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Department of Civil Engineering

'Introduction to Civil Engineering'

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M-2

Societal and Global Impact of Infrastructure

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Infrastructure:

Infrastructure is the set of facilities required for the societal and economic functioning of a country, city, or an area. Infrastructure includes structures such as roads, railways, bridges, tunnels, water supply, sewers, electrical grids, and telecommunications Internet connectivity etc.

Sustainable development goals:

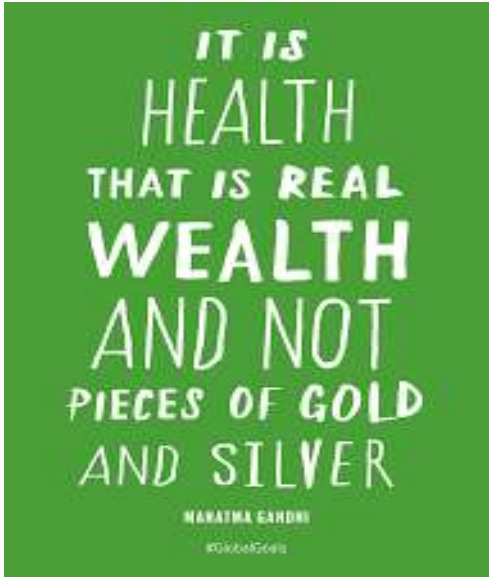
On 1 January 2016, the Sustainable Development Goals (SDGs) of the 2030 came in to force. This is taken on the basis of historic UN summit of different countries held in September 2015. These new Goals apply to all nations who are supposed to achieve in the coming 15 years.

The following are the sustainable development goals:

- **No Poverty:** No poverty means that everybody has enough money for their basic needs

- **No Hunger:** Every one should get the food and there is no hunger

- **Good Health and Well-Being:** It aims to prevent suffering from preventable diseases and premature death by focusing on key targets that boost the health of a country's overall population



- **Quality Education:** This goal ensures that all girls and boys complete free primary and secondary schooling by 2030.

- **Gender Equality:** Empowering women and promoting gender equality is crucial to accelerating sustainable development. Ending all forms of discrimination against women and girls.

- **Clean Water and Sanitation:** Access to safe water, sanitation and hygiene is the most basic human need for health and well-being**.**

- **Affordable and Clean Energy:** Lack of access to energy supplies and transformation systems is a constraint to human and economic development. The environment provides a series of renewable and non-renewable energy sources i.e. solar, wind, hydropower, geothermal, biofuels, natural gas, coal, petroleum, uranium.

- **Decent Work and Economic Growth:**
- The SDGs promote sustained economic growth, higher levels of productivity and technological innovation. Encouraging entrepreneurship and job creation are key to this. Totally avoid forced labour, slavery and human illegal usage. With these targets in mind, the goal is to achieve full and productive employment, and decent work, for all women and men by 2030.

- **Industry, Innovation, and Infrastructure:**

Investment in infrastructure and innovation are crucial drivers of economic growth and development. With over half the world population now living in cities, mass transport and renewable energy are becoming ever more important, as are the growth of new industries and information and communication technologies.

Technological progress is also key to finding lasting solutions to both economic and environmental challenges, such as providing new jobs and promoting energy efficiency. Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development.

- **Reduced Inequalities:**

Income inequality is on the main inequality, the richest 10 percent have up to 40 percent of global income whereas the poorest 10 percent earn only between 2 to 7 percent. If we take into account population growth inequality in developing countries, inequality has increased by 11 percent. These widening disparities require sound policies to empower lower income earners.

- **Sustainable Cities and Communities:**

More than half of us live in cities. By 2050, two-thirds of all humanity 6.5 billion people will be urban. Sustainable development cannot be achieved without significantly transforming the way we build and manage our urban spaces.

Making cities sustainable means creating career and business opportunities, safe and affordable housing, and building. It involves investment in public transport, creating green public spaces, and improving urban planning and management.

