deployment of **solar energy technologies.**
- Jointly launched by India and France in 2015 in the **CoP21** of **UNFCCC** in Paris.
- All member states of the UN are eligible to join (Amendment in 2020).
- **Key Strategy:** Guided by the **'Towards 1000' strategy.**
  - Mobilise **USD 1,000 billion** in solar energy solutions by 2030
  - Delivering **energy access to 1,000 million people**
  - **Installation of 1,000 GW of solar energy capacity.**
- **Significance of ISA: Ensuring Just energy transition;** asserts India's soft power along with other initiatives like Global Biofuels Alliance, CDRI, etc.
- **Challenges:** Lack of finance, technologies; uneven global electricity landscape; lack of solar energy equipment manufacturing capability, etc.
- **Other Initiatives by ISA**
  - **One Sun One World One Grid (OSOWOG)** (led by India and UK in collaboration with ISA and World Bank).
    - India has **established cross-border interconnections** with its neighbours through which **electricity is exported to Nepal, Bangladesh, and Myanmar** and **imported from Bhutan** along with an MoU with BIMSTEC.
  - **Solar Technology Application Resource Centre (STAR C),** for capacity building.
  - **Large-scale Solar Power Projects** under Solar Park Concept.

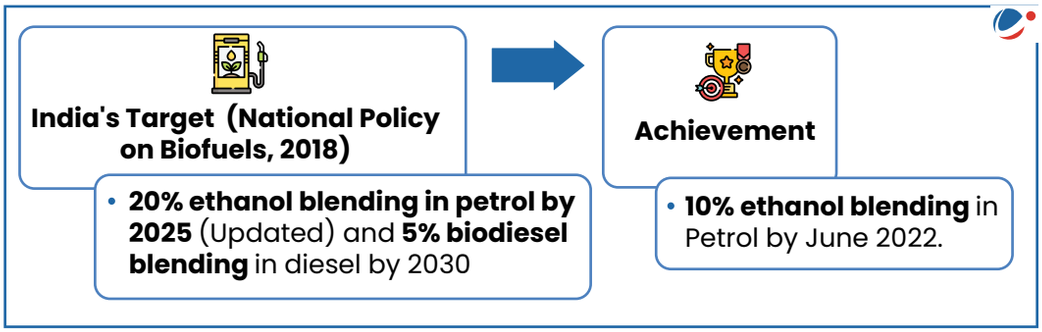
5.4 Ethanol blending in India

- **Ethanol: Principal-biofuel,** naturally produced by the **fermentation of sugars by yeasts** or **petrochemical processes such as ethylene hydration.**
- **Ethanol Blending:** Involves a **blended motor fuel containing ethyl alcohol** that is at least 99% pure, derived from agricultural products.



Initiatives

- **National Policy on Biofuels - 2018**
- **Ethanol blending Program (EBP)** with the target of 20% ethanol blending in petrol by 2025.
  - » Reduced GST (from 18 to 5%) on ethanol under EBP.



- **PM JI-VAN YOJANA** for **second-generation (2G) ethanol projects.**
- **Flexi-fuel engines** and components included under **PLI scheme.**
- **Amending Industries (Development & Regulation) Act,** 1951 for free movement of ethanol.

Challenges	Way Forward
◇ **Demand of Water Intensive sugarcane crop impacting Food and water security** » Recently, government banned using 'sugarcane juice and sugar syrup' for ethanol production as per **Sugar (Control) Order 1966 for the 2023-24.** ◇ **Others:** Non- uniform availability of ethanol across various states, modification in vehicles increasing the cost; etc.	◇ **Uniform availability of ethanol blends** across India. ◇ Augmenting **infrastructure of Oil marketing companies.** ◇ Focus on **sustainability of supplies.** ◇ **Tax incentive** to absorb R&D cost on E20 compatible design, etc.

5.4.1 Sustainable Alternative towards Affordable Transportation (SATAT)

Why in the news?

Parliamentary Standing Committee on Petroleum and Natural Gas submitted an action taken report on its earlier recommendations on the subject **'Review of Implementation of CBG (SATAT)'.**

About SATAT

- **Launched: 2018.**
- **Objective:** Set up **Compressed Bio-Gas (CBG) production plants and make CBG available in the market** for use in automotive fuels.
  - CBG is obtained after **purification and compression of bio-gas** (having high methane content (>90%) and higher calorific value (47-52 MJ/kg)).
- **Nodal Ministry:** Ministry of Petroleum and Natural Gas (MoPNG).

Targets under SATAT

- **5000 CBG Plants by 2023**
- **15 MMT of CBG**
- **50 MMT of Bio-Manure**

Fulfills all 4 pillars of our vision of India's energy future -energy access, energy efficiency, energy sustainabillity and energy security.

Challenges	Way Forward
◇ **Governance-related issues:** » **Multiple regulatory approvals** including various ministries. » **Discontinuation of Central Financial Assistance (CFA)** since April 2021 to new and renewable energy projects. » **Lack of interest among Oil PSUs** in setting up CBG projects ◇ Limited timeframe for gathering agricultural feedstock and the **unpredictability of feedstock prices.** ◇ **Differential tax structure** of Compressed Natural Gas and CBG. ◇ No buyers for **fermented organic manure.**	◇ **National Bio-fuel Coordination Committee (NBCC) to meet regularly.** ◇ **Generation Based Incentive (GBI)** instead of Capex-based subsidy ◇ Setting up a **Bio Fuel Infrastructure Fund** and **Credit Guarantee Fund.** ◇ **Fiscal support** for **pipeline infrastructure: connecting CBG projects with the CGD network.** ◇ **Governance reforms** » Simplify and digitise **regulatory approvals; single window clearance** » **Capacity building of Urban Local Bodies** and involving the **PPP model.** » **Restricting or regulating the export.** ◇ Using **Technology** like AI-based sensors, etc.

5.5 Energy Transition in India

About Energy Transition

- **Shifting energy production away from sources that release a lot of GHGs** to those that release little to no GHGs.

India's Status of Clean Energy Transition	» **India's rank:** 63rd (from 67, 2023) (WEF Fostering Effective Energy Transition Report, 2024).
	» **Installed RE Capacity** increased from **76.37 GW (2014) to 195 GW (2024) (including hydro).**

Indian Iniatives	Global Initiatives
National Solar Mission (2010)	**International Solar Alliance (2015)**
National Electric Mobility Mission Plan (2013)	**Clean Energy Transitions Programme** of IEA.
Green Energy Corridor Project: Supported by the World Bank,	**Panel on Critical Energy Transition Minerals (India is its member).**
National Biofuel Policy (2018)	**Carbon Border Adjustment Mechanism (CBAM)** by EU.
Renewable Purchase Obligation (RPO)	**Global Renewables and Energy Efficiency Pledge** at **COP 28 (UAE):** tripling the renewable capacity rate by 2030.
National Green Hydrogen Mission (2023)	**Energy Charter Treaty.**

Challenges	Way Forward
Adding/ replacing 80 million kilometers of power lines by 2040 to achieve all national climate/energy goals.	**Managing energy demand** can cut energy consumption by **31%, causing annual savings of up to $2 trillion (WEF).**
Clean energy technologies, like advanced batteries still in the early development stage.	**Supportive policy: India's UJALA program,** reduced the initial cost per LED bulb to $0.8 (WEF).
Almost **90% of the growth** in Clean energy infrastructure investments since 2021 in **advanced economies and China.**	**Increased grid investment,** nearly doubling by 2030 to over USD 600 billion per year.
Others: Uncertainties in Subsidies; Geopolitical tensions, capital intensive, etc.	**Others:** Strong political commitments and regulations to advance decarbonization; Deliver energy equity for vulnerable households; etc.

