# UGC-NET Paper I Unit IX: People, Development and Environment

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## 1. Development and Environment: MDGs and SDGs

**Millennium Development Goals (MDGs):** 8 goals adopted at the UN Millennium Summit (2000), with a target year of 2015 — poverty and hunger, primary education, gender equality, child mortality, maternal health, HIV/AIDS and other diseases, environmental sustainability, and global partnership.

**Sustainable Development Goals (SDGs):** adopted in September 2015 as the '2030 Agenda for Sustainable Development'; 17 goals, 169 targets, applicable to all countries. Guiding principle: 'leave no one behind'.

| SDG | Theme | SDG | Theme |
|---|---|---|---|
| 1 | No poverty | 10 | Reduced inequalities |
| 2 | Zero hunger | 11 | Sustainable cities and communities |
| 3 | Good health and well-being | 12 | Responsible consumption and production |
| 4 | Quality education | 13 | Climate action |
| 5 | Gender equality | 14 | Life below water |
| 6 | Clean water and sanitation | 15 | Life on land |
| 7 | Affordable and clean energy | 16 | Peace, justice and strong institutions |
| 8 | Decent work and economic growth | 17 | Partnerships for the goals |
| 9 | Industry, innovation and infrastructure | | |

**Sustainable development** (Brundtland Report, *Our Common Future*, 1987): development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In India, NITI Aayog monitors progress through the SDG India Index.

## 2. Human and Environment Interaction

Anthropogenic (human-caused) activities affecting the environment: deforestation, urbanisation, industrialisation, intensive agriculture (fertilisers, pesticides), mining, burning of fossil fuels, dams and over-extraction of groundwater. Effects include habitat loss, biodiversity decline, pollution, soil erosion, desertification and climate change.

## 3. Environmental Issues: Pollution

**Air pollution**

- Major pollutants: particulate matter (PM10, PM2.5 — particles with diameter of 10 and 2.5 micrometres or less), sulphur dioxide ($SO_2$), nitrogen oxides (NOx), carbon monoxide (CO), ground-level ozone ($O_3$), ammonia, lead.
- $SO_2$ and NOx cause **acid rain**; NOx and hydrocarbons form photochemical smog.
- India's **Air Quality Index** (2014) has six categories: good, satisfactory, moderate, poor, very poor, severe. The **National Clean Air Programme** (NCAP) was launched in 2019.

**Water pollution**

- Sources: sewage, industrial effluents, agricultural run-off, oil spills.
- **BOD** (Biochemical Oxygen Demand): high BOD indicates high organic pollution. **Eutrophication**: nutrient enrichment (nitrates, phosphates) causing algal blooms and oxygen depletion.

| Disease | Cause |
|---|---|
| Minamata disease | Mercury |
| Itai-itai disease | Cadmium |
| Blue baby syndrome | Nitrates in drinking water |
| Fluorosis | Excess fluoride |
| Arsenicosis | Arsenic in groundwater (e.g. West Bengal) |
| Black-foot disease | Arsenic |

**Soil pollution:** caused by excess fertilisers and pesticides, industrial waste, heavy metals, plastics and e-waste.

**Noise pollution:** measured in decibels (dB). CPCB ambient noise limits:

| Zone | Day (dB) | Night (dB) |
|---|---|---|
| Industrial | 75 | 70 |
| Commercial | 65 | 55 |
| Residential | 55 | 45 |
| Silence zone | 50 | 40 |

## 4. Waste

| Type | Key rules in India |
|---|---|
| Solid waste | Solid Waste Management Rules, 2016 (segregation at source) |
| Plastic waste | Plastic Waste Management Rules, 2016 (single-use plastic ban from July 2022) |
| Bio-medical waste | Bio-Medical Waste Management Rules, 2016 — colour coding: yellow (anatomical, soiled waste), red (contaminated recyclable plastic), white/translucent (sharps), blue (glassware) |
| Hazardous waste | Hazardous and Other Wastes Rules, 2016 |
| E-waste | E-Waste (Management) Rules, 2022 — Extended Producer Responsibility |
| Liquid waste | Sewage treatment plants; Namami Gange programme |

## 5. Climate Change

- **Greenhouse gases (Kyoto basket):** carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride ($SF_6$); nitrogen trifluoride ($NF_3$) was added later. $CO_2$ is the largest contributor; methane comes from paddy fields, livestock and landfills.
- **Ozone depletion** is caused mainly by CFCs and halons; it is a separate issue from global warming.
- **IPCC** (Intergovernmental Panel on Climate Change) was set up in 1988 by WMO and UNEP.
- **Impacts:** rising temperatures, melting glaciers, sea-level rise, extreme weather, crop losses, water stress, health risks.
- **Socio-economic and political dimensions:** unequal responsibility and vulnerability between developed and developing countries ('common but differentiated responsibilities'), climate finance, technology transfer, climate refugees and climate justice.

## 6. Impacts of Pollutants on Human Health

| Pollutant | Health effect |
|---|---|
| PM2.5 | Enters lungs and blood; respiratory and heart disease |
| Carbon monoxide | Reduces oxygen-carrying capacity of blood |
| Lead | Damages nervous system, especially in children |
| $SO_2$ and NOx | Respiratory irritation, asthma |
| Ozone (ground level) | Lung damage |
| Noise | Hearing loss, stress, hypertension, sleep disturbance |

## 7. Natural and Energy Resources

| Resource | Key points |
|---|---|
| Solar | Abundant in India; solar parks, rooftop solar; National Solar Mission (2010). Solar is now the largest source of India's renewable capacity (excluding large hydro) |
| Wind | Mainly in Tamil Nadu, Gujarat, Karnataka, Maharashtra, Rajasthan; offshore potential |
| Hydro | Renewable but dams cause displacement and ecological change |
| Geothermal | Heat from the Earth's interior (e.g. Puga Valley, Ladakh) |
| Biomass | Energy from organic matter: crop residue, dung, biogas |
| Nuclear | Low-carbon but raises waste and safety concerns; plants include Tarapur, Kudankulam, Kalpakkam, Rawatbhata |
| Soil | Basis of agriculture; threatened by erosion, salinity and degradation |
| Forests | Carbon sinks, biodiversity, livelihoods; India's target of 33% area under forest and tree cover (National Forest Policy, 1988) |

**India's targets:** 500 GW of non-fossil fuel electricity capacity by 2030 and net-zero emissions by 2070 (announced at COP26, Glasgow, 2021). The updated NDC (2022) commits to reducing the emissions intensity of GDP by 45% by 2030 from 2005 levels and achieving about 50% of installed power capacity from non-fossil sources by 2030.

## 8. Natural Hazards and Disasters

**Hazards:** earthquakes, tsunamis, floods, cyclones, droughts, landslides, heat waves, avalanches, forest fires. A hazard becomes a disaster when it causes widespread loss that exceeds a community's capacity to cope.

- Earthquake magnitude is measured on the Richter (now moment magnitude) scale; intensity on the Mercalli scale.
- Tsunamis are caused mainly by undersea earthquakes (e.g. the 2004 Indian Ocean tsunami).

**Disaster management cycle:** mitigation → preparedness → response → recovery.

**Mitigation strategies**

- Structural: earthquake-resistant buildings, embankments, cyclone shelters, check dams.
- Non-structural: early warning systems, hazard mapping, land-use planning, building codes, awareness, insurance, community-based disaster management.

**Institutions and frameworks**

- **Disaster Management Act, 2005** created the National Disaster Management Authority (NDMA), chaired by the Prime Minister, and the National Disaster Response Force (NDRF).
- **Sendai Framework for Disaster Risk Reduction, 2015–2030:** global framework with seven targets.
- Earlier: Hyogo Framework for Action (2005–2015).

## 9. Environmental Laws and Policies in India

| Law / policy | Year |
|---|---|
| Wildlife (Protection) Act | 1972 |
| Water (Prevention and Control of Pollution) Act | 1974 |
| Forest (Conservation) Act | 1980 |
| Air (Prevention and Control of Pollution) Act | 1981 |
| **Environment (Protection) Act** — an umbrella law enacted after the Bhopal gas tragedy (1984) | 1986 |
| Biological Diversity Act | 2002 |
| National Green Tribunal Act | 2010 |

**National Action Plan on Climate Change (NAPCC), 2008** — eight national missions:

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Ecosystem
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

## 10. International Agreements and Efforts

| Agreement / event | Year | Key points |
|---|---|---|
| Stockholm Conference on the Human Environment | 1972 | First global environment conference; UNEP set up (HQ Nairobi); 5 June is World Environment Day |
| Vienna Convention | 1985 | Framework for protecting the ozone layer |
| Montreal Protocol | 1987 | Phase-out of ozone-depleting substances (CFCs, halons); Kigali Amendment (2016) phases down HFCs |
| Rio Earth Summit (UNCED) | 1992 | Produced UNFCCC, Convention on Biological Diversity, Agenda 21, Rio Declaration and Forest Principles |
| Convention on Biological Diversity (CBD) | 1992 | Conservation, sustainable use, fair benefit sharing. Cartagena Protocol (2000) on biosafety; Nagoya Protocol (2010) on access and benefit sharing; Kunming-Montreal Global Biodiversity Framework (2022) with '30×30' target (protect 30% of land and sea by 2030) |
| Kyoto Protocol | 1997 (in force 2005) | Binding emission cuts for developed (Annex I) countries; mechanisms: emissions trading, Clean Development Mechanism, Joint Implementation |
| Paris Agreement | 2015 (COP21) | Keep warming well below 2°C and pursue 1.5°C; Nationally Determined Contributions from all countries |
| International Solar Alliance (ISA) | 2015 | Launched by India and France at COP21; HQ at Gurugram, India |
| Rio+20 | 2012 | 'The Future We Want'; started the SDG process |