

Millennium Development And Sustainable Development Goals

To understand this topic we must first understand what Sustainable Development is? Sustainable Development is the development which meets the needs of the present without disturbing the future generations to meet their own needs. It is based on the three pillars of sustainability: economic, environmental and social sustainability.

In the year 2000 at the UN Headquarters in New York, Millennium Summit was held where eight development goals known as “Millennium Development Goals” (MDGs) were taken upon till the year 2015. The targets were mainly achieved across the countries and it was required to start afresh plan in the world beyond 2015.

For the next 15 years, the UN General Assembly in its 70 session adopted the Sustainable Development Goals (SDGs) with 17 goals, 169 targets. It came into force from 1 January 2016, have 2030 as their deadline to achieve the target. Though it was not legally binding it gave prospects to the countries to reorient their domestic spending during the next fifteen years. The countries are expected to own sustainable development policies, plans and programmes. They would be responsible for implementing the goals and targets and review at the national level which require quality, availability and timely data.

The 17 Goals are as follows:

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

In India, Prime Minister Sh. Narendra Modi with his High-Level Steering Committee periodically reviews and refines the National Indicator Framework (NIF) to monitor the Sustainable Development Goals (SDGs).

The targets of the team are:

- To check the on-going national policies, programmes and plans and work upon the developmental challenges.

- To monitor the Sustainable Development Goals (SDGs) at the national and state levels and how they scientifically measure the outcomes of the policies.
- The committee also reviews the National Indicator Framework for its enhancement.
- For effective monitoring, sophisticated IT tools are used.
- The sustainable development goal (SDGs) aim is to eradicate poverty and promote prosperity into a changing world with the motto of “Sabka Saath Sabka Vikash”.

SDGs with 17 Goals and 169 Targets intend for the promotion of sustainable, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion, promoting integrated and sustainable management of natural resources and ecosystems.

The flagship programme of Government like Swachh Bharat Mission, Beti Bachao, Beti Padhao, Pradhan Mantri Awas Yojna, Pradhan Mantri Jan-Dhan Yojna highlight the Government's commitment for the development that it reaches to all its citizens.

Not only these, from connecting villages with roads and expansion of digital connectivity, to provide universal health coverage, sanitation and housing for all are also focused.

Various programmes and enactments focused on the empowerment of girl's right, women and persons with disabilities. It shows how the Government ensures growth for all.

United Nations has praised the progress that India makes on Sustainable Development Goals, its extraordinary economic growth, commitment to sustainability and social and technological innovations. The SDGs aims are to promote equitable economic growth, to create opportunities for all, reduce inequalities, to raise basic standards of living, to encourage social development, to promote integrated and sustainable management of natural resources and ecosystems.

SDG India Index scores within each Goal, leading States/UT's can be identified under each goal-

1. No poverty – Tamil Nadu and Puducherry
2. Zero hunger – Goa and Delhi
3. Good health and well-being – Kerala and Puducherry
4. Quality education – Kerala
5. Gender equality – Kerala, Sikkim and Andaman & Nicobar Islands
6. Clean water and sanitation – Gujarat, Chandigarh, Dadra & Nagar Haveli and Lakshadweep
7. Affordable and clean energy – Tamil Nadu and Chandigarh
8. Decent work and economic growth – Goa and Daman & Diu
9. Industry innovation and infrastructure – Manipur, Delhi and Puducherry
10. Reduced inequality – Meghalaya, Mizoram, Telangana, Dadra & Nagar Haveli, Daman & Diu and Lakshadweep
11. Sustainable cities and communities – Goa and Andaman & Nicobar Islands
12. Life on land – Assam, Chattisgarh, Goa, Manipur, Odisha, Uttarakhand, Dadra & Nagar Haveli and Lakshadweep
13. Peace, justice and strong institutions – Himachal Pradesh and Puducherry.