5.5.1 Critical Energy Transition Minerals

Why in News?

United Nations appoints panel on Critical Energy Transition Minerals.

About Critical Energy Transition Mineral

- **Essential components** in **today's rapidly growing clean energy technologies,** from wind turbines and solar panels to electric vehicles. **E.g. copper, lithium, nickel, cobalt etc.**

Indian Initiatives	Global Initiatives
◇ **Identification of 30 critical minerals** ◇ **Partnership with Australia** (lithium and cobalt) and **Argentina** (lithium). ◇ **Khanij Bidesh India Limited (KABIL), in** overseas locations for supply in India	◇ **Mineral Security Partnership (MSP):** India is also a part. ◇ **Critical Minerals Mapping Initiative** ◇ **UN Framework on Just Transitions for Critical Energy Transition Minerals** (to be launched by the end of 2024)

Challenges	Way Forward (6 key actions by1st IEA Critical Minerals and Clean Energy Summit)
◇ Major reserves in fewer countries- **Lithium triangle** (Argentina, Chile and Bolivia). ◇ **Unsustainable Mining and processing:** pollution, destruction of ecosystems, etc. ◇ **Mismatch in demand and supply** (demand to grow by 3.5 times by 2030, IEA).	◇ **Diversified** minerals supplies. ◇ **Unlock technology and recycling** powers. ◇ **Promote transparency** ◇ **Availability of reliable information.** ◇ **Incentives** for sustainable and responsible practices. ◇ Foster **international collaboration.**

6. Conservation efforts

6.1 Definition of Forest

Why in the news?

Supreme Court (SC) recently directed the Government to follow the definition of "forest" as laid down in the 1996 judgment in **T. N. Godavarman Thirumalpad v. Union of India.**

Forest Definition-

- **Under SC judgment**
  - All areas recorded as **"forest" in any government (Union and State) record.**
  - All areas that conformed to the "dictionary" meaning of forest.
  - Areas identified as "forest" by expert committees set up by State governments.
- **Under Forest Conservation (Amendment) Act, 2023:** Land declared as a forest under the Indian Forest Act, 1927 or other laws, or recorded in the Government as forest as on or after 1980.
- **Under Van (Sanrakshan Evam Samvardhan) Rules, 2023**
  - State Governments/UT Administrations must prepare consolidated record of lands for Forest Conservation (Amendment) Act, 2023.
  - Includes forest-like areas, unclassed forest lands, and community forest lands.

Forest Conservation Amendment Act (2023) Key Provisions

New name: 'Van (Sanrakshan Evam Samvardhan) Adhiniyam' (Forest (Conservation and Augmentation) Act), 1980.

Addition of Preamble: Includes India's Nationality Determined Contribution and other National targets.

Excluded activities from non-forest purposes: establishment of zoos and safaris, eco-tourism facilities, silvicultural operations, and other Central Government purposes.

Exempted categories of land include connectivity to habitation, rail, national projects, and national security.

Directions of the Supreme Court	Implications of SC judgment
◇ Continue principles of **TN Godavarman judgment until Van (Sanrakshan Evam Samvardhan) Rules, 2023** are completed. ◇ Database creation, under Central government ◇ Prior approval of the court **Safeguard in zoo creation.**	◇ **Protects** forest land. ◇ **Consistent with FCA, 1980** spirit. ◇ **Encourages sustainable development** through consensus definition.

6.2 Community Forest Governance

Why in news?

The study titled 'Community Forest Governance and Synergies among Carbon, Biodiversity and Livelihoods' was published by Nature Climate Change Journal

Community Forest Governance

- Communities have the right to manage forest resources to improve living conditions.
- **Benefits**
  - Provides **livelihood, nutrition, and employment.**
  - Utilizes **unique knowledge for biodiversity conservation.**
  - **Utilizes traditional knowledge** for natural resource management.
  - **Customary laws** for ecological balance and conflict resolution.
  - Prioritizes **forest regeneration for management and benefit-sharing mechanisms.**

Steps taken by India

- **National Forest Policy (1988)** through JFMP.
- **Scheduled Tribes and Other Traditional Forest Dwellers (FRA) Act, 2006.**
- **'Van Panchayats'** in Uttarakhand.
- **Eco-Development Committee** for Protected Area villages.
- **Biodiversity Conservation and Rural Livelihood Improvement Project.**

Challenges	Way forward
◇ **Lack of policy support** for local community participation. ◇ Implementation of Joint forest management is **expensive.** ◇ Forest bureaucracies prioritizing measurable targets like tree planting. ◇ **Commercial interests,** like Vedanta's proposed bauxite mining project.	◇ **Telangana model:** Amending Panchayat and municipal acts for environmental concerns. ◇ **Recognition of Community Forest Resource rights:** Chhattisgarh and Odisha ◇ **Financial and institutional support** for local communities.

6.3 Wildlife Conservation and Protection

6.3.1 Project Tiger

Why in the news?

The Indian government officially marked 2023 as the 50th year of 'Project Tiger'.

Project Tiger

- **Launched in 1973** by the Ministry of Environment, Forests and Climate Change.

Achievements

- **Number of tigers increased to 3,682,** from 2967 in 2018.
- India achieved TX2 initiative **targets 4 years in advance.**
- Tiger reserves increased from **9 in 1973 to 55 in 2024.**
- **23 tiger reserves** of India have CA|TS accreditation

- **Provides central assistance** to tiger range States for conservation.
- **Objective:** Aims to maintain a viable tiger population for scientific, economic, aesthetic, cultural, and ecological values.
- Implemented by the **National Tiger Conservation Authority.**
- Merged with Project Elephant to form **Project Tiger & Elephant.**

Project Tiger's Conservation Activities

- **Establishment and development** of Tiger Reserves.
- **Core-buffer strategy** for tigers management.
- **Technological advancements:** e-Bird project uses UAV for surveillance and monitoring; **M-STrIPES for tiger monitoring.**
- **Special Tiger Protection Force** deployed for focused anti-poaching operations.

Global initiatives

International Big Cat Alliance (IBCA)

Sustainable Finance for Tiger Landscapes Conference (SFTLC)

TRAFFICGlobal Tiger Recovery Program (GTRP)

IUCN's Integrated Tiger Habitat Conservation Programme (ITHCP) or Tiger Program.

