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- 1.1 The social interactions of a person with other people is defined as psychological environment. The interpersonal relations among people in a society form part of it.
- 1.2 The cultural dimensions of environmental decision making involves taking certain cultural factors into account such as the customs, the rituals & practices of that culture.
- 1.3 Having an ethical relationship with environment is called ~~a~~ environmental ethics. Taking decisions regarding environment on the basis of what is ethically wrong or right is basically environmental ethics.
- 1.4 The variety of flora & fauna ⁱⁿ of a particular habitat is known as biodiversity of that place. It is important because it balances the ecosystem.
- 1.5 Challenges related with environment —
→ Environment pollution & degradation
→ Global warming
- 1.6 → National Action Plan for Climate Change (NAPCC)
→ Clean Ganga Mission (Namami Gange)

1.7 Environmental technologies —

- Green buildings
- E-vehicles
- Solar pumps (solar power)

1.8 Eco-friendly technologies are environmentally sustainable technologies. These are designed to reduce carbon footprint and as an alternative to conventional technologies. Example — Solar energy, E-vehicles, Wind energy, etc.

1.9 Fossil fuels are formed due to submergence of organisms under freshwater million years ago (e.g. petroleum products) or getting trapped under rock surface (e.g. coal). While natural gas is trapped gas under rocks. This mainly contains methane & some quantity of Butane & Propane.

1.11 Geological Timescale is representation of major geological events in form of a calendar. This is categorised into Era, eon, epoch & periods.

1.12 Steps of soil formation —

- Weathering of parent material
- Erosion by various erosion agents such as water, wind, glaciers, etc.
- Transportation of eroded material & sedimentation
- Deposition of transported material.

1.13

National Biodiversity Authority of India was formed in 2003, under the Biodiversity Act, 2002. It is responsible for regulating & monitoring all the issues related to biodiversity & its conservation.

1.14

Hydrosphere is that part of the Earth which is covered with water. It consists around 70% of total earth's surface. It maintains the water cycle & provide life & home to ~~thor~~ millions of organisms.

1.15

Greywater is household or domestic waste water (except toilet wastewater). This can be recycled and can be reused in garden, irrigation & as in toilet flush.

- 2.1 Effects of human activities on the environment —
- Increased carbon footprint due to more & more urbanisation & industrialization.
 - Increased greenhouse gases emission.
 - Ozone depletion.
 - Water pollution due to industrial & agricultural waste such as toxic pesticides.
 - Ground water contamination due to mixing of sewage water & other such waste.
 - Habitat loss of wildlife due to encroachment of forest areas & deforestation.
 - Increase in human-animal conflict.

2.2 Jalshakti Abhiyan was launched in 2019 by Jalshakti Ministry.

Salient features —

- Watershed management & development
- Wastewater treatment
- Groundwater & aquifer recharge
- Rainwater harvesting
- Targeted afforestation
- Conservation & promotion of traditional water bodies.
- Focus of efficient irrigation methods.
- Revival of drying rivers & other water bodies.

2.3 Constitution of India provides for various provisions related to environment and its protection. These are -

- Part IV (DPSP) - Article 48A was added through 42nd Constitutional Amendment Act, 1976. It provides for protection of environment & wildlife.
- Part IV A (fundamental duties) - It provides for citizen's duty to protect ~~envi~~ natural environment including, river, lakes, & wild life.
- Article 21 Under Part III (Fundamental Rights) provides for Right to have healthy environment, clean air, etc.

2.4 Effects of environment change in human development -

- Rising air pollution leads to various health conditions such as lung cancer etc.
- Water pollution & ^{ground} water contamination leads to various health problems.
- Soil pollution due to excessive use of pesticides (because of Green Revolution) leads to bioaccumulation & biomagnification.
- Increasing number of vehicles leads to more & more air pollution.
- Rapid industrialization has resulted in deforestation & thus loss of biodiversity.
- Habitat loss of wildlife.

2.5 Issues & challenges related with environment in India —

- India is one of largest emitter of carbon.
- India has 14% of world population but it is responsible for 7% of Greenhouse gas emissions.
- India is one of largest groundwater extractor in the world.
- India has a coastline of 7500 km which is vulnerable to climate change induced sea level rise.
- Unscientific agriculture & irrigation practices are responsible for soil pollution & groundwater depletion & contamination.
- Lack of proper implementation of existing Environment protection laws & rules.

2.6 Environmental education involves education & awareness generation regarding environment, its relevance, its protection & conservation. The environment & its protection has a direct bearing on human health & safety. The mindless exploitation of natural resources & environment degradation leads to various health hazards in humans. For example excessive exploitation of natural resources puts a threat on food security for future generation, Excessive pollution of water, air, soil, etc leads to various health conditions such as cancer, ~~food~~ & other life threatening diseases. Hence, this is paramount to focus on environmental education.

2.7 Eco-friendly technologies are environment-ally sustainable technologies. These are developed to reduce human carbon emissions in order to protect & conserve environment & fight climate change. These technologies include, solar energy, wind energy, wave energy, biofuels, e-vehicles, green architectures, etc. These technologies provide alternatives to conventional energy sources & thus help control the environment degradation & climate change in a more effective & efficient way.

2.8 Geology is ~~the~~ ^a discipline of physical sciences under which the evolution of earth is studied. It includes formation & origin of earth & other planets, study of interior as well exterior of earth, the rock formation & life-cycle of rocks & its various types, etc. Geology is as a branch of physical science has vital importance as it helps understand the origin & evolution of earth, the major geological events related to earth, & thus helps understanding the present state of earth & helps estimating future geological changes.

2.9 The origin of earth is traced back to ~~4.5~~ 4.5 Billion years ago. Various theories have been given by various geologists & geographers regarding this. According to Emanuel Kant's theory of Nebular hypothesis, earth was originally a nebula of gases which evolved as a planet later on. Later Laplace improvised it & gave his Revised Nebular Hypothesis regarding earth's origin. But, the most accepted theory is Edwin Hubble's 'Big Bang theory'. According to which Universe was originated from a concentrated mass of tiny ball which kept expanding & galaxies & solar systems ~~are~~ ^{were} formed.

2.10 ~~the~~ Difference between minerals & ores

Minerals

- Naturally occurring substances
- They exist as single element, e.g. Sulphur.
- They are the natural form in which a metal can exist
- All minerals are not ores
- Example - Sulphur, Iron, Zinc, Aluminium, etc

Ores

- Naturally occurring substance which contains metals & minerals.
- Metals & minerals are extracted from it e.g. Bauxite → Aluminium
- One ore can contain one or more metals
- All ores are minerals
- Examples - Bauxite, Hematite, Magnetite, etc

2.11 Difference between erosion & weathering

Weathering

- It is disintegration of parent rock
- It occurs under environmental conditions like pressure, heat, etc
- No displacement of rocks takes place
- It involves compaction & contraction of rocks
- Weathering can be mechanical, chemical, organic, etc

Erosion

- It is transportation of weathered material
- It is done by various erosional agents such as water, wind, glacier, etc
- Displacement of rocks takes place
- It doesn't involve it
- Erosion can be wind erosion, water erosion, etc

2.12 Groundwater related problems in India -

- Overirrigation
- Waterlogging & leaching
- Fluoride, Arsenic, Uranium, etc contamination
- Sewage leakage
- Industrial & chemical waste mixing
- Agriculture waste such as pesticides
- Unscientific agriculture such as growing water intensive crops in water stressed regions
- Rainwater runoff
- Lack of watershed management & aquifer recharge system.

3.1 Around 24% of India's area is under Forest cover (as per State of the Forest Report, 2020). And India stands 10th in the world in forest area ranking. This allows India to become one of top countries in the world which has 'Mega biodiversity' in terms of wild flora & fauna.

India represents two bio-geographic realms of the world that is Palaearctic (Himalayan Region), & Indo-Malayan Realm (Rest of India).

India has 5 Biomes that are Himalayan Region, Western Ghats, Deserts, Coastal areas, etc. And India also comes under 4 Biodiversity Hotspots of the world that are Himalayan Region, Indo-Burma, Biodiversity Hotspots, Western Ghats & (including Sri Lanka), & Sundaland Hotspot (Nicobar group of Islands are under this).

The biodiversity of an area is described by the variety of wild life including flora & fauna it has.

The various biodiversity areas of India are -

→ Himalayan region → It consists of Western Himalayan region & eastern Himalayan region.

Western Himalayan Region → It has temperate climate with low rainfall

Flora - Fir, Pine, Birch, Aodendron, etc

Fauna - Snow leopard, Kashmiri stag (Hangul), Chiru, Pashmings goat, etc

Eastern Himalayas

Flora - Pine, Deodar, Tropical deciduous trees such as sal, teak in N-E states.

Fauna - Red Panda, Golden langur, Elephants, Rhinos, Porcupines, ~~she~~ musk deer, Sangai deer, etc

Western Ghats - Tropical climate with huge rainfall

Flora - Tropical trees such as sal, sagwan, sandalwood, Shola forests

Fauna - Malabar civet, Lion tailed macaque, Elephants, tigers, various species of snakes, etc

Andaman & Nicobar Islands - Equatorial climate with abundant rainfall

Flora - Mangroves & other tropical trees

Fauna - Dugongs, various species of turtles & butterflies, etc

Sundarban delta

Flora - Tropical trees, Mangroves

Fauna - Gharials, Bengal tigers, fishing cats, etc

India is home to thousands of species of wild flora & fauna & represents a large range of wildlife biodiversity.

3.2 India has emerged as a forerunner in environment protection measures policies. It ranked 5th in German watch's Climate Performance Index, 2021.

In the recent decades,

India has taken various policy measures & enforced various laws & regulations for environment protection. These can be enumerated as -

- ① Wildlife Protection Act, 1972 - After participating in Stockholm Conference (1972) India enacted this legislation for wildlife protection. It provides varied degree of protection to wild flora & fauna, and also sets penalties for the violators. NTCA is set up under this Act.
- ② Water (Protection & Regulation) Act, 1974 - It was enacted to deal with all the protection & regulation issues related to water including ground water. Central Water Board is formed under it.
- ③ Air (Protection & Regulation) Act, 1981 - It was enacted to take care of all the regulations regarding air quality, emission controls & protection of air.
- ④ Environment Protection Act, 1986 - It was enacted in the wake of Bhopal Gas Tragedy (1984). Various bodies are set up under this for environment protection. These are

National Tiger Conservation
Genetic Appraisal Committee, National Wildlife
Board etc.

⑤ National Biodiversity Act, 2002 - It was enacted to protect & conserve biodiversity of India. National Biodiversity Board Authority is setup under this.

⑥ National Green Tribunal Act, 2010 - It was enacted to deal with all the legal cases regarding environment protection. A National Green Tribunal which is a quasi-judicial body is setup under this.

⑦ Other measures - CRZ rules; waste management rules, 2016; E-waste policy, etc

International treaties → India has signed various international treaties & conventions for environment protection.

These are - Paris Climate Agreement, United Nations Framework for Climate Change (UNFCCC), Convention of Biological Diversity (CBD), Convention to Combat Desertification (UNCCD), REDD+, Kyoto Protocol, Montreal Protocol, Bonn Convention, Stockholm Convention, etc.

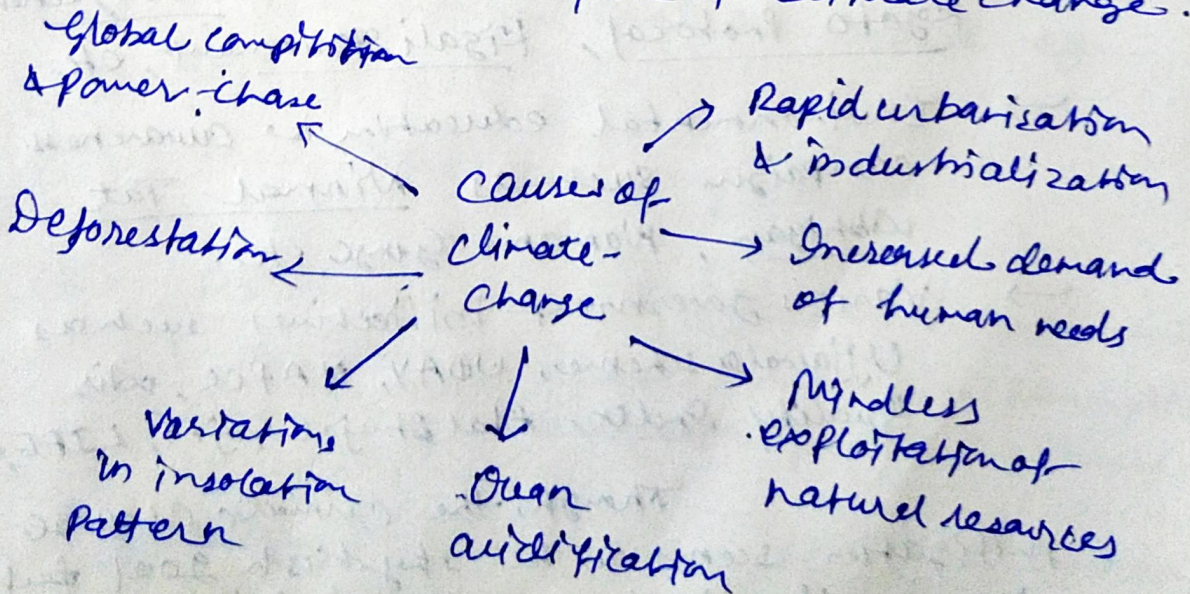
India has a strong framework for biodiversity & environment protection & it endeavours to perform better in future.

3.3. Environment change or Climate change can be defined as variations in climate of a place over a period of time.

These variations or changes can be natural or man-made.

Natural Reasons of climate change involve the geological cycle of earth which keeps changing over the period of time. The earth is kept changing since its origin & these variations are part of its evolution.

Man-made or anthropogenic reasons may be rapid industrialization, rising urbanisation & global competition of development & advancement. It led to environmental degradation & it has increased the pace of climate change.



Impacts of Climate Change

- Global warming
- Various health hazards
- Loss of biodiversity
- Human-wildlife conflict
- Resource crunch
- Ocean acidification
- Early mortality of ocean organisms
- Rise in sea level
- Frequent occurrence of extreme weather events such as cyclones, storm surge etc
- Variation in rainfall, due to frequent El-Nino & La-Nina events
- Threat on food security & variation in food production & productivity.

Steps taken

- Various laws such as Environment Protection Act, Wildlife Protection Act, etc
- Various treaties such as Paris Agreement, Kyoto Protocol, Kigali Agreement, etc
- Environmental education & awareness campaign such as Nisarga Tat, Ashrayan, Atamami Gharje, etc.
- Various government initiatives such as Ujjwala scheme, WDAY, NAPCC, Air Quality Index, Atal Bhujal Yojna, LIFE, etc

Though, the climate change mitigation seems to be sky-high goal but with effective implementation of policy, it can be achieved.

8.4

Rocks are made due to compaction & contraction of parent material under various environmental conditions such as pressure, heat etc.

Types of rocks →

- Igneous
- Sedimentary
- Metamorphic

(I) Igneous Rocks → Formed due to solidification of magma or lava.

Types — (1) Intrusive or plutonic → Formed below the earth surface due to solidification of magma which can not escape. These are crystalline & coarse grained. eg. Granite

(2) Extrusive or basaltic → Formed above the surface of earth. Lava solidifies & fine grained rocks are formed. eg. - Basalt.

These rocks have no fossils.

(II) Sedimentary — Formed due to sedimentation & deposition of igneous rocks or metamorphic rocks. These are stratified & are porous. ex. Coal

These are known for its fossil content,

(III) metamorphic rocks - formed due to metamorphism (change of form) of Igneous & sedimentary rocks under immense pressure.

e.g. marble

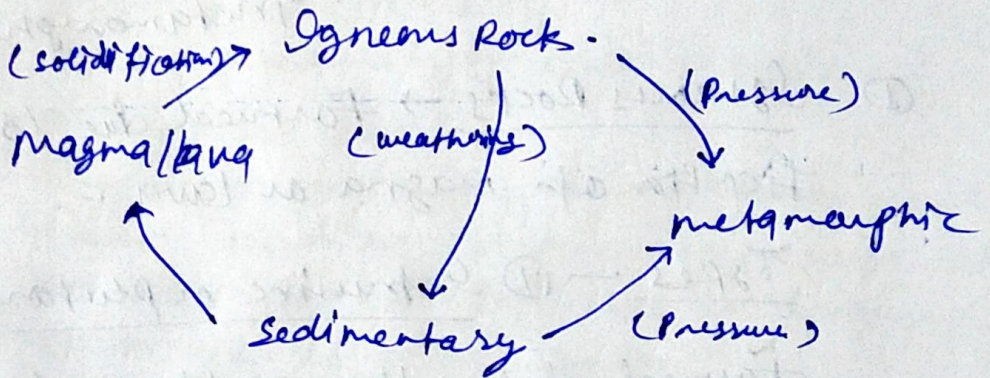


figure - Rock cycle

3.5 India is one of largest groundwater extractor in the world as per Water Quality Report.

According to Economic Survey 2020-21, more than 80% districts of India are water stressed.

Reasons for Ground water depletion —

- Unscientific irrigation method
- Not following the demands of agro-climatic zones
- Production of water intensive crops such as rice in water stressed states like Haryana, Punjab.
- Export of water guzzling crops like rice.
- Overirrigation
- No effective methods of rain water harvesting
- ~~No~~ lack of aquifer recharge
- Water logging issue
- Rain water runoff

Steps taken by Government of India —

- Various schemes like Atal Bujal Yojna (World Bank funded), Jalshakti Abhiyan, etc.

- Promotion of efficient irrigation system such as Drip & Sprinkle method.
- Revival of traditional wells & other irrigation sources
- check dams at grass root level for rain water harvesting
- Construction of Buffer zones for aquifer recharge
- Promotion of Zero Budget Natural Farming for efficient irrigation
- Schemes such as 'PM Kisan sinchai Yojna' & its components like 'soil Khet ko pani' & 'Per drop more crop' etc.

Government of India has been ~~doing~~ taking various policy measures for ground water protection. The better implementation of existing laws & policies, additionally community participation to conserve the ground water is need of the hour.