- **Responsible Consumption and Production**

The efficient management of our shared natural resources, and the way we dispose of toxic waste and pollutants, are important targets to achieve this goal. Encouraging industries, businesses and consumers to recycle and reduce waste is equally important, as is supporting developing countries to move towards more sustainable patterns of consumption by 2030.

- **Climate Action**

There is no country that is not experiencing the drastic effects of climate change. Greenhouse gas emissions are more than 50 percent higher than in 1990. Global warming is causing long-lasting changes to our climate system, which threatens irreversible consequences if we do not act.

- **Life Below Water**

Over three billion people depend on marine and coastal biodiversity for their livelihoods. However, today we are seeing 30 percent of the world's fish stocks overexploited, reaching below the level at which they can produce sustainable yields. Enhancing conservation and the sustainable use of ocean-based resources through international law will also help mitigate some of the challenges facing our oceans.

- **Life On Land**

Human life depends on the earth as much as the ocean for our sustenance and livelihoods. Plant life provides 80 percent of the human diet, and we rely on agriculture as an important economic resources. Forests cover 30 percent of the Earth's surface, provide vital habitats for millions of species, and important sources for clean air and water, as well as being crucial for combating climate change. Urgent action must be taken to reduce the loss of natural habitats and biodiversity which are part of our common heritage and support global food and water security,

- **Peace, Justice, and Strong Institutions**

We cannot hope for sustainable development without peace, stability, human rights and effective governance, based on the rule of law. Yet our world is increasingly divided. Some regions enjoy peace, security and prosperity, while others fall into seemingly endless cycles of conflict and violence. This is not inevitable and must be addressed. The SDGs aim to significantly reduce all forms of violence, and work with governments and communities to end conflict and insecurity. Promoting the rule of law and human rights are key to this process, as is reducing the flow of unlawful arms and strengthening the participation of developing countries in the institutions of global governance.

- **Partnerships for the Goals**

The world is more interconnected than ever. Improving access to technology and knowledge is an important way to share ideas and foster innovation. Coordinating policies to help developing countries manage their debt, as well as promoting investment for the least developed, is vital for sustainable growth and development.

Smart City:

A smart city is an urban development vision to integrate information and communication technology (ICT) and Internet of things (IOT) technology in a secure fashion to manage a city's assets. These assets include local departments' information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services.

The core elements of Smart City Infrastructure include

- Assured Supply of Electricity
- Adequate Supply of Water
- Solid Waste Management
- Sanitation
- Efficient Urban Mobility
- Affordable Housing

- Public Transport
- Digitalization
- IT Connectivity
- Sustainable Environment
- Good Governance
- Health and Education
- Security of the Citizens


SMART CITY
Traffic Management
Education
Air Pollution
Open Data
Internet of Things
Smart Health
Intelligent Shopping
Smart Environment
Electromagnetic Emissions
Smart Buildings
Public Safety
Smart Home
Gas & Water Leak Detection
Smart Street Lights
Smart Energy
Water Quality
Smart Parking
Electric Vehicle Charging
Waste Management

Smart City Concepts:

- **Smart Governance:**

Smart Governance includes political and active participation, citizenship services and the smart use of e-Government. In addition, it often relates to the use of new communication channels, such as e-government or "e-democracy".

- **Smart Citizen:**

People are smart in terms of their skill and educational levels, as well as the quality of social interaction in terms public life and their ability to open to the outside world.

- **Smart Energy:**

The power generation from renewable energy sources, generation and consumption are connected in an efficient and intelligent way

- **Smart Technology:**

Technological development, supported by Innovation, is essential to offer competitive products and services. The new relationship emerging from e-Government has led to the emergence of a new kind of citizen, the e-citizen. It also includes areas such as new means of marketing and more efficient organizational and managerial systems

- **Smart Infrastructure:**

Smart Infrastructure designs will need to be anticipatory and proactive to be truly sustainable. For example, not only provide food for urban dwellers, but serve as storm water management systems, allowing water and waste to be recycled at the smallest scale with real-time sensors telling the centralized system how much less will have to be processed.