Challenges

- **Lack of trust** between forest department and local communities.
- **Low capacity** among officials for effective surveillance and monitoring.
- **Financial constraints** for habitat restoration activities.
- **Human wildlife conflicts** and retaliatory killings.
- **Habitat loss** due to land use, climate change, and invasive species

Conclusion

India needs to enhance habitat quality, establish safe connectivity, and minimize human-tiger conflicts through outreach systems and compensation policies.

6.3.2 The Wildlife (Protection) Amendment Act, 2022

Why in the news?

New rules were notified under the Wildlife (Protection) Amendment Act, 2022.

New Rules under the Amendment

- **Captive Elephant Transfer Rules, 2024**
  - Application to Deputy Conservator of Forests (DCF) for elephant registration.
  - **Transfer conditions:** Owner can't maintain elephant etc.
- **Wildlife Licensing Rules, 2024**
  - No license granted for wild animals specified in Schedule I, except with previous consultation of Central Government.
  - License issued by Chief Wildlife Warden or Authorised Officer based on existing licenses and implications on hunting or trade.
- **Living Animal Species (Reporting and Registration) Rules, 2024:** Registration of possession, transfer, birth, and death of listed species.

WPA, 2022 Key Amendments

- Removes **current schedule for vermin species** and introduces new schedule for extinction specimens under CITES.
- **Reduces schedules from 6 to 4:** Schedule I (highest level) Animal species; Schedule II (lesser protection); Schedule III (Protected Plant species); and Schedule IV (Specimens listed in Appendices under CITES).
- **Empowers Centre to regulate invasive alien species.**
- **Permits use of elephants** for'religious or other purposes'.
- **Managing Authority and a Scientific Authority** to regulate the import and export of specimens of species
- **Chief Wildlife Warden** to manage and maintain sanctuaries.
- Centre too can notify **conservation reserves.**

Concerns	Way Ahead
◇ Allows **open sale and purchase of elephants.** ◇ Continues **Centre's hold over 'vermin'** declaration. ◇ **Concerns over federal structure.** » Amendment renders State Boards for Wildlife defunct and establishes Standing Committee of Board for Wildlife.	◇ Certify elephant ownership. ◇ **Adhere to Federalism principles** in Management and Scientific Authorities. ◇ **Encourage research and scientific information** incorporation in conservation planning. ◇ **Temporarily restrict vermin** declaration period for wildlife population review.

6.3.3 Human-Wildlife Conflict

Human-Wildlife Conflict

- Man-animal conflict when **encountered between humans and wildlife lead to negative results,** such as loss of property, livelihoods, and even life.
- **Causes:** Wildlife species adapting to changing landscapes; Habitat fragmentation; Increased population due to Conservation efforts; Climate change; Resource competition etc.

 **Extent** (Accidental Deaths & Suicides in India 2022)	» **1,510 deaths** recorded in the country due to animal attacks in 2022
	» **10085** Animal/Reptiles/Insects Bite recorded in 2022

Impact

- **Psychological Impact on Communities** due to fear/anxiety and Loss of life and property.
- Rising zoonotic diseases like **Nipah**
- **Growing antipathy** towards animals.
- **Retaliatory killing of predators Predation** of livestock causing economic hardships for pastoral communities.

Laws and Policy

- Forest and wildlife are subjects: **Concurrent List**
- **Wildlife Protection Act of 1972** provides the statutory framework for protecting wild animals, plants, and their habitats.
- Network of 1022 Protected Areas.
- Standard Operating Procedures/guidelines: Issued by Central government.
- Advisory for management of man-animal conflict

Way forward as given in the National wildlife Action Plan (2017-2035)

- **Science-based plans for** species-specific and region-specific conflict-mitigation programs
- **Others:** Creation of database; **Participation of local community, etc.**

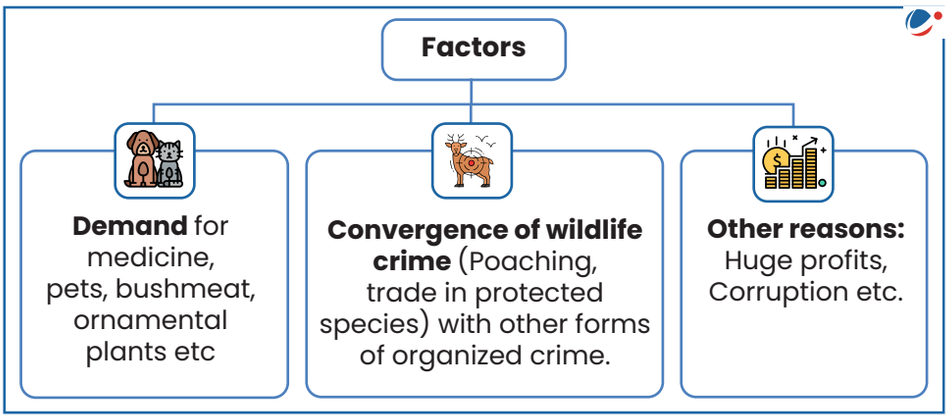
6.3.4 Wildlife Crime

Why in the news?

United Nations Office on Drugs and Crime (UNODC) released World Wildlife Crime Report 2024.

Wildlife crime

- Involves taking, possessing, trading, or consuming wild animals and plants in violation of international, regional, or national laws.



Impact of Wildlife Crime

- **40% of Seized Fauna** threatened or near-threatened.
- **Money-laundering** and illegal cross-border financial flows.
- **Risks of disease transmission** and service degradation.
- **Undermining government role, revenue loss, enforcement costs.**

Steps taken to combat Wildlife Crime

- **Global:** UNODC's Global Programme for Combating Wildlife and Forest Crime, 2014; South Asia Wildlife Enforcement Network (SAWEN); CITES, 1973; TRAFFIC etc.

- **India:** Wildlife Crime Initiative in India; Wildlife (Protection) Act, 1972; Wildlife Crime Control Bureau under Ministry of Environment and Forests

6.3.5 COP 14 to the Conservation of Migratory Species of Wild Animals

Why in the news?

Fourteenth Meeting of the Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals (CMS COP 14) held in Samarkand, Uzbekistan.

About CMS

- **Intergovernmental treaty** under **UNEP enforced in 1983.**
- **Focus: conservation and sustainable use of migratory animals** and their habitats.
- **Appendices**
  - **Appendix I:** Lists endangered migratory species.
  - **Appendix II:** Lists species with unfavorable conservation status requiring international agreements.
  - **Conference of Parties (COP):** Convention's principal decision-making body.

Key Outcomes

- Addition of **14 species to CMS Appendices.**
- **New Concerted Actions for six species.**
- **Single Species Action Plans for aquatic species.**
- **Agreement on Central Asian Flyway (CAF)** covering 30 range states of migratory birds.
- Launch of **Global Partnership on Ecological Connectivity (GPEC).**

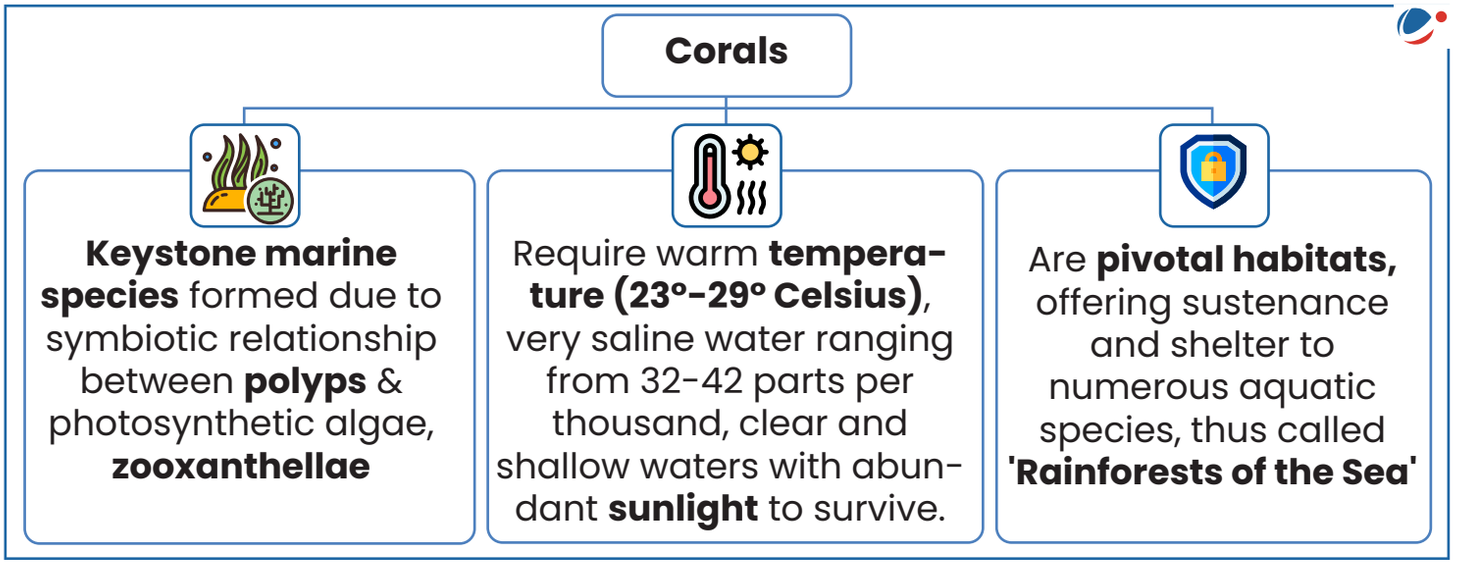
India-CMS Cooperation

Signed non-legally binding MoU on conservation and management of Siberian Cranes, Marine Turtles, Dugongs, and Raptors.	Hosted **COP-13 of CMS in 2020 at Gandhinagar.**	Part of CMS Special Species Initiatives: **Central Asian Flyway and Central Asian Mammals Initiative.**	**Zoological Survey of India** compiled list of migratory species under CMS.

6.3.6 Coral Bleaching

Why in the news?

- Coral bleaching observed at Lakshadweep, Gulf of Munnar, Palk Bay and Andaman and Nicobar Islands.



About Coral Bleaching

- Sea Surface Temperature increases, leading to 'coral bleaching', where zooxanthellae, providing pigmentation and 90% of corals' nutritional needs, leave their hosts.

Status	» 2023-2024 is the **fourth global mass coral bleaching event.**
	» **30% of world's coral reefs are severely damaged,** with 60% potentially lost by 2030
	» **Bleaching in India: E.g., Gulf of Mannar:** Live coral cover decreased from 37% to 27.3% between 2005 and 2021.

Initiatives for coral conservation in India

- **Coastal Regulation Zone Notification (1991)** under Environment Protection Act, 1986.
- **Gulf of Mannar Biosphere Reserve** Trust's eco-development activities.
- **Coral Reef Recovery Project-Mithapur** in Gulf of Kachchh and Gujarat's Marine National Park.
- **PMMSY promotes artificial reef** under "Integrated Modern Coastal Fishing Villages."

Multilateral cooperation in policymaking

- ICRI established at the **1st CoP of the CBD in 1992.**
- **Target of target 30by30:** Aims to save 30% of degraded reefs by 2030.

Reasons of Coral Bleaching	Way forward
» **Rising sea surface temperatures** in tropical regions. » **Marine heatwaves,** like the 2020 Gulf of Mannar, causing coral bleaching. » **Biological invasion by invasive species** like seaweeds and crown of thorns starfish. » Exposure to **chemical contaminants** like Copper. » Epizootics or pathogen-induced bleaching causing colony death.	◇ **Biorock technology:** E.g., used in the Gulf of Kachchh Coral restoration. ◇ **Super corals:** Ex-situ breeding of high temperature-resistant corals using 'human-assisted evolution'.

6.3.7 UNESCO World Heritage Sites

Why in the news?

A new research by UNESCO and IUCN, the **World Heritage Sites (WHS's)** make up **less than 1% of the Earth's surface,** but they **harbour more than 20% of the planet's biodiversity.**

About WHS and Convention

- Areas or objects inscribed on the **UNESCO World Heritage List.**
- Designated as having outstanding universal value under the **1972 World Heritage Convention** (WHC).
  - **WHC** was adopted as Convention Concerning the Protection of World Cultural and Natural Heritage.
  - **Objectives- Five Cs:** Credibility, Conservation, Capacity-building, Communication, and Communities.
- Sites are selected under three categories: **cultural, natural, and mixed.**
- 42 World Heritage Sites in India, 34 cultural, 7 natural, and one mixed

Significance of World Heritage Sites in conserving biodiversity	Challenges
◇ Covers natural, cultural, and mixed heritage sites. ◇ **Encourages integration of site protection** into Regional Planning Programmes. ◇ Utilizes **World Heritage Fund for disaster relief.** ◇ **Requires regular reports on conservation** state to the World Heritage Committee. ◇ **Others: Encourages Public Participation;** dialogue between **policymakers and World Heritage actors; Balance between Nature and Culture,** etc.	◇ **Decline in the population of the endangered species.** E.g. Tropical Rainforest Heritage of Sumatra. ◇ **Human activities** E.g. Lake Turkana National Parks in Kenya. ◇ **Climate Change** ◇ Lack of funds

6.4 Wetland Conservation in India

Current situation in India	» **7 lakh wetlands** covering **~16 Mha i.e., 4.86%** of the total geographic area of the country.
	» India **lost 2 out of 5 wetlands** in last 3 decades

Significance of Wetlands

- **Carbon sink** and **Water storage**
- **Habitat** for wide range of Biodiversity
- **Nature's shock absorber** (prevents coastal erosion
- **Intrinsic cultural and recreational value;** create livelihoods
- **Kidneys of landscapes** (filters out contaminants).

Schemes/Policies/Initiatives in India

Wetland (Conservation and Manage ment) Rules 2017	Establishment of **Centre for Wetland Conservation and Management** (CWCM).	**National Plan for Conservation of Aquatic Eco-systems** (NPCA).	**National Mission for Clean Ganga** (NMCG)	Party to **Ramsar Convention**	**Blue Flag Certification** (India has 12 Blue Flag Beaches)

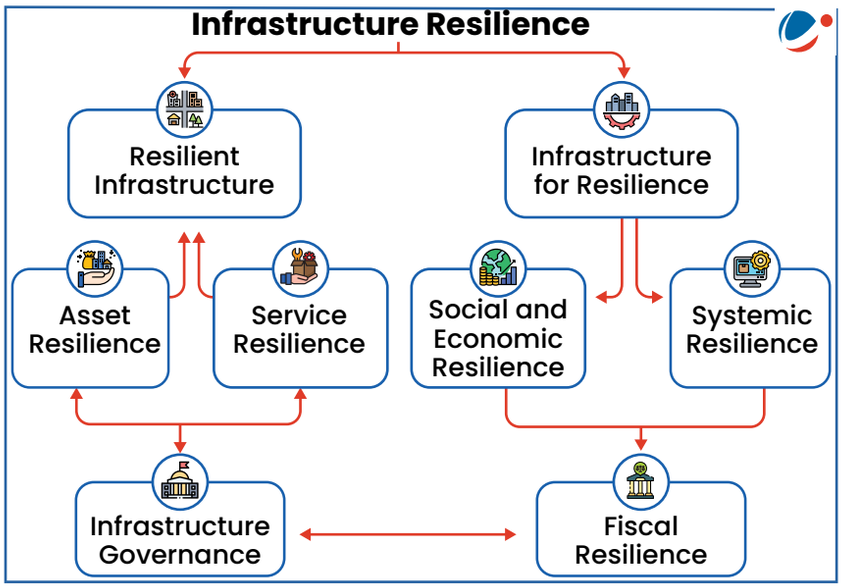
Constraints	Way Forward
◇ Groundwater salinization and over-extraction **altering natural hydrological regimes.**	◇ **Holistic and standardized protocol** for monitoring
◇ **Growing waste disposal** from urban and peri-urban areas.	◇ **Restoration of degraded wetlands.**
◇ **Proliferation of invasive species** like Water hyacinth and Salvinia.	◇ **Strict implementation** of pollution norms.
◇ Climate change impacts including sea level rise, drought, and Harmful Algal Bloom.	◇ **Proper treatment** and disposal of wastes.
	◇ **Participatory conservation** by involving local communities.

7. Disaster Management

7.1 Infrastructure Resilience

Definition

- Absorbs, responds to, recovers from hazard events.
- Supports broader social, economic, or systemic resilience.
- Doesn't generate new systemic risk.



Need for Infrastructure resilience

- **Obsolescence of infrastructure.**
- **Weak infrastructure governance.**
- **Systemic risks** like climate change and biodiversity loss.
- **Developmental benefits** include quality services.
- **Disproportionate impact** in Low and middle income countries.
- **Annual investment** required for infrastructure deficits, SDGs, and net zero by 2050.

Challenges	Way Forward
Higher upfront costs. **No common agreed** way to measure resilience.	**Private capital investment** **Standardization** and **certifications** Integrating **Nature-based Infrastructure** Solutions

7.2 Heatwave Management in India

About Heatwaves

- **IMD criteria for Heat waves:** Maximum temperature of **40 deg. C (Plains) and 30 deg. C (hills).**
- **Declaration of Heat waves:**
  - **Based on actual temperature:** Recorded maximum temperature of **45 deg. C or**

above for all locations and **40 deg. C or below for coastal locations.**

- **Based on departure from normal:** Heat wave when departure is 4 deg. C to 5 deg. C and severe heat wave when 6 deg. C.

- **Conditions favorable for Heat waves:** Absence of moisture in the upper atmosphere; Anti-cyclone; Cloudless sky etc.

Vulnerability	» **13% of the districts and 15% of the population** are moderate to very highly vulnerable
	» **4% of the districts and 7% of the population** are highly vulnerable

Initiatives taken

- Action taken by **IMD- Color code** impact based heat wave warning.
- **Heat Action Plans** by IMD

Effect of Heatwaves

- Require **new interdisciplinary Human Health**
- **Environment:** wildfires and droughts;etc.
- **Loss of productivity:** India expected to lose around **5.8% of daily working hours during to rising temperatures by 2030** (UNESCAP).
- **Economic and Social Impacts:** Increased migration, impact on food secuirty etc

Way forward (NDMA Guidelines)

- **A national level strategy** and plan
- Identity **vulnerable hotspot.**
- **New heatwave criteria** must be evolved
- Integrate **climate variability mitigation and adaptation** in heat plans.

7.3 Earthquake Management in India

About Earthquales

- **Sudden, rapid shaking of the earth** caused by the **shifting of underground rock.**
- **Causes: Tectonic Plate Movements; Fault Slippage** (Build-up of stress along the fault line overcomes the friction between rocks); Volcanic and anthropogenic activities, etc.
- **Recent Earthquakes:** Morocco (Epicentre- Atlas Mountains); Taiwan; Afghanistan

Vulnerability	» **59% of the Indian landmass** classified as earthquake-prone.
	» **11% fall in very high-risk zone V,** 18% in high-risk zone IV, and 30% in moderate-risk zone III.

Initiatives

- **Earthquake Risk Assessment and Mapping by GSI.**

- **Indian Standard Code for seismic design and construction of structures (IS 1893) by BIS.**
- **Earthquake Early Warning System (EEWS)**

Challenges	Way forward (NDMA Guidelines)
◇ **Difficult to predict** ◇ **Lack of earthquake-resilient infrastructure** ◇ **Movement of Indian and Eurasian plate** towards each other. ◇ Central Himalaya, considered a prominent **'seismic gap.** ◇ **High cost of retrofitting,** etc.	◇ Ensure **incorporation of Earthquake resistant design features.** ◇ **Facilitate selective strengthening and seismic retrofitting** of existing priority structures. ◇ Improve the compliance regime.

7.4 Landslide Management in India

About Landslides

- Occurs when gravity forces on hill slope material exceed the frictional forces holding the material in place.
- **Recent Occurrences:** Joshimath (Uttarakhand), Silkyara-Barkot tunnel, Uttarakhand

India's Landscape Susceptibility to Landslides	
	» **13.17% of India's geographical area.**
	» **4.75% of the area** is categorized as **"very highly susceptible."**

Initiatives Taken by India

- **National Landslide Susceptibility Mapping** (NLSM) Programme by **GSI.**
- **Landslide Atlas of India** by **ISRO**
- **Provisions in the MNREGA** scheme **for mitigation** of landslides.

Causes of Landslides	Way forward (NDMA Guidelines)
◇ **In Himalayas:** Steep slopes and rapid rivers and intense snowmelt or heavy rains. » Slope cutting and blasting activity for construction, lack of comprehensive land use policy, and excessive tourism. ◇ **In Western Ghats:** High gradient, basalt rocks, greater water retention and increased pore water pressure.	◇ **No construction** in the areas having **slopes above 30 degrees** or **areas falling on the spring lines and first-order streams.** ◇ Perform **load-bearing tests,** use of **hazard zonation,** and **slope and land-use maps** in urban planning. ◇ **Fast-growing trees and useful grasses** to be grown.

7.5 Crowd Disaster Management in India

Definition: When the density of a group of gathered people is critical and governed by involuntary forces, this can lead to a situation of crowd disaster or stampede.

Constitutional and Legal Provisions regarding Crowd Management

- **Article 19: Article 19 (1) (b)** provides citizens r**ight to assemble peacefully and without** arms. However, **under Article 19(3) the** Government can impose reasonable restrictions on such right.
- **Police Act of 1861:** Lays down **conditions** that may be **imposed for regulating lawful processions** and assemblies to prevent public inconvenience.
- **Disaster Management Act 2005:** Deals with vehicular and human traffic, and other areas **related to crowd management.**

Factors that may prompt crowd disasters

- **Collapse of structures:** E.g., Morbi Bridge in Gujarat
- **Fire/Electricity:** E.g., Uphaar Cinema Fire in 1997.
- **Sudden changes in Crowd Behaviour:** E.g., stampede at the Mahakumbh Mela in 1954.
- **Poor management:** E.g., Seoul crowd tragedy (2022)

Challenges to Effective Crowd Management

- Sense of **Urgency.**
- **Dangerous behaviour,** such as climbing onto equipment/ structures
- **Fatigue** due to congregated crowd.
- **Rumour or false information,** etc.

Way Forward: National Institute of Disaster Management (NIDM) Crowd Management Strategies:

- **Knowing crowd type** (age, gender, region, etc.), Motives of visitors (social, entertainment),
- **Capacity planning:** Staging points,queue complexes and multiple routes.
- **Understanding Crowd Behaviour**
- **Risk analysis** and **preparedness** through mock drills, etc.
- **Timely Information Dissemination**
- **Security measures** like CCTV monitoring etc.

7.6 Fire Safety Regulations in India

Why in the news?

Recent fire accidents in a **gaming zone in Rajkot** (Gujarat), a **firecracker factory in Harda** (Madhya Pradesh) and a **private hospital in Delhi** have raised concerns over fire safety in India.

Fire Accidents in India	» 7,435 deaths in over 7,500 fire accidents in 2022 (NCRB).

Reasons behind Major fire incidents in India

Major Fire Incidents	Non-compliance of Fire safety standards and protocols
Coaching centres in Mukherjee Nagar and Kalu Sarai (Delhi)	**Narrow staircases, Lack of emergency** exits, Lack of sprinkler system
Kumbakonam School fire (Tamil Nadu, 2004)	Usage of **highly flammable materials (thatched roof)** in building, lack of safe fire exits
AMRI Hospital fire in Kolkata (2011)	**Inactive fire alarms** and **sprinklers,** Lack of adequate training, Unsafe storage of flammable material

Existing Fire Safety Standards and regulations in India

- **Constitution:** Fire service is a **State subject** in the 12th Schedule.
- **National Building Code (NBC):** Central standard **by Bureau of Indian Standards (BIS).**
- Others: **Model Building Bye Laws 2016** by Ministry of Housing and Urban Affairs, **Model Bill 2019, Fire and Life Safety guidelines** by Ministry of Health

Challenges	Way forward
◇ **Absence of uniform safety legislation,** across states. ◇ **NBC provisions are recommendatory**. ◇ A **shortage** of 5,191 fire stations and 5,03,365 personnel in 2019. ◇ **High population density, poor urban planning.** E.g., Kamala mills fire in Mumbai 2017.	◇ **NDMA Guidelines:** » Enactment of **a Fire Act** at the state level. » Improve **outreach of Fire Services.** » **Professional Head** of fire services at state and district levels. » **R&D** of indigenous, less water-consuming fire extinguishing technologies. ◇ **13th Finance Commission Recommendations:** Municipal Corporations with populations over 1 million must develop fire hazard response and mitigation plans.

7.7 Forest Fires in India

Reasons for Forest Fires

- **Natural Causes:** Lightning; volcanic eruptions; high summer temperatures, availability of flammable chir pine trees
- **Anthropogenic causes:** (90% - IUCN): Slash and burn shifting cultivation; accidental fires, climate change etc.

 **Forest Fires in India**	◇ **13,000 thousand fire alerts** reported in 2023-24
	◇ **22% area falls** under highly and extremely fire prone category.
	◇ **Impact:** 1.6% tree cover lost between 2001 and 2023 (Odisha witnessed the highest loss).

- **Recent Occurrence:** Forest fire in Uttarakhand (2024); Australian bushfire (2019).
- **Benefits of Forest Fires:** Regeneration of certain forests; reduce fuel loads; removes undergrowth; removal of exotic, non-native species; addition of nutrients through ashes, etc.

Steps Taken

- **National:** New National Forest Policy (1988); National Action Plan on Forest Fire (NAPFF) 2018; Centrally Sponsored Forest Fire Prevention and Management Scheme of MoEF&CC etc.
- **Global:** Global Wildland Fire Network by UN International Strategy for Disaster Reduction (UNISDR); Global Fire Management Hub by FAO.

Major issues and gaps in India's forest fire management

No dedicated forest fire management **institution.**	**Minimal attention** to mitigation, prepared ness and research.	**Insufficient effort** in collecting. documenting. and utilizing fire data	**Limited efforts** to involve local communities in forest fire management.	Lack of **preventive andprepar-edness measures** to ensure better response	**Poor early warning system** to detect fires and disseminate information

Way forward: NAPFF Guidelines to manage Forest Fires

- **Fire Risk Zonation** and **mapping.**
- **Maintenance** and **creation of fire lines.**
- **Controlled burning** and fire terracing
- **Counter fire** before the main fire to exhaust fuels.
- **Fire fighter aircrafts**
- **Community participation** using Joint Forest Management.

7.8 Industrial Safety

- **Occurrences:** Chennai ammonia gas leak (2024); Chasnala Mining Disaster (1975); Bhopal Gas Tragedy (1984)
- **Regulatory Mechanism in India**
  - **Acts:** Mines Act, 1952; Civil Liability for Nuclear Damage (CLND) Act 2010; Public Liability Insurance Act (PLIA), 1991.
  - **National Green Tribunal (NGT) deals with cases related to industrial accidents.**
  - **Occupational Safety, Health and Working Conditions (OSH) Code, 2020**
  - **National Policy on Safety, Health and Environment at Workplace (NPSHEW).**
- **International Regulations Regarding Industrial Safety**
  - **ILO Convention No. 155 (Occupational Safety and Health Convention, 1981)**, not ratified by India.
  - **ILO Convention No. 187** (Promotional Framework for Occupational Safety and Health Convention, 2006), not ratified by India.
  - **International Organization for Standardization (ISO):** Example **ISO 45001:** Occupational health and safety management systems.

Issues with Industrial Safety Management	Way Ahead
◇ **Informal Economy** employing a significant portion of India's, labour where **safety regulations may not be strictly adhered** to. ◇ **Others:** Lack of reporting and national-level database; Inadequate safety regulations and enforcement.	◇ **Integrating technology and innovation:** E.g., using **real-time data, sensors, AI etc.** ◇ **Improving the training and awareness of workers and employers.** ◇ **Strengthening Regulatory Enforcement:** E.g. Implement penalties for non-compliance. ◇ **International Collaboration** for the exchange of experiences and learning.

7.9 Oil Spills

- **Definition:** Release of a liquid petroleum hydrocarbon into environment, especially marine areas
- **Recent occurrence:** Ennore Oil Spill, Tamil Nadu; Nagapattinam Oil Spill, Tamil Nadu

Causes of Oil Spills

Natural disasters like hurricanes	Accidents involving tankers, refineries, etc.	Equipment breaking down due to human errors	Deliberate acts by illegal dumping

Impacts of oil spill

- Insulating ability of fur on mammals and repelling qualities of a bird's feathers.
- Immune system and reproduction of dolphins and whales by oil inhalation.
- Obstruct passage of sunlight into sea, thereby destroying photosynthesising phytoplankton.

Initiatives taken

National	International
National Oil Spill Disaster Contingency Plan (1996): The Indian Coast Guard is the nodal agency for the Plan **Merchant Shipping Act, 1958** has provision of prevention and containment of Pollution of Sea by Oil.	International Convention on **Civil Liability for Bunker Oil Pollution Damage** (2001): India ratified in 2015 International Convention for the **Prevention of Pollution from Ships or MARPOL Convention** (India is a signatory) International Convention **on Oil Pollution Preparedness Response and Cooperation (OPRC) 1990** (India is a signatory)

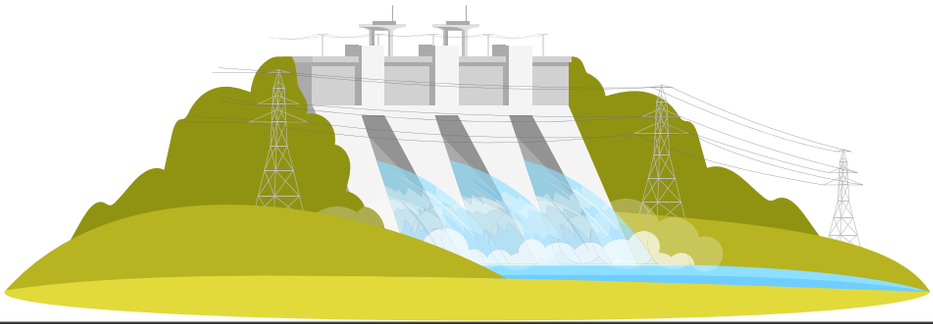
7.10 Dam Safety in India

Major Dam Failures across the globe include

- **1975: Banqiao dam failure in China.**
- **1979: Machchhu Dam failure in Morbi, Gujarat** claimed over 2,000 lives.
- **2023: Derna dam** collapse in **Libya** claimed over 3,800 lives.
- **2023: Damage to Chungthang Dam in Sikkim** due to floods.

Initiatives for dam safety

- **National: Dam Safety Act, 2021; National Register of Large Dams (NRLD) by CWC; Dam Rehabilitation and Improvement Project (DRIP)** ; Dam Health and Rehabilitation Monitoring Application **(DHARMA).**
- **Global: World Commission on Dams; International Commission on Large Dams (ICOLD),** etc.



Concerns associated with Dams	Way Forward
◇ **Ageing dams:** 80% in India over 25 years old. ◇ **Seismic vulnerability:** e.g., earthquake in Bhuj (Gujarat). ◇ **Abrasive sediments** damage turbines and other components ◇ **Reducing storage:** Around 3700 dams in India will lose 26% of the total storage by 2050 due to the accumulation of sediments. ◇ **Non-compliance with legislative mandates** as highlighted by **the CAG audit report.**	◇ **Decommissioning of large dams.** ◇ **Integrated water management considering hydrological units involving allied disciplines such as soil management, land use, etc.** ◇ **Using advanced technology for collecting information** such as remotely operated underwater vehicles **(ROVs) and drones** ◇ Building **medium or minor irrigation based small storage structures.**

7.11 Environmental Cost of War

Why in the news?

Experts have raised concerns with respect to environmental impact and associated costs of Russia-Ukraine war and the Israel-Palestine conflict.

Environmental costs of war

Stage	Associated environmental cost
Before war	◇ **Exploitation of Resources while** building military forces ◇ **Energy requirements of military mostly derived from fossil fuels.**
War	◇ **Deforestation** for **white phosphorous,** bombing of protected areas, etc. E.g., During **Vietnam War** US military cleared rainforests in Vietnam. ◇ **Others**: Air and soil pollution from debris from explosive weapons; oils pills from wrecked ships; **potential for invasive species.**
After war	◇ **Radiation from** Nuclear-weapons. ◇ **Others:** increasing hunting/poaching; budget cut for environmental projects etc.

Key Initiatives

- **Geneva Convention** imposes restrictions on warfare methods damaging environment.
- **Brundtland Report (1987)** emphasizes that **Armed conflict pose significant barriers to sustainable development.**
- **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)**

Challenges	Way ahead
◇ **Armaments and military emissions** not included in the Paris Climate Agreement. ◇ Immediate reconstruction efforts **ignore environmental considerations.** ◇ Vicious cycle of war and Climate change ◇ Difficulty in quantifying environmental damage.	◇ **UN Framework on Climate Change:** Hold responsible parties accountable based on the "polluter pays" principle. ◇ **Prioritize green and sustainable recovery.** ◇ **Educate Armed Forces** on environmental preservation. ◇ **Decarbonizing Military:** Hybrid and electric cars, install solar arrays, etc. E.g. UK

8. Geography

8.1 India Meteorological Department (IMD)

Why in the news?

India Meteorological Department (IMD) celebrated the **150th Year of its establishment and service** to India which was established in 1875.

About IMD

- **Ministry:** Ministry of Earth Sciences (MoES).
- **Role:** National Meteorological Service of India and principal government agency for meteorology and allied subjects.
- **Mandate:** Provide meteorological information and warning; and conduct research in meteorology.

Achievements of IMD	» WMO recognized three IMD observatories as long-term observing stations.
	» 39 Doppler Weather Radars (DWRs) across India by 2023
	» **Aviation Weather monitoring and forecasting** for all 117 airports
	» **Improvement in severe weather forecast accuracy** by 40-50% over the last 5 years.
	» **Air Quality Early Warning System (AQEWS):** Integrated with DSS, showing 88% accuracy for predicting extreme pollution events.
	» **Recognition:** By the UN for early warning services during Super Cyclone Amphan (2020) and Cyclone MOCHA (2023).

Challenges Faced by IMD	Way forward
◇ **Limited weather models**	◇ Invest in **advanced technologies** and infrastructure.
◇ **Data misinterpretation**	◇ **Global collaboration** for sharing data and technologies.
◇ Challenges in **predicting localized extreme weather** events	◇ **Use AI and predictive analytics** for more precise climate predictions.
◇ Difficulties due to **India's tropical climate** and complex monsoon season	◇ **Develop early warning systems.**
◇ Issues in **recruiting and retaining qualified personnel.**	◇ **Strengthen capacity** through training programs and skill development.

8.2 El-Nino - Monsoon Link

Why in the News?

A paper published in Nature's Scientific Report highlighted the regional and temporal variability of Indian summer monsoon rainfall in relation to ENSO.

About El Niño Southern Oscillation (ENSO)

- A climatic phenomenon involving fluctuating ocean temperatures in the central and eastern equatorial Pacific, coupled with atmospheric changes.
- **Study Findings:** The El Nino-monsoon relationship has diminished in Central India, strengthened in North India, and remains unchanged in South India.

Phases of ENSO

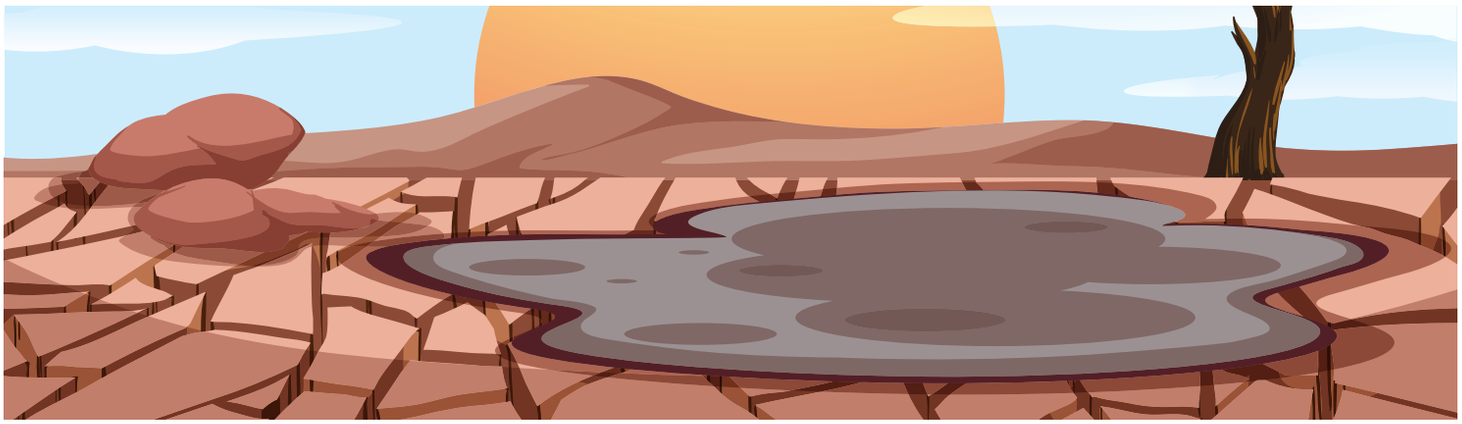
La Niña	El Niño	Neutral
La Niña: Cooling with below-average SST in the central and eastern Pacific.	**El Niño:** Warming with above-average SST in the central and eastern Pacific.	**Neutral:** SSTs are generally close to average

El Niño-Monsoon Relationship

- A major tropical **modulator of the Indian monsoon** and **largest inter-annual climate signal** in the tropics.
- **Inverse Relationship:** El Niño suppresses while La Niña enhances monsoon rainfall.

How El Niño Impacts Monsoon?

- **Weakens Walker circulation.**
- **Shifts Jet Stream** that influences weather systems and moisture transport.
- **Weakens pressure gradient** between Indian and Pacific Oceans, bringing changes in wind pattern.
- **Increases atmospheric stability,** inhibiting development of convective clouds.
- **Other impacts:** Affects marine fisheries, threatens food security, drought situations, and inflation



8.3 Triple Dip La-Nina

Why in the News?

Study on the triple-dip La Niña (2020-2023) showing peculiar impacts on air quality in peninsular and North India.

Observed Impacts

- **Peninsular India:** Poor air quality due to higher northerly wind influx and slower surface winds.
- **North India:** Improved air quality due to weaker western disturbances and faster ventilation.

About Triple Dip La Niña

- Rare event where La Niña lasts three consecutive years. Distinct in 2020-23 as it did not follow a strong El Niño.
- **Possible Explanations**
  - ENSO **interactions with Indian and Atlantic Oceans.**
  - Influence from **North and South Pacific Oceans.**
  - Smoke from **Australian bushfires** (2019-2020).
  - Changing conditions in tropical Pacific and atmosphere possibly due to **climate change.**
- **Conclusion:** Need to understand ENSO cycle variability originating beyond the tropical Pacific

Building Mental Resilience for UPSC CSE with VisionIAS Student Wellness Cell

The UPSC Civil Services Examination is one of the most prestigious exams in the country, bringing immense professional and personal satisfaction. However, the journey often involves overcoming loneliness, intense competition pressure, anxiety, and other psychological challenges. These issues can impact both your preparation and overall well-being.

At **VisionIAS**, we recognize the multifaceted nature of this journey. To support our students comprehensively, we have established a dedicated Student Wellness Cell. Since April 2024, our highly professional psychologists and experienced professionals have provided confidential and mindful support as per student needs.

From Stress Management to Academic Excellence

Enhancing Academic Performance: Effective stress management contributes to better academic outcomes.

Comprehensive Wellness Cell: Addressing various issues impacting mental health and academic performance.

Professional Mental Health Support: Seeking professional help is crucial for success in UPSC preparation.

Safe and Non-Judgmental Environment: A space for students to discuss issues and receive personalized support.

Well-Supported Mind for Excellence: Mental well-being is essential for achieving success in UPSC exams.

Confidential and Structured Support: Multiple, structured sessions based on the severity of the issues.

Common Issues and Our Approach

Our counseling services have addressed a variety of issues, including:

Anxiety and Hopelessness: Using Cognitive Behavioural Therapy (CBT) to promote positive thinking.

Lack of Motivation and Focus: Introducing time management strategies and SMART goal-setting.

Emotional Struggles: Providing a safe space for expression and techniques such as journaling and progressive muscle relaxation.

Social Isolation and Loneliness: Encouraging healthy social interactions and setting personal boundaries.

Family and Personal Issues: Offering advice on coping with family dynamics, personal loss, and significant life stressors.

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To support the larger student community, **VisionIAS** is now extending our counseling and wellness support to all students preparing for UPSC CSE, regardless of their coaching institute affiliation. Schedule a session by visiting our office at Apsara Arcade near Karol Bagh Metro Station or emailing ***student.wellness@visionias.in.***

Remember, seeking help is a sign of strength, not weakness.

Heartiest Congratulations to all Successful Candidates

16 in **TOP 20** Selections in **CSE 2023** from various programs of **Vision IAS**

Aditya Srivastava

Animesh Pradhan

Ruhani

Srishti Dabas

Anmol

Nausheen

Aishwaryam Prajapati

39 Selections in **TOP 50** in **CSE 2022**

Ishita Kishore

Garima Lohia

Uma Harathi N

SHUBHAM KUMAR

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