- The National Indicator Framework (NIF), helps to monitor and report on the progress of SDGs on the national level.
- In 2018 Sustainable Development Goals Report the highlights were on the progress for dignity, peace and prosperity of the nation in the present scenario and in the future.
- The report also highlighted that in sub-Saharan Africa the maternal mortality ratio has declined by 35 per cent. In South Asia, girl's risk of marrying in childhood has also dropped by over 40 per cent.
- A good indication, in the least developed countries, access to electricity has more than doubled. Some areas showed a decrease in the unemployment rate and an increase in labour productivity. More than 100 countries have adopted the sustainable consumption and production policies and initiatives.
- Where we read all good and progressive things happening, the report also showed us lack of progress amongst the disadvantaged and marginalized groups.
- Youths are unemployed, children not able to meet the minimum standards of reading. Lacks of proper sanitation service, electricity problem in rural areas are seen. HIV among women of reproductive age is higher than the global average. Women discrimination, gender inequality against basic rights and opportunities are some of the areas.
- The report also showed additional challenges like conflict, climate change and growing inequalities, undernourished people due to drought and disasters linked to climate change.
- The sustainable development goals report not only mentioned the statistics of work done or the areas which are yet to develop but it also highlighted the challenges faced, processing, analysis, etc. and calls for better evidence-based policymaking.
- With technological development, it is possible to collate the data easily but needs of political leadership; resources are also required to work more effectively.
- To achieve the deadline of 2030, the United Nations has introduced many initiatives so that it could be more effective, organized and accountable.
- The Sustainable Development Goals (SDGs) main aims are to bring change in the lives of people and to monitor the progress of implementation which at the end will benefit the whole nation.
- The commitment of the Government of India to achieving the Sustainable Development Goals (SDGs) can be realised only if actions at the national level are complemented by initiatives of the State Governments and the Union Territories (UTs).
- It is necessitated by the federal governance structure of the country, where most of the functions that have a bearing on SDGs are in the State or Concurrent List of the VII Schedule of the Constitution of India.
- Therefore, the State governments have the prime responsibility in achieving SDGs and are essential stakeholders in implementing the Agenda 2030.

Human and Environment Interaction: Anthropogenic activities and their impacts on the Environment

Environment and human beings are inter-related. The environment gives us food, water, fuel, medicines, building materials, etc. Though science and technology have advanced and because of that we have benefitted a lot but it also introduced pollution and damaged the environment. The impact of this is also on human beings like health-related issues and socio-economic development. Further, to this, we will study the relationships between human beings and the environment and how we use environmental resources.

Interaction of human activity and the environment –

- By environment, we understand the surrounding of the place, natural world of land, sea and atmosphere and its characteristics in which we live. Human beings interact with this environment when they first walked on the Earth.
- People can live and flourish when they have a good climatic condition with accessible clean water, fertile soil, etc. Whereas, it becomes difficult for people to survive on a very hot climate, limited water resources and infertile land.
- We also get affected on the natural calamities like floods, drought, and earthquakes which damage the agriculture, properties, homes and water sources, pipelines, etc. These causes dislocation of people, loss of life, destruction, etc. Waterborne diseases, water contamination can be caused due to damage of water sources.
- Another change which is affecting our environment is due to industrialization. We use various types of things to do our things which have increased the human impact on the environment.
- Though the relationship between human activities and the environment are multifaceted they can be grouped in major two types of activities. They are:
Use of natural resources like land, water, soils, food, minerals, animals and plants.
Production of waste like agriculture, industry and mining and from our own bodies.
In our daily lives, we use different types of natural resources. We require food and water for our living and energy for various different uses like cooking or industrial processes.

We require different types of resources for the production of clothes, transport, building, etc. A simple example of natural resources is the production of a notebook. To manufacture a paper we require raw materials like wood and water and energy for the production process. The wood we are getting from the trees which require soil, water and land to grow on. There are other components in the notebook like ink or metal staples which require other types of resources. Thus, the need for resources is infinite and it is growing with the increase of population and consumption with socio-economic progress.