- **Smart Mobility:**

Smart Mobility aims to improve operational efficiency through linking traffic road information, the vehicle condition, real-time data acquisition and integration of urban traffic capacity, thus achieving smooth flow of traffic running with automatic toll collection technology and other data gathering instruments.

- **Smart Building:**

At the most fundamental level, smart buildings deliver useful building services that make occupants productive (e.g. illumination, thermal comfort, air quality, physical security, sanitation, and many more) at the lowest cost and environmental impact over the building lifecycle

- **Smart Healthcare:**

The application of new technologies for health care, from diagnosis to monitoring patients, including the management of the organizations involved in these activities, is defined as Smart Healthcare.

Clean City concept

India has a population of over one billion, of which almost 300 million people are living in 600 towns and cities.It is unfortunate that, as a result of stressed environmental conditions, most of these towns and cities are unable to keep the pace for development. Water pollution, Depletion of Groundwater, inadequate sanitation, open dumping of waste, and loss of forest cover are the problems. These impacts on the health of the people and also does an economic impact on the country. Similarly, water diseases like diarrhea, jaundice, and cholera are Increasing daily on the basis of pollution done by us and are affecting both human health and economic productivity.

This situation demands a proper solution in the management of rapidly growing urban environmental problems. The grade of the environment needs to be monitored regularly and scientific work needs to extend beyond the laboratory and become more community-centered. While the regulatory agencies continue to play their role Programs that are community-based are required. This will help the people understand local problems and take necessary actions to improve the local environmental conditions and come up with new relative options to help save the environment.

CLEAN-India program was launched for the Development of Alternatives with the vision of developing a cleaner environment for our urban centers. This nation-wide program focuses on environmental assessment, awareness, and action on school children who are the future citizens. The underlined realization is that ‘each one of us is responsible for the current state of our environment and we cannot wait for someone else to solve it’.

The CLEAN-India program aims to deploy responsibility to the people for the assessment of environmental consequences and improvement in all major cities and states in India through schools and NGOs linked with governments and other private organizations.

While the term 'clean city' refers to a city that is free from pollution and environment degradation. Both these terms are relative in nature. A city that has many trees than buildings all over will be free from environmental problems as trees help to purify the air and maintain the cycle of nature.

Clean and green cities around the world show us that first impressions count. Neat and tidy public green areas, roads, and paths do not only contribute to a good image for visitors and the local inhabitants. Moreover, it is a sign that this council encourages people to keep the city clean and tidy.

Launched in 2015, Swachh Bharat Mission (SBM), has come a long way. The program made sure that cleanliness and sanitation found a place in India's governance landscape. The program was aimed at transforming the behavior of the masses on issues of sustainable waste management.

To further strengthen and evaluate the performance of the mission, the Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI) kick started India's first and largest cleanliness survey, Swachh Survekshan in 2016. Since, then the survey has evolved significantly, engaging citizens, administrative systems and civil society towards creating a robust waste management system.

Swachh Survekshan 2020 results (Declared in August 2020)

- Indore from Madhya Pradesh emerged as the cleanest city for the fourth time.
- Surat from Gujarat and Navi Mumbai from Maharashtra claimed second and third rank respectively.
- Varanasi was emerged as cleanest Ganga town
- Jalandhar cantonment was ranked the cleanest cantonment in the country.

Safe City Concept:

It refers to the duty and function of the state to ensure the safety of its citizens, organizations and institutions against threats to their well-being as well as the traditional functions of law and order.

The safe city concept is based on a consolidated ICT(Information and communication Technology) platform which combines public-safety information of different types and from different sources, obtained through sensors and multi-agency collaboration.

Four major requirements of Safe city concept

- It provides reliable and comprehensive security measures to predict threats and hazardous situations
- It aids to public-safety organizations in collecting, sharing and analyzing data more effectively to provide early warnings and raise situational awareness
- It enables the key organizations in the city to react to security threats in real time

- It provides post-event examination and analysis, identify victims and provide assistance in rescue actions.

