

PEOPLE, DEVELOPMENT & ENVIRONMENT (PDE)

Complete Exam-Oriented Study Module — MDGs & SDGs, Ecology & Biodiversity, Climate Change, Pollution, Environmental Laws, International Agreements & Natural Disasters.



MDGs, SDGs & AGENDA 2030



Ecosystem, Biodiversity & Conservation



Climate Change, Pollution & Waste



Indian Acts & International Agreements

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MODULE 01: DEVELOPMENT & ENVIRONMENT — MDGs & SDGs



Figure 1.1: The 2030 Agenda is a universal call to end poverty, protect the planet and ensure peace & prosperity for all people.

8

MDG Goals (2000–
2015)

17

SDG Goals (2016–
2030)

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SDG Targets

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SDG Indicators

1.1 Millennium Development Goals (MDGs) — 2000 to 2015

The **MDGs** were adopted at the **UN Millennium Summit in September 2000**, with all 189 UN member states agreeing to achieve 8 goals by **2015**. They arose from the Millennium Declaration.

#	MDG	Key Focus
1	Eradicate Extreme Poverty & Hunger	Halve extreme poverty rates
2	Achieve Universal Primary Education	All children complete primary school
3	Promote Gender Equality	Eliminate gender disparity in education
4	Reduce Child Mortality	Reduce under-5 mortality by 2/3
5	Improve Maternal Health	Reduce maternal mortality by 3/4
6	Combat HIV/AIDS, Malaria & Other Diseases	Halt and reverse spread
7	Ensure Environmental Sustainability	Integrate principles into policies
8	Develop a Global Partnership	Aid, trade, debt & technology transfer

1.2 Sustainable Development Goals (SDGs) — The 2030 Agenda

The SDGs were adopted on **25 September 2015** at the UN Sustainable Development Summit in New York. They emerged from the **Rio+20 Conference (2012)** and replaced the MDGs. India's **NITI Aayog** coordinates SDG implementation.

5PS FRAMEWORK OF SDGS

People (SDGs 1-5) · **Planet** (SDGs 6,12-15) · **Prosperity** (SDGs 7-11) · **Peace** (SDG 16) · **Partnership** (SDG 17)

1 No Poverty — End poverty in all forms

2 Zero Hunger — Food security & nutrition

3 Good Health — Well-being for all ages

4 Quality Education — Inclusive & lifelong learning

5 Gender Equality — Empower women & girls

6 Clean Water — Safe water & sanitation

7 Clean Energy — Affordable & modern

8 Decent Work — Economic growth for all

9 Industry & Innovation — Infrastructure

10 Reduced Inequality — Within & between nations

11 Sustainable Cities — Safe & resilient

12 Responsible Consumption — & Production

13 Climate Action — Urgent combat

14 Life Below Water — Oceans & marine

15 Life on Land — Forests & biodiversity

 PYQ ALERT: MDG VS SDG COMPARISON

Feature	MDGs	SDGs
Year Adopted	2000 (Millennium Summit)	2015 (UNGA, New York)
Timeline	2000 – 2015	2016 – 2030
Number of Goals	8 Goals, 21 Targets	17 Goals, 169 Targets
Scope	Developing countries only	Universal (all countries)
Successor Event	Rio+20 (2012) led to SDGs	—
Focus	Social development	Social + Economic + Environment

MODULE 02: ECOLOGY, ECOSYSTEM & BIODIVERSITY



2.1 Ecology — Basic Concepts

Ecology (coined by **Ernst Haeckel, 1866**) is the scientific study of interactions between organisms and their environment. The term "Environment" comes from the French word *Environner* (to surround).



2.2 Components of an Ecosystem

Component	Type	Examples	Role
Biotic	Living	Plants, Animals, Microbes	Producers, Consumers, Decomposers

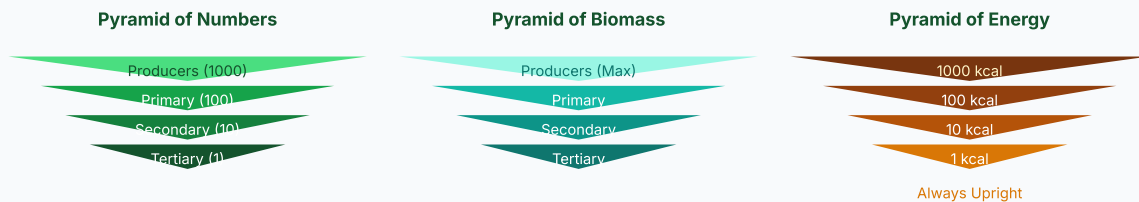
Component	Type	Examples	Role
Abiotic	Non-Living	Sunlight, Soil, Water, Air, Temperature	Physical substrate for life

2.3 Food Chain, Food Web & Ecological Pyramids

KEY DEFINITIONS

- **Food Chain:** Linear sequence of who eats whom. Energy flows in ONE direction: Producer → Primary Consumer → Secondary Consumer → Tertiary Consumer → Decomposer.
- **Food Web:** Interconnected network of multiple food chains. More realistic; offers ecological stability.
- **Trophic Level:** Each feeding level in a food chain. Producers = Trophic Level 1; Primary Consumers = TL 2, etc.
- **10% Law (Lindemann, 1942):** Only **10%** of energy is transferred from one trophic level to the next. 90% is lost as heat.

ECOLOGICAL PYRAMIDS — THREE TYPES



TRICK — WHICH PYRAMID CAN BE INVERTED?

Pyramid of Numbers: Can be inverted (e.g., One large tree → Many insects → Few birds).

Pyramid of Biomass: Can be inverted in aquatic ecosystems (Phytoplankton < Zooplankton).

Pyramid of Energy: ALWAYS UPRIGHT — never inverted. This is the most fundamental.

2.4 Biodiversity — Levels & Threats

Biodiversity (term coined by **Walter G. Rosen, 1985**) refers to the variety of life on Earth at all its levels — from genes to ecosystems. The Convention on Biological Diversity (CBD) was adopted at the **Rio Earth Summit, 1992**.

Level	Definition	Example
Genetic Diversity	Variation in genes within a species	Different varieties of rice (Indica, Japonica)
Species Diversity	Variety of species in a region	Western Ghats has 5,000+ flowering plant species
Ecosystem Diversity	Variety of ecosystems	Mangroves, deserts, wetlands, coral reefs

2.5 Conservation Methods

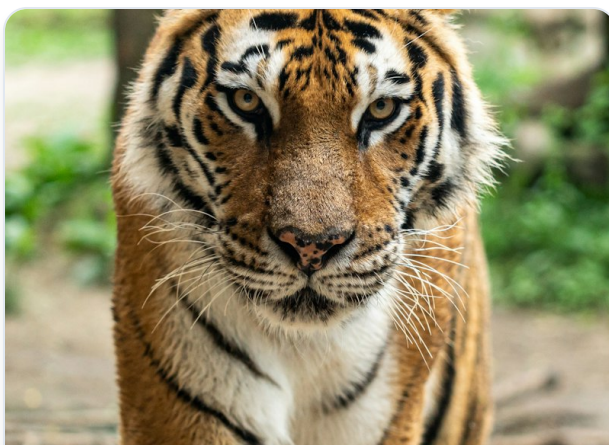


Fig 2.3: Project Tiger (1973) — India's flagship in-situ conservation. Tiger population rose from 1,827 (2014) to 3,167 (2022).



Fig 2.4: Deforestation threat — these ancient forests are being cleared at an alarming rate. India loses ~1.5 million hectares of forest annually. Deforestation is the #1 threat to biodiversity — when habitats are lost, species are lost forever.

Method	Type	Description	Examples
In-situ Conservation	On-site	Protecting species in their natural habitat	National Parks (106), Wildlife Sanctuaries (566), Biosphere Reserves (18)
Ex-situ Conservation	Off-site	Protecting species outside their natural habitat	Zoos, Botanical Gardens, Seed Banks, Gene Banks, Aquaria

🔥 PYQ ALERT: BIOSPHERE RESERVES IN INDIA

India has **18 Biosphere Reserves**. Of these, **12 are recognised by UNESCO's Man and Biosphere (MAB) Programme**. The first: **Nilgiri (1986)**. Others include: Sundarban, Gulf of Mannar, Nanda Devi, Nokrek, Pachmarhi, Simlipal, Achanakmar-Amarkantak, Great

Nicobar, Agasthyamalai, Kanchenjunga, Cold Desert, Seshachalam, Panna, Khangchendzonga, Panna, Dibru-Saikhowa, Dehang-Dibang.

MODULE 03: ENVIRONMENTAL POLLUTION & WASTE MANAGEMENT

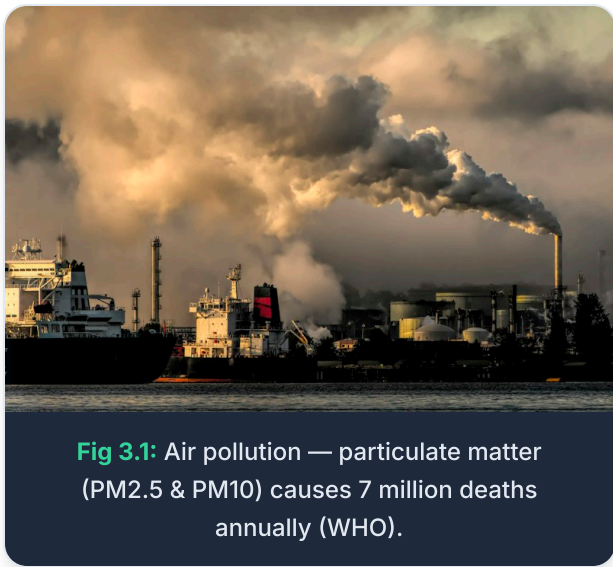


Fig 3.1: Air pollution — particulate matter (PM2.5 & PM10) causes 7 million deaths annually (WHO).



Fig 3.2: Water pollution — 2 billion people lack access to safe drinking water globally.

3.1 Air Pollution

Air pollution is the presence of harmful substances (pollutants) in the atmosphere beyond permissible limits. India follows **National Ambient Air Quality Standards (NAAQS)**.

Pollutant	Source	Health Impact
PM2.5 & PM10	Vehicles, industries, construction	Respiratory diseases, lung cancer
CO (Carbon Monoxide)	Incomplete combustion	Reduces oxygen-carrying capacity of blood
SO ₂ (Sulphur Dioxide)	Coal burning, industries	Acid rain, respiratory irritation
NO ₂ (Nitrogen Dioxide)	Vehicles, power plants	Smog formation, lung damage

Pollutant	Source	Health Impact
Lead (Pb)	Old paint, leaded petrol (phased out)	Neurological damage in children
Ozone (Ground level)	Photochemical reaction of NO _x + VOC	Chest pain, airway inflammation

3.2 Water Pollution

KEY WATER POLLUTION PARAMETERS

- **BOD (Biochemical Oxygen Demand):** Amount of oxygen needed by microorganisms to decompose organic matter. High BOD = high pollution.
- **COD (Chemical Oxygen Demand):** Oxygen needed to chemically oxidise organic compounds in water.
- **DO (Dissolved Oxygen):** Oxygen dissolved in water. Low DO = polluted water. Fish need at least 4–5 mg/L DO.
- **Eutrophication:** Excessive nutrient (N, P) enrichment → algal bloom → oxygen depletion → aquatic death zone.



Figure 3.3: Untreated industrial effluents and sewage entering rivers — India generates over 3.5 million tonnes of plastic waste annually. The **Namami Gange Mission (2014)** aims to clean the river Ganga. Industrial effluents discharged untreated into rivers are a major source of water pollution.

3.3 Noise Pollution — Permissible Levels (India)

Zone	Day (6 AM–10 PM)	Night (10 PM–6 AM)
Industrial Area	75 dB(A)	70 dB(A)
Commercial Area	65 dB(A)	55 dB(A)
Residential Area	55 dB(A)	45 dB(A)
Silence Zone (Hospitals, schools)	50 dB(A)	40 dB(A)

3.4 Waste Management



Fig 3.4: Solid Waste Management — India generates ~62 million tonnes of solid waste annually.

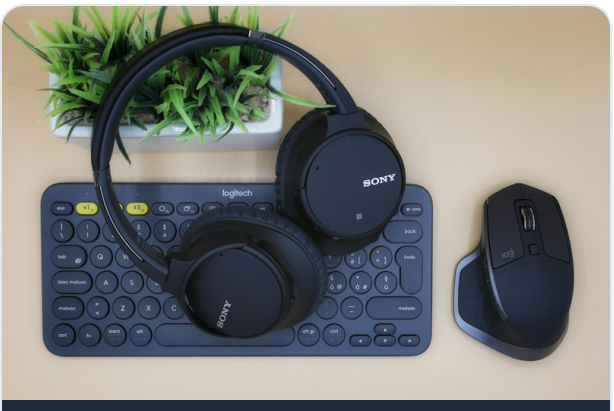


Fig 3.5: E-waste — India is the 3rd largest e-waste generator in the world (after China & USA).

Waste Type	Definition	Management Approach	Governing Rule
Solid Waste	Municipal garbage, biodegradable & recyclable	Segregation at source (wet/dry), composting, landfills	SWM Rules, 2016
Biomedical Waste	Hospitals, clinics — sharps, blood, bandages	Autoclaving, incineration, colour-coded bins	BMW Management Rules, 2016
Hazardous Waste	Industrial chemicals, toxic substances	Secure landfill, chemical treatment, incineration	HWM Rules, 2016
Electronic Waste (E-waste)	Discarded electronics — mobiles, computers	Extended Producer Responsibility (EPR), formal recycling	E-Waste Management Rules, 2016

Waste Type	Definition	Management Approach	Governing Rule
Plastic Waste	Single-use plastics, non-biodegradable	Reduce, Reuse, Recycle; India banned SUP from July 2022	Plastic Waste Management Rules, 2016

3R + 2R WASTE HIERARCHY (5R PRINCIPLE)

Refuse → Reduce → Reuse → Recycle → Recover

The **waste hierarchy** ranks waste management strategies from most preferred (top) to least preferred. Prevention (Refuse) > Reduction > Reuse > Recycling > Recovery > Disposal (landfill — least preferred).

PYQ ALERT: BIOMEDICAL WASTE COLOUR CODES

Colour	Waste Category	Disposal Method
 Yellow	Anatomical, chemical, pharmaceutical waste, soiled linen	Incineration / deep burial
 Red	Contaminated recyclables — IV tubes, syringes (without needles)	Autoclaving + shredding
 White (Translucent)	Sharps — needles, blades, glass	Autoclaving + shredding/encapsulation
 Blue	Glassware, metallic body implants	Autoclaving + shredding / recycling

MODULE 04: CLIMATE CHANGE, GLOBAL WARMING & OZONE DEPLETION



Fig 4.1: Industrial emissions — power plants and factories release CO₂, SO₂ and NO_x, the primary drivers of the enhanced greenhouse effect and global warming.

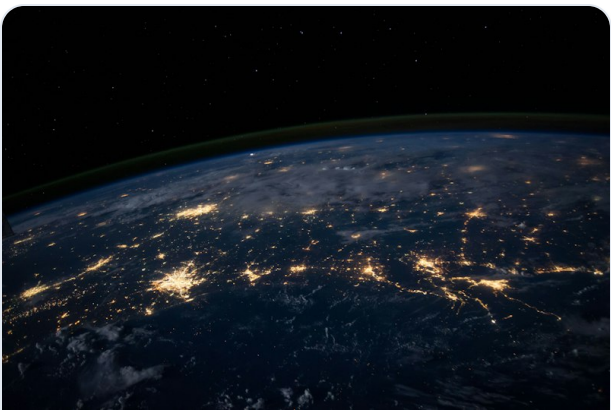


Fig 4.2: Earth's night lights from space — cities burning fossil fuels 24/7 release GHGs. The IPCC reports global temperatures have risen by ~1.1°C since pre-industrial times (1850–1900).

4.1 The Greenhouse Effect

The **Greenhouse Effect** is a natural process by which certain gases in Earth's atmosphere trap heat from the sun, keeping the planet warm. Without it, Earth's average temperature would be **−18°C** instead of the current **+15°C**.

 **MAJOR GREENHOUSE GASES (GHGS) & THEIR CONTRIBUTION**

Gas	Chemical Formula	GWP (100-yr)	Main Source
Carbon Dioxide	CO ₂	1 (reference)	Fossil fuels, deforestation
Methane	CH ₄	28–36	Rice paddies, livestock, landfills
Nitrous Oxide	N ₂ O	265–298	Agriculture, fertilisers
CFCs	CFC-11, CFC-12	4,750–10,900	Old refrigerants, aerosols
Water Vapour	H ₂ O	—	Evaporation (amplifying feedback)

GWP = Global Warming Potential (measure of how much heat a gas traps relative to CO₂ over 100 years).

4.2 Ozone Layer Depletion

The **ozone layer** (stratosphere, 15–35 km altitude) absorbs 97–99% of the sun's harmful ultraviolet (UV-B & UV-C) radiation. Chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODS) destroy ozone molecules.



Figure 4.3: The "Ozone Hole" over Antarctica was discovered in 1985 by British scientists Farman, Gardiner & Shanklin. The Montreal Protocol (1987) successfully phased out CFCs.

⚠️ EFFECTS OF OZONE DEPLETION

- Increased UV-B radiation reaching Earth's surface
- Increased risk of **skin cancer, cataracts**, and immune suppression in humans
- Damage to marine ecosystems — particularly phytoplankton (base of marine food chain)
- Reduced crop yields (UV stress on plants)

4.3 Acid Rain

Acid rain has a pH below **5.6** (normal rainwater = 5.6). It is caused by **SO₂ and NO_x** emissions from industries and vehicles reacting with atmospheric moisture.

🧪 ACID RAIN CHEMISTRY (EXAM SHORTCUT)

$\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$ (Sulphurous acid $\rightarrow$ becomes Sulphuric acid)

$\text{NO}_x + \text{H}_2\text{O} \rightarrow \text{HNO}_3$ (Nitrogen oxides $\rightarrow$ Nitric acid)

Effects: Damages buildings (Taj Mahal — "Marble Cancer"), kills aquatic life, degrades soil nutrients, and causes forest die-back.

4.4 Impacts of Climate Change — Socio-Economic & Political Dimensions

Dimension	Key Impacts
Environmental	Rising sea levels, glacier retreat, extreme weather events, coral bleaching, species extinction
Economic	Crop failures, loss of fisheries, infrastructure damage from floods/cyclones, increased energy costs
Social	Climate refugees/migration, food and water insecurity, increased disease burden (malaria, dengue)
Political	International conflicts over resources, displacement of island nations (Tuvalu, Maldives), migration-induced tensions



Fig 4.4: Industrial emissions — India is the 3rd largest CO₂ emitter globally. India's NDC pledges a 45% reduction in emissions intensity of GDP by 2030 (vs 2005 levels) and net-zero by 2070.

- The **Intergovernmental Panel on Climate Change (IPCC)** was established in 1988 by UNEP and WMO.
- Global surface temperature has risen by **~1.1°C** since pre-industrial times (1850–1900).
- Each of the last four decades has been successively warmer than any decade that preceded it since 1850.
- Sea level is rising at **3.7 mm/year** (2006–2018 average).

MODULE 05: NATURAL & ENERGY RESOURCES



Fig 5.1: Solar energy — India's installed solar capacity crossed 81 GW (2024). National Solar Mission targets 500 GW of renewable energy by 2030.



Fig 5.2: Wind energy — India is the 4th largest wind energy producer in the world. Gujarat, Tamil Nadu & Rajasthan are top states.

5.1 Renewable vs. Non-Renewable Energy

Type	Resources	Characteristics	India's Status
Renewable Inexhaustible	Solar	Photovoltaic (PV) & thermal; Largest potential in India (300+ sunny days/yr)	81+ GW installed (2024)
	Wind	Kinetic energy of moving air; Onshore & offshore	~44 GW installed
	Hydro	Potential energy of water; large dams + micro-hydro	~46 GW; Potential: 148 GW
	Biomass	Agricultural residues, wood; converts to biogas/biofuel	~11 GW installed
	Geothermal	Heat from Earth's interior; Puga Valley, Ladakh (India's best site)	Limited commercial use in India

Type	Resources	Characteristics	India's Status
Non-Renewable Finite	Tidal	Ocean tidal movements; high potential in Gulf of Kutch	Under development
	Hydrogen (Green)	Produced from renewable electricity via electrolysis	National Green Hydrogen Mission, 2023
	Coal	Most abundant fossil fuel in India; High CO ₂ emitter	India: 4th largest coal reserve globally
	Petroleum & Natural Gas	Liquid/gaseous fossil fuels; used in transport & industry	India imports ~85% of its petroleum needs
	Nuclear	Uranium/Thorium fission; Classified as non-renewable but very high energy density	22 reactors; India has world's largest Thorium reserves



Figure 5.3: India's **International Solar Alliance (ISA)** — founded by India & France at COP21 (Paris, 2015). Headquartered at Gurugram. Aims to mobilise \$1 trillion for solar energy in 121 sunshine countries by 2030.

KEY ENERGY TERMS FOR EXAM

- **Energy Security:** Reliable access to clean, affordable energy at all times.
- **Energy Efficiency:** Producing the same output using less energy input.

- **Energy Mix:** Combination of different energy sources in a country's supply.
- **Carbon Footprint:** Total GHG emissions caused by an individual, activity or product.
- **Energy Audit:** Systematic process to assess & improve energy use in a building/industry.
- **BEE (Bureau of Energy Efficiency):** Under Ministry of Power, India; implements National Mission for Enhanced Energy Efficiency (NMEEE).

 TRICK — INDIA'S RENEWABLE ENERGY TARGETS (NDC 2030)

"500 GW by 2030" — total installed renewable capacity target from non-fossil sources.

50% of electricity from renewable sources by 2030.

45% reduction in emissions intensity of GDP (vs 2005 baseline).

 PYQ ALERT: NATURAL RESOURCE CATEGORIES

Category	Based On	Examples
On the basis of origin	Biotic / Abiotic	Biotic: fish, forests; Abiotic: sunlight, minerals, water
On the basis of stock	Renewable / Non-renewable	Renewable: solar, wind; Non-renewable: coal, petroleum
On the basis of development	Potential / Actual	Potential: untapped; Actual: currently used
On the basis of ownership	Individual / Community / National / International	Rivers, oceans (international), forests (national)

MODULE 06: NATURAL HAZARDS, DISASTERS & MITIGATION



Fig 6.1: Floods — Most frequent natural disaster in India. States like Bihar, Assam & Uttar Pradesh are most flood-prone.



Fig 6.2: Earthquakes — India lies on the Eurasian and Indo-Australian plate boundary. ~59% of India's area is earthquake-prone (Zones II–V). Zone V (highest risk) covers NE India, J&K, Himachal, Uttarakhand, Gujarat & Andaman.

6.1 Key Definitions

📌 HAZARD VS. DISASTER VS. RISK VS. VULNERABILITY

- **Hazard:** A dangerous phenomenon with potential to cause harm (e.g., earthquake, flood, cyclone).
- **Disaster:** Serious disruption of community functioning that exceeds the community's capacity to cope. **Disaster = Hazard × Vulnerability / Capacity.**
- **Risk:** Probability of harmful consequences or expected losses. **Risk = Hazard × Exposure × Vulnerability.**
- **Vulnerability:** Characteristics that make a community susceptible to harm.
- **Resilience:** Ability to absorb, recover from, and adapt to hazards.

6.2 Classification of Disasters

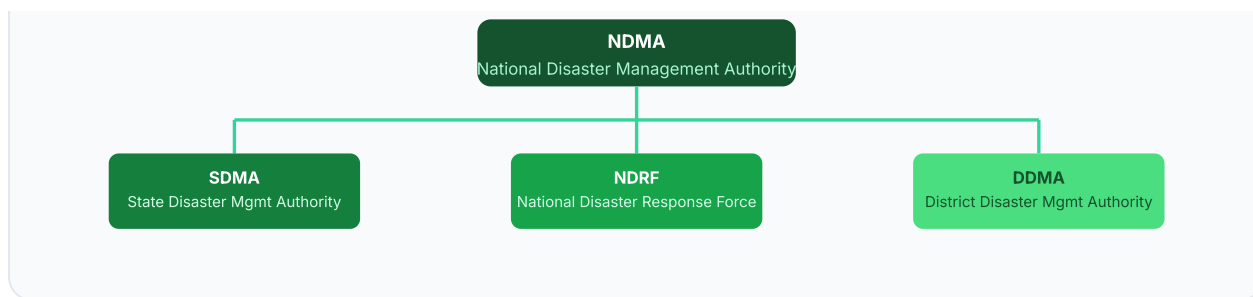
Type	Sub-types	India-specific Examples
Geophysical	Earthquake, Tsunami, Volcanic eruption, Landslide	2001 Bhuj earthquake (M 7.7), 2004 Indian Ocean Tsunami
Hydrological	Floods, flash floods, landslides (rain-induced)	2013 Uttarakhand floods, 2018 Kerala floods
Meteorological	Cyclones, heatwaves, cold waves, fog	Cyclone Amphan (2020), Odisha cyclones
Climatological	Drought, wildfires	Droughts in Vidarbha, Marathwada
Biological	Pandemics, epidemics, pest attacks	COVID-19, Locust attacks (2020)
Man-made (Technological)	Industrial accidents, nuclear accidents, oil spills	Bhopal Gas Tragedy (1984), Vizag chemical leak (2020)



Figure 6.3: Disaster Risk Reduction — The **Sendai Framework (2015–2030)** is the global blueprint for DRR, adopted at the World Conference on Disaster Risk Reduction in Sendai, Japan.

6.3 Disaster Management in India — Institutional Framework

INDIA'S DISASTER MANAGEMENT STRUCTURE



🔥 PYQ ALERT: DISASTER MANAGEMENT ACT 2005 KEY POINTS

- **NDMA:** Chaired by the Prime Minister of India. Apex body for DM in India.
- **NDRF:** 16 battalions; trained for rescue and relief operations.
- **SDRF:** State Disaster Response Fund — first line of funding for disaster relief.
- **NDRF (Fund):** National Disaster Response Fund — for major disasters beyond state capacity.
- **DM Act 2005:** Enacted after the 2004 Indian Ocean Tsunami; first comprehensive disaster law in India.

6.4 Sendai Framework for Disaster Risk Reduction (2015–2030)

Element	Details
Period	2015–2030 (successor to Hyogo Framework 2005–2015)
Adopted At	Third UN World Conference on DRR, Sendai, Japan (March 2015)
Overarching Goal	Prevent new & reduce existing disaster risk; reduce disaster losses in lives, livelihoods & assets
7 Global Targets	Reduce mortality, affected people, economic losses, infrastructure damage; increase early warning systems, national strategies, and international cooperation
4 Priorities	1) Understanding disaster risk; 2) Strengthening governance; 3) Investing in DRR; 4) Enhancing disaster preparedness

MODULE 07: ENVIRONMENTAL PROTECTION — LAWS & INTERNATIONAL AGREEMENTS



Figure 7.1: International climate negotiations — the Conference of Parties (COP) meets annually under the UNFCCC. COP28 was held in Dubai (2023); COP29 in Baku, Azerbaijan (2024).

7.1 Indian Environmental Legislation — Chronological

- **1972 — Wildlife (Protection) Act**
Protects wild animals, birds & plants. Establishes Protected Areas. Amended multiple times; latest major amendment in 2022.
- **1974 — Water (Prevention & Control of Pollution) Act**
Established Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) to prevent water pollution.
- **1980 — Forest (Conservation) Act**

Restricts de-reservation of forests and use of forest land for non-forest purposes. Prior approval of Central Government required.

- **1981 — Air (Prevention & Control of Pollution) Act**

Controls air pollution; gives power to PCBs to regulate industries; sets ambient air quality standards.

- **1986 — Environment (Protection) Act (EPA)**

Umbrella legislation enacted after Bhopal Gas Tragedy. Empowers Central Government to take all necessary measures for protecting & improving environment. CPCB & SPCBs work under this Act.

- **1991 — Coastal Regulation Zone (CRZ) Notification**

Restricts industrial activity within 500m of High Tide Line (HTL) along the coast.

- **2002 — Biological Diversity Act**

Implements Convention on Biological Diversity (CBD); establishes National Biodiversity Authority (NBA), State Biodiversity Boards, Biodiversity Management Committees.

- **2006 — Forest Rights Act (Scheduled Tribes)**

Recognises rights of forest-dwelling Scheduled Tribes (STs) and other traditional forest dwellers over forest land.

- **2010 — National Green Tribunal (NGT) Act**

Established the **NGT** — specialised judicial body for fast disposal of environment-related cases. India became the 3rd country (after Australia & New Zealand) to have a dedicated Green Tribunal.

7.2 International Environmental Agreements — Chronological

Year	Agreement / Event	Location	Key Outcome
1971	Ramsar Convention	Ramsar, Iran	Conservation of Wetlands; India has 75 Ramsar sites (most in Asia)
1972	Stockholm Conference (UNCHE)	Stockholm, Sweden	First global environmental conference; Created UNEP; June 5 = World Environment Day
1973	CITES	Washington DC	Convention on International Trade in Endangered Species; 3 appendices (I, II, III)
1987	Montreal Protocol	Montreal, Canada	Phase-out of Ozone-Depleting Substances (ODS); Most successful environmental treaty; Universal ratification

Year	Agreement / Event	Location	Key Outcome
1987	Brundtland Report	WCED	"Our Common Future" — Defined Sustainable Development as "meeting present needs without compromising future generations"
1992	Rio Earth Summit (UNCED)	Rio de Janeiro	3 Conventions: UNFCCC, CBD, UNCCD; Agenda 21; Forest Principles
1994	UNCCD	Paris	Convention to Combat Desertification
1997	Kyoto Protocol	Kyoto, Japan	GHG reduction targets for Annex I nations; CDM for developing countries; CBDR principle
2000	Cartagena Protocol	Montreal, Canada	Biosafety of Living Modified Organisms (LMOs/GMOs) in international trade
2012	Rio+20	Rio de Janeiro	Led to formulation of SDGs; Green Economy concept
2015	Paris Agreement	Paris, COP21	Limit warming to well below 2°C (target 1.5°C); NDCs by all nations; Loss & Damage fund
2022	Kunming-Montreal GBF	Montreal, COP15-CBD	30×30 target — protect 30% of land & oceans by 2030

🧠 **TRICK — MONTREAL VS KYOTO VS PARIS (MUST KNOW!)**

Feature	Montreal Protocol (1987)	Kyoto Protocol (1997)	Paris Agreement (2015)
Focus	Ozone Layer (ODS/CFCs)	Climate Change (GHGs)	Climate Change (All GHGs)
Framework	Vienna Convention	UNFCCC	UNFCCC
Targets	Top-down mandatory phase-out	Binding for Annex I only	Bottom-up NDCs (all nations)
Principle	Precautionary Principle	CBDR (Common But Differentiated Responsibilities)	Universal applicability + CBDR
Special Mechanism	Multilateral Fund	CDM, JI, Emissions Trading	NDCs, Climate Finance (≈\$100B/yr)

Feature	Montreal Protocol (1987)	Kyoto Protocol (1997)	Paris Agreement (2015)
Temp Target	—	5.2% below 1990 levels (2008–2012)	Well below 2°C; prefer 1.5°C

7.3 India's National Action Plan on Climate Change (NAPCC) — 2008

NAPCC was launched on **30 June 2008** by the Prime Minister's Council on Climate Change. It outlines India's strategy for climate change adaptation and mitigation with **8 National Missions**.

📌 THE 8 NATIONAL MISSIONS OF NAPCC — "SWEHMGAS"		
#	Mission Name	Focus Area
1	National Solar Mission (JNNSM)	Solar power — target 100 GW by 2022 (Jawaharlal Nehru National Solar Mission)
2	National Mission for Enhanced Energy Efficiency (NMEEE)	Market mechanisms for energy efficiency in industries; PAT scheme
3	National Mission on Sustainable Habitat	Energy-efficient buildings, solid waste management, public transport
4	National Water Mission	Water conservation; 20% improvement in water use efficiency
5	National Mission for Sustaining the Himalayan Ecosystem	Protect Himalayan glaciers, biodiversity & water security
6	National Mission for Green India (NMGI)	Increase forest cover; target 5 million hectares
7	National Mission for Sustainable Agriculture (NMSA)	Climate-resilient agriculture, dryland farming, risk management
8	National Mission on Strategic Knowledge for Climate Change	Research, global collaboration, knowledge networks

🔥 PYQ ALERT: INDIA'S KEY ENVIRONMENTAL BODIES		
Body	Est.	Function
CPCB (Central Pollution Control Board)	1974	Advises MoEFCC; monitors air & water quality nationally

Body	Est.	Function
MoEFCC (Min. of Environment, Forest & Climate Change)	1985	Apex ministry for environment; gives environmental clearances (EIA)
NGT (National Green Tribunal)	2010	Fast disposal of environmental cases; has own enforcement powers
NCAP (National Clean Air Programme)	2019	Target: 20-30% reduction in PM2.5 & PM10 by 2024 (vs 2017 baseline)
ISA (International Solar Alliance)	2015	India-France initiative; mobilise \$1 trillion for solar energy by 2030
CDRI (Coalition for Disaster Resilient Infrastructure)	2019	India initiative; build disaster-resilient infrastructure globally

MODULE 08: QUICK REVISION — ONE-LINERS & FLASH CARDS



Fig 8.1: "Earth provides enough to satisfy everyone's needs, but not everyone's greed."
— Mahatma Gandhi



Fig 8.2: Only 2.5% of Earth's water is freshwater; only 0.3% of that is accessible surface water. Water conservation is critical.

8.1 High-Yield One-Liners (Exams Love These!)

📌 MDGS / SDGS

- MDGs: **8 goals, 21 targets** (2000–2015). SDGs: **17 goals, 169 targets** (2016–2030).
- SDGs adopted on **25 September 2015**. Took effect from **1 January 2016**.
- SDG 13 = Climate Action. SDG 14 = Life Below Water. SDG 15 = Life on Land.
- NITI Aayog is the nodal body for SDG implementation in India.
- SDG India Index published by NITI Aayog. Kerala typically ranks #1.

📌 ECOLOGY & BIODIVERSITY

- Ecology coined by **Ernst Haeckel (1866)**.
- Biodiversity coined by **Walter G. Rosen (1985)**. Edward O. Wilson popularised the term.
- India: Mega Biodiversity country — 17 megadiverse countries worldwide.
- 10% energy transfer law — **Lindemann (1942)**.
- India has 106 National Parks, 566 Wildlife Sanctuaries, 18 Biosphere Reserves.
- Convention on Biological Diversity (CBD) — Rio Earth Summit, 1992. In force: 1993.

- Hotspots of biodiversity: India has 4 — **Himalaya, Western Ghats, Indo-Burma, Sundaland.**

📌 CLIMATE CHANGE & AGREEMENTS

- UNFCCC established in **1992 (Rio)**; entered into force **1994**.
- IPCC established **1988** (UNEP + WMO). Shared Nobel Peace Prize **2007** with Al Gore.
- Kyoto Protocol adopted **1997**, entered into force **2005**. USA did not ratify.
- Paris Agreement adopted **December 12, 2015 (COP21)**. Entered into force: **November 4, 2016**.
- Target of Paris Agreement: Keep warming well below **2°C**, preferably **1.5°C**.
- Montreal Protocol (1987) = Most successful treaty ever. Phased out CFCs. 198 parties (Universal ratification).
- Ramsar Convention (1971) — Wetlands. India's 1st Ramsar site: **Chilika Lake** & Keoladeo National Park (1981).

📌 INDIA-SPECIFIC ENVIRONMENT FACTS

- EPA 1986 — called the "Umbrella Act" for environment. Enacted after **Bhopal Gas Tragedy (1984)**.
- NGT established under NGT Act 2010. Principal Bench at **New Delhi**. Regional Benches at Bhopal, Pune, Kolkata, Chennai.
- India's first environmental court: **National Green Tribunal (2010)**.
- India's forest cover: ~21.76% of total geographical area (State of Forest Report 2021).
- Highest forest cover state: **Madhya Pradesh** (in absolute area). **Mizoram** (by percentage %).
- NAPCC launched: **30 June 2008**. 8 missions including Solar, Water, Green India missions.
- Jawaharlal Nehru National Solar Mission (Mission 1 of NAPCC) launched **2010**.

8.2 Important Environment Days

Date	Day	Focus
2 February	World Wetlands Day	Ramsar Convention adopted (1971)
21 March	World Forest / Earth Day	Forest conservation
22 March	World Water Day	Freshwater conservation (since 1993)
22 April	Earth Day	Environmental protection; first held 1970

Date	Day	Focus
5 June	World Environment Day	Established by Stockholm Conference (1972)
16 September	World Ozone Day	Montreal Protocol signed (1987)
2 December	National Pollution Control Day	Bhopal Gas Tragedy Anniversary (1984)
11 December	International Mountain Day	Mountain ecosystem protection

8.3 PYQ — Expected Pattern Questions

⚠ MOST REPEATED PYQ TOPICS — MUST REVISE

1. Identify the correct number of SDGs / MDGs and their year of adoption.
2. Match the international agreement with its focus area (Montreal = Ozone; Kyoto = GHGs; Paris = NDCs).
3. Which pyramid of ecology can be inverted? (Answer: Numbers & Biomass; NEVER Energy).
4. 10% Law — who propounded it? (Answer: **Lindemann, 1942**).
5. In-situ vs Ex-situ conservation — match with examples (National Park vs Zoo).
6. The 8 Missions of NAPCC — name & their objectives (especially Solar, Water & Green India).
7. BOD — High BOD means (more/less) pollution? (Answer: **More pollution**).
8. Ramsar convention is about? (Answer: **Wetlands**).
9. Which body coordinates SDG implementation in India? (Answer: **NITI Aayog**).
10. Biomedical waste colour codes — Yellow bin contains? (Answer: Anatomical waste, chemical waste).

📌 ASSERTION-REASONING COMMON TYPE

A: The Pyramid of Energy is always upright in all ecosystems.

R: Energy decreases at each successive trophic level due to the 10% law of energy transfer.

→ **Answer: Both A and R are true, and R is the correct explanation of A.**

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