Renewable and non-renewable resources

Resources can be classified as renewable and non-renewable resources. Renewable resources can be replenished by natural means like solar energy is powered by heat from the sun and never runs out.

Oxygen, water, solar energy and biomass are some examples of renewable resources.

Whereas, non-renewable resources cannot be replenished by natural means and quickly as the rate they are consumed like minerals and fossils fuels such as oil, coal and gas which are produced over several of years by natural processes from decayed plants and animals.

Over-exploitation of natural resources damages the eco-system. By eco-system we understand, all the living organisms like human beings, animals, plants, etc. and their physical environments like soil, water, air and land and the connections between them. If one of the components is detached of the system, then it affects the other part as well.

Another, issue that affecting the natural resources is deforestation, which happens when the trees are cut down from the forests or not allowed to re-grow. If there are no forests it also has a significant impact on water supply. The roots of the trees reach deep into the soil and create space between the particles which further increases the soil, allowing rainwater to soak and replenish groundwater.

Energy resources

Renewable and non-renewable resources play a major role in energy resources. For global industrialization, fossil fuels are the main energy source, but as they are non-renewable the quantity is limited and are not sustainable for longer period. Another main cause of climatic change is due to the burning of fossil fuels. The wood we know is a renewable source, when we cut the trees, it will re-grow but this also causes deforestation. Solar power is another renewable energy source that converts the sun's energy into electricity.

Water resources

The direct use of water can be categorized into three main categories – Domestic use
Agricultural use Industrial use

The use of unnecessary water from rivers and groundwater for domestic, agricultural and industrial use decreases the amount of water availability for current and future generations.

Water is also important for biodiversity. Rivers, lakes and wetlands are important for wildlife and need water. It will become a problem if the demand for water exceeds the supply. The demand of water supply in many parts of the world and is above sustainable water supply. By sustainable water supply we understand, the adequate supplies, in both quality and quantity which meets both the current and future requirements of people. Warming of climate is due to the increased rate of evaporation from the lake.

Production of waste and pollutants

The impact of inadequate sanitation, waterborne diseases in water and food has been contaminated by the wastes from infected people. Not only has these, industry, agriculture and energy production all generated wastes that pollute the air, water and soil.

Technology and the environment

Human beings have produced many several types of wastes that pollute the environment. One of the major examples is e-waste, which is caused by discarded electronic gadgets like mobile phones, computers, televisions, microwaves, etc. It has many toxic substances that pollute groundwater, soil and air unless and until they are disposed in a well-managed way.

We conclude this article on a positive note...human beings also contribute to the environment positively to sustain it. When we do wastewater treatment on plants, it protects the species and replants the forests. It gives a positive impact on our environment. With some developmental programme like reforestation, the environment has benefitted and improved a lot.

Impacts of Pollutants on Human Health

The existence of harmful substance causing an adverse effect on the environment and on human health is known as pollution. It can occur in different forms like,

- Air pollution
- Water pollution
- Soil pollution
- Noise pollution
- Radioactive pollution
- Light pollution

Air pollution has a major impact on human health.

With the onset of industrialization, there has been a change in the atmosphere due to the fire used for

- generating energy.
- Not only industrialization but
- different modes of transport
- the burning of fossil fuels
- forest fires
- burning of leaves
- large scale agricultural waste
- industries and power plants are some of the main sources of air pollution. They are consisting of odours, gaseous pollutants, suspended particulate matter (SPM) in the form of dust, smoke, mist and fume.

These sources of air pollution release harmful gases and substances that are poisonous for human beings. Some of them are

- sulphur tropospheric ozone
- sulphur dioxide
- nitrogen dioxide
- suspended particulate matter

Common atmospheric pollution sources and their pollutants		
Category	Source	Emitting pollutants
Agriculture	Open burning	Suspended particulate matter, carbon monoxide, volatile organic compounds
Mining and quarrying	Coal mining; crude oil and gas production; stone quarrying	Suspended particulate matter, sulphur dioxide, oxides of nitrogen, volatile organic compounds
Power generation	Electricity; gas; steam	Suspended particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, volatile organic compounds, sulphur trioxide, lead
Transport	Combustion engines	Suspended particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, volatile organic compounds, lead
Community service	Municipal incinerators	Suspended particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, volatile organic compounds, lead

The effects of air pollution on human health depend upon the physical and physiological of the person who is affected by air pollution. Many organs or body functions can be harmed by this. Some of the consequences are:

- Respiratory diseases
- Cardiovascular damage
- Fatigue, headaches and anxiety
- Irritation of the eyes, nose and throat
- Damage to reproductive organs
- Harm to the liver
- Damage of nervous system
- People living in urban areas are the sufferers as they are more exposed to this air pollution.

Health impacts of some specific air pollutants

1. Tobacco smoke – it generates harmful chemicals and causes cancer to the smoker. It also affects the passive smoker like burning sensation in the eyes or nose, throat irritation, etc.

2. Volatile organic compounds – they can cause irritation of the eyes, throat, nose, headaches and nausea. They even can damage the liver and other parts of the body.
3. Lead – the exposure damages the nervous system, digestive problems, cancer. It is also dangerous to small children.
4. Ozone – the exposure to this gas causes itching on the eyes, burning and watery. It also increases respiratory disorders like asthma. It also lowers the resistance to colds and pneumonia.
5. Nitrogen oxide – this gas makes the children disposed to respiratory diseases in winters.
6. Carbon monoxide – carbon monoxide combines with haemoglobin and lessen the required oxygen that enters our blood through lungs. This causes changes in the function of the affected organs like the brain and cardiovascular system. It also affects the concentration level, makes one sleepy.
7. Sulphur dioxide – sulphur dioxide in the air are caused due to the increase in the burning of fossil fuels. It causes diseases of lungs and other lung disorders like wheezing and shortness of breath.
8. Suspended particulate matter (SPM) – they consist of dust, mist, fumes and smoke. The main components of SPM that affects the health are lead, nickel, arsenic and those present in diesel exhaust. When we breathe these particles it affects our lungs causing lung damage and respiratory problems.

Like air pollution, water pollution is also harmful to human beings.

- Water is very important for survival. We need clean water for drinking, irrigation of crops and many other purposes.
- If the water resources like the lake, river, streams are polluted and contaminated it will affect our health.
- If we drink polluted water then diseases like amoebiasis, typhoid and hookworm will affect our health.
- Water is polluted by chemicals like heavy metals, lead, pesticides and hydrocarbon causes hormonal and reproductive problems, damages the nervous system, liver and kidney. Exposure to mercury causes diseases like Parkinson's, Alzheimer's, heart disease and death.
- If the sea beaches are polluted then diseases like rashes, hepatitis, gastroenteritis, diarrhoea, stomach aches and vomiting will happen.
- Water pollution also affects our marine life which is one of the food sources.

Soil pollution

Soil pollution happens when the toxic chemicals, pollutants or contaminants in the soil are high causing risk to the plants, wildlife, human beings and to the soil. The major causes of soil pollution are:

- Use of chemicals like pesticides, herbicides, insecticides and fertilizers are the main factors.
- The breaking of the underground storage tank

- Leakage of wastes from landfills
- Direct discharge of industrial wastes
- Harmful irrigation practices
- Improper maintenance
- Leakage from sanitary sewage, acid rain falling onto the soil
- Fuel leakage of automobiles that soak into the soil
- Soil pollution can have harmful effects on ecosystems, human beings and plants. It can harm the water and food which are in direct contact with the polluted soil.

Noise pollution

When there is too much noise or an unpleasant sound causing a temporary disruption in the natural balance is known as noise pollution. The main causes of noise pollution are:

1. Industrialization
2. Poor urban planning
3. Social events
4. Transportation
5. Construction activities
6. Household chores
7. Noise pollution causes health issues like
8. Hearing problems
9. Sleeping disorders
10. Cardiovascular issues
11. Trouble in communicating
12. Radioactive pollution

Radioactive pollution happens when there is the presence of radioactive materials in the environment caused by the emission of harmful radiations like alpha or beta particles or gamma rays. The main causes of radioactive pollution are:

- Nuclear accidents from nuclear energy generation plants
- The use of nuclear weapons for mass destruction
- Mining
- Spillage of radioactive chemicals
- Tests on radiation
- Cosmic rays
- The major effects of radioactive pollution are:
 - Genetic mutations
 - Diseases like cancer
 - Infertility in soils
 - Cell destruction

Some of the solutions of radioactive pollution are:

- We should dispose of the radioactive wastes properly like burying the wastes.
- We should properly label the content of any radioactive content so that one can take protective measures to handle it.
- Banning of nuclear tests
- We should think of alternative sources of energy like solar energy, hydro-electric and wind power.
- Proper storage or container should be there for the radioactive materials so that there is no leakage.

Light pollution

By light pollution, we understand the excessive, flashy and unwanted artificial lighting. The cause of light pollution is mainly due to

- Industrialization
- Modernization

Following are the adverse effects of light pollution:

- Over-illumination causes headache, fatigue, stress and anxiety.
- Light trespass during night causes the sleeping disorder.
- Glaring on outdoor lights decreases our vision and the chances of accidents increases.

Human activities have polluted the environment that we live in. But, at the same time, we are also trying to repeal the damage caused by pollution. Small efforts we make towards our greener environment will show can start showing its effect. We can still keep and save what is left from our natural resources to make the world a better place to live for our future generation.

Environmental Issues

- With the word Environment, we understand the surroundings or the situation in which an animal, person or plant lives or functions.
- With the growing pollutions, and unpredictable environmental conditions there are several issues arises which are affecting our environment.
- So, what are the Environmental issues which are harming our environment?
Environmental issues like

1. global warming
2. air pollution
3. water pollution
4. noise pollution
5. space pollution
6. heat pollution
7. acid rain
8. waste disposal
9. ozone layer depletion
10. use of fossil energy
11. greenhouse gas releases

12. climatic changes, etc are some of the adverse effects which are affecting not only human beings or animals but the entire nation on this planet earth.

It is causing floods, soil erosion, an increase in global warming, climatic imbalance, loss of wildlife, etc. Here in this article, we will study in details how and what are the causes and consequences of environmental issues and its various dimensions.

The environment consists of three components.

Abiotic or non-living component, which is subdivided into the three categories like,

- Lithosphere (Rocks, soil and solid air)
- The hydrosphere (water component)
- Atmosphere (gaseous envelope) which is again divided into four zones, namely:-
 - a) Troposphere
 - b) Stratosphere
 - c) Ionosphere, and
 - d) Exosphere.

Thus the three basic divisions of the physical environment may be termed as

- a) Lithospheric Environment
- b) Hydrospheric Environment
- c) Atmospheric Environment

The biotic or living component consists of flora and fauna including man as an important factor. Thus the biotic environment may be divided into

- i) Plants Environment and
- ii) Animals Environment.

Energy component, which includes solar energy, geochemical energy, thermo-electrical energy, hydro-electrical energy, nuclear atomic energy, energy due to radiation etc., that helps in maintaining the real life of organisms.

Environmental pollution –

By environmental pollution, we understand the contamination of the physical and biological components of the earth or the atmospheric system to an extent that it adversely affects the environmental process. Environmental pollution can be classified into 2 groups:

1. Natural pollution like earthquakes, food, drought, cyclone
2. Artificial pollution like human activities

Environmental pollution is a global problem and is concerned for all the countries irrespective of their size, developmental level or ideology.

With science and technological development, it has changed the life of human being and leading to a more comfortable life. Modern means of communications, industrial development has also its own side effects. Industrial wastes and toxic gases are hazardous to human health causing air pollution, water pollution, etc.

There are several kinds of pollution, they are as follows:

Air Pollution – Air pollution is mainly caused due to the release of toxic gases or smokes from the industries or small factories.

Water Pollution – As natural water resources is diminishing day by day, water has become a scarcity. The major issues due to which water pollution are cause are the lakes and rivers are filled with the sewage, garbage or liquid wastes from the households, agricultural lands and factories. They contain harmful chemicals which makes the water poisonous for the aquatic plants and animals.

Waste disposal/garbage pollution – When there are no proper waste disposal mechanisms, the garbage gets accumulated which cause garbage pollution. There should be a proper waste disposal system so that it does not pollute our environment.

Noise Pollution – Noise pollution is caused when there are excessive noises which are disturbing others, creating physical and mental health like sleep disturbance, hearing loss, hypertension, etc. They are mainly due to noise from the machines, transportation systems, aircraft, trains, etc.

The major factors of pollution are:

1. **Population growth** – population growth has become a global problem. Population growth is the major cause of the degradation of the environment. With the increase in population, people require land for buildings, more minerals, more water and more energy. The effects include uses of chemical fertilizers, insecticides, deforestation, increased population and heavy transportation, etc.
2. **Urbanization** – with the increase in population, people moving from villages to towns and cities causing chaos as they face various problems like lack of water, sanitation, houses at an affordable price, roads, public transport, traffic problems, congestions, fresh air, as well as an unsafe social environment.
3. **Agricultural development** – agricultural practices causes ecological and social harm in developing countries. They pollute the environment in various ways like:
 - I. -Through chemical fertilizers, pesticides and insecticides
 - II. -Through unreasonable facilities and other irrigation processes.
 - III. -By making changes in biological communities.
4. **Industrialization** – industrial revolution had brought drastic changes in manufacturing, agriculture, animal husbandry and transportation among various other things. Without proper treatment, these industries discharge wastewater into rivers causing water pollution. Misuse of natural resources to meet the industrial demands has resulted in,
 - I. -reduction of forests due to the cutting of trees.
 - II. -digging of land for mining purposes.
 - III. -lowering of groundwater level due to excessive extraction of groundwater.
5. **Deforestation** – forests play a vital role in India for its economy, social and cultural. Deforestation gives problems to various issues like soil erosion, increase of residue in the rivers, increase of floods and droughts. Growth of greenhouse effects which destructs the atmospheric storms, etc. damage to agricultural crops due to floods and droughts results in loss of economy. It also results in a decrease in agricultural production, the supply of raw materials to the industries and building matters, etc.

6. Electronic waste (E-waste) – electronics, telecommunications, and computerizations are inseparable in this fast developing economy like India. But, these electronic devices contain toxic substances and their disposal and recycling become a health issue. E-waste is growing very fast as people changing their devices more frequently than ever before. Each year they are just dumped or burnt. Though global initiatives have been started in 2006 to phase out chemicals from electronic devices with the launch of the Restriction of Hazardous Substances Directive (RoHS) in Europe.
7. Thermal power plants – power plants mainly use coal for generating electricity. Energy in the form of electricity is a basic requirement for any developmental activities and can be generated by various methods, materials and mechanisms. The wear and tear of plant and machinery, low thermal efficiency, choking and scaling of furnaces results to a large amount of fly ash. Due to little land space, thermal plants cannot afford an ash pond and they let the waste run into the nearby river or stream, choking the drainage system. Coal-based thermal plants pollute the atmosphere by emitting gaseous substance like sulphur dioxide (SO₂), Nitrogen oxide etc., causing acid rain, damage of soil, vegetation and aquatic life of that region. It is preferred that power plants should be placed more on wastelands but with the course of time, we can find that some of the cultivable areas are covered for ash mount site. The presence of fly ash is very harmful to the lungs as it affects the tissues of the respiratory tract when inhaled.
8. Modern productive technology – though modern technologies and techniques have enabled the man to increase his comfort level. But, these also have created several environmental problems affecting our forests, rivers, streams, etc. The most dangerous is the production of toxic chemicals, synthetic materials. Disposal of plastics is also a main issue for any developing or advanced countries. Another major which is affecting our environment is the disposal of nuclear wastes coming out of nuclear reactor plants. Thus, we can say that modern technologies or growth in industrialization are responsible for an alarming situation of environment and ecological disturbances all over the countries.

ENVIRONMENTAL ISSUES: LOCAL, REGIONAL AND GLOBAL

The environmental issue or problem occurs when there is a change in the quality or quantity of environmental factors that can affect everything on Earth directly or indirectly. These problems can occur at three levels.

LOCAL ENVIRONMENTAL Issues

- Waste Disposal
- Water Scarcity
- Desertification
- Pollution
- Endangered Species

REGIONAL AND GLOBAL ENVIRONMENTAL Issues

- Global warming
- Ocean Acidification
- Pollution

- Acid Rain
- Ozone Depletion
- Polar Melting

We will be discussing two main issues: **Pollution** and **Climate Change** in detail.

A. POLLUTION

Pollution can be defined as an undesirable addition of constituents to water, land, or air which adversely affects human life, species, living conditions and will deteriorate our resources. Pollution can be classified mainly into four categories- Air pollution, Water pollution, Soil pollution, Noise pollution.

1. **AIR POLLUTION:** Air pollution refers to the addition of pollutants into the air that is detrimental to human beings and the planet as a whole.

SOURCES OF AIR POLLUTION:

The pollutants are added to the atmosphere by the following sources:

1. *Automobiles*
2. *Electrical Power Plants*

MAJOR AIR POLLUTANTS –THEIR SOURCES AND THEIR IMPACT

AIR POLLUTANTS	SOURCES	IMPACT
Carbon Monoxide (CO)	Fuel combustion from engines and vehicles	Reduces the amount of oxygen, aggravates heart disease, chest pain
Lead (Pb)	Metal refineries and other metal industries, waste incinerators (waste burners)	Damages the nervous system, results in IQ loss, Cardiovascular and renal effects in adults, effects related to anaemia.
Nitrogen Dioxide (NO ₂)	Fuel combustion and wood burning	Lung diseases leading to respiratory symptoms increases susceptibility to respiratory infection
Particulate Matter (PM)	Chemical reactions, fuel combustion, industrial processes, farming and during road constructions.	Lung or heart diseases, respiratory problems and sometimes premature deaths.
Sulphur Dioxide (SO ₂)	Fuel combustion (electric utilities and industrial processes as well as natural occurrences like volcanoes.	Asthma and makes breathing difficult

2. **WATER POLLUTION:** Water pollution is the contamination of pollutants in water bodies like lakes, rivers, oceans, aquifers and groundwater without treatment very often by human activities which leads to harmful effects.

SOURCES OF WATER POLLUTION

1. **NATURAL SOURCES:** These include decay, the composition of plants and animals, volcanic eruptions, coastal, cliff erosion, landslides and soil erosion.
2. **ANTHROPOGENIC SOURCES:** These include industry, urban, agricultural and cultural sources.
 - Industrial pollutants: Includes heavy metals-boron, arsenic, zinc, lead, mercury.
 - Agricultural pollutants: Insecticides, pesticides, chemical fertilizer, weeds, plants remain.
 - Urban pollutants: Sulphate ion, nitrate ion, chlorine ion, sodium ion, calcium ion, nitrates and potassium ions.
 - Natural pollutants: Volcanic dust, debris caused by landslides, decomposed organic matter.
 - Physical pollutants: Oil, grease, dissolved and suspended solids, volcanic dust.

Effects of Water Pollution

- Death of aquatic (water) animals.
- Irrigation by polluted water affects plants resulting in yellowish colouration and defoliation.
- Disruption of food-chains.
- Diseases-hepatitis, cholera, typhoid, jaundice, diarrhoea and skin diseases.
- Destruction of ecosystems.

3. **LAND POLLUTION:** Land pollution is the destruction of the earth's land surfaces, directly or indirectly as a result of man's activities.

SOURCES OF LAND POLLUTION

1. Agricultural sources: It includes waste produced by crop, animal manure and farm residues, chemical left over of all pesticides, fertilisers and insecticides.
2. Ashes: The residual matter that remains after solid fuels are burned is known as ashes.
3. Two types of ashes are: **Bottom ash** is the debris from burnt metal and glass waste and it is not bio-degradable. The second type of ash - **fly ash**. It is the ash which is trapped by filters in the chimney of the incinerators.
4. Mining sources: It includes underground debris, piles of coal refuse and heaps of slag.
5. Industrial sources: These include paints, chemicals, metals and aluminium, plastics.
6. Sewage Treatment: It includes the biomass sludge, and settled solids.
7. Garbage or waste: Household or municipal waste such as glass, metal, cloth, plastic, wood, paper, and so on.
8. Deforestation: This results in soil erosions, desertification and land degradation.

9. **Chemical And Nuclear Plants:** Chemical waste from chemical industries that are disposed of into landfills. Hazardous chemicals can wipe out living organisms in the soil. The activity of landfills, mining, industry, are destructive to vegetation. It may cause arsenic poisoning. It can also cause liver, skin, heart, cancers and neurological damage.

4. **NOISE POLLUTION:** Noise is an unwanted sound or unpleasant sound which produces discomfort on the ears. Noise is considered as environmental pollution.

SOURCES OF NOISE POLLUTION

- Household sources: Gadgets like TV, Loudspeakers, grinder, food mixer, dryer, vacuum cleaner, washing machine cooler and air conditioners.
- Social events: Places of worship, parties, discos and other social events.
- Industrial and Commercial activities: Printing presses, construction sites and manufacturing industries.
- Transportation: Aeroplanes flying over houses, trains, over the ground and underground trains, vehicles on road.

EFFECTS OF NOISE POLLUTION

Noise pollution may lead to many problems such as hearing loss, sleep disruption, stress related illnesses, speech interference, and lost productivity.

CLIMATE CHANGE

Climate change can be defined as significant changes in global temperature, wind patterns, sea levels precipitation, and other measures of climate that occur over several decades.

Climate change is evident in the form of:

1. Global temperature rise
2. Warming oceans
3. Shrinking ice sheets
4. Glacial retreat
5. Decreased snow cover
6. Sea level rise
7. Declining Arctic sea ice

CAUSES OF CLIMATE CHANGE

1. **Increased Greenhouse Effect:** Greenhouse effect is the warming that results when the atmosphere traps heat radiating from Earth toward space. Gases that contribute to the greenhouse effect include-Nitrous Oxide (NO₂), Carbon Dioxide (CO₂), Water Vapour (H₂O), Methane (CH₄) and Chloro-fluorocarbons (CFCs).
2. **Burning of fossil fuels:** It has increased the concentration of atmospheric carbon dioxide
3. (CO₂).

4. Industrial activities: These activities have raised atmospheric carbon dioxide levels from 280 parts per million to 400 parts per million in the last 150 years.

FUTURE EFFECTS OF CLIMATE CHANGE

- Sea level will rise 1 to 4 feet by 2100.
- The Arctic Ocean is likely to become ice-free.
- Hurricanes will become more intense and stronger.
- Climate change will result in more droughts and heat waves.
- Changes in precipitation patterns.
- Frost-free season (and growing season) will lengthen.
- Temperatures will continue to rise.

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