Built-environment:

Energy efficient buildings:

An energy-efficient building creates comfortable living conditions inside the dwelling with the least possible amount of energy consumption maximizing efficiency in use of resources.

An energy-efficient building balances all aspects of energy use in a building by providing an optimized mix of passive solar–design strategies, energy-efficient equipment, and renewable sources of energy.

Aspects of Energy efficient buildings:

1. Nearly: Zero-Energy Passive Building Design:

The design of a nearly zero-energy passive building involves adopting all solar passive strategies at the design stage before actual construction begins. For instance, passive solar heating/cooling, building day lighting, and provision for rainwater harvesting.

In a hot and dry climate, passive cooling designs, such as wall and roof cooling, solar refrigeration, and earth water heat exchangers should be integrated into the building.

In the cold zones, passive heating designs should be adopted, such as air handling units, sunspace, trombe wall, etc.

2. Utilization of Low Embodied Energy Building Materials:

The usage of low embodied energy materials for building construction is important for reducing the impact of global warming and making the building energy-efficient.

Some of the examples of low embodied energy construction materials are fly ash bricks, fiber-reinforced bricks, woods, stabilized adobe blocks, cement-replacement materials such as silica fume, slag, and fly ash which is mostly by-products in factories.

3. Usage of Energy-Efficient Equipment

This involves using energy-efficient equipment in a building that requires the lowest possible energy, such as LED lights, fans, air-conditioners, and refrigerators. Energy star-approved fluorescent bulbs are highly desirable because they are more durable, and their maintenance cost is 75% less than conventional bulbs.

4. Integration of Renewable Energy Technologies in Different Applications:

Solar water heaters, small wind turbines to generate electricity, solar electricity generation are examples of renewable energy technologies installed in a building to reduce operational energy consumption. Other renewable energy sources like hydroelectricity, biomass, and biofuels can also be used.

Recycling:

Recycling is the process of breaking down and reusing materials that would otherwise be thrown away as waste.

There are numerous benefits of recycling, and with so many new technologies making even more materials recyclable, with everyone's help, we can clean up our Earth. Recycling not only benefits the environment but also have a positive effect on the economy.

1.Mechanical Recycling

One of the most globally used methods of giving residues new usages is mechanic recycling. This method is used to recycle plastics, either obtained from industrial scrap, or domestic, or commercial disposals. The residues are mechanically transformed into new materials without changing their chemical structures.

2. Energy Recycling:

The method used to convert plastics into both thermal and electric energy is called energy recycling. The process is done by leveraging, through incineration and the heat is released in the form of fuel.

3.Chemical Recycling

Among all types of recycling, chemical recycling is the most complex method. In this process, the chemical structures of plastics are modified after reprocessing them. The final product is produced to be used as raw material in different industries. It can also be used as a basic input in manufacturing new plastic products.

Temperature control in buildings:

Heat-reflecting roofs, insulation, and energy efficient windows will help to reduce that heat conduction.

Radiation is heat traveling in the form of visible and non-visible light. Sunlight is an obvious source of heat for homes. In addition, low-wavelength, non-visible infrared radiation can carry heat directly from warm objects to cooler objects. Infrared radiation is why you can feel the heat of a hot burner element on a stovetop, even from across the room. Older windows will allow infrared radiation coming from warm objects outside to radiate into your home; shades can help to block this radiation. Newer windows have low-e coatings that block infrared radiation. Infrared radiation will also carry the heat of your walls and ceiling directly to your body.

Heat transfer in and out of a building occurs in only three ways:

1. Radiation
2. Conduction
3. Convection

1. Reduction of Radiation heat transfer:

- Use light colours on the roof and external walls
- Increase wall shading with verandahs, carports on North walls
- Reduce window sizes on West facing walls
- Add window shading, on East, North and West walls
- Consider window tinting or reflective film

2.Condction is the pathways the heat travels though

- Keep external surfaces cooler in summer, e.g. by shading or using light colours
- Insulation reduces thermal conduction through roof, ceiling and external walls
- Window coverings with pelmets add additional isolation spaces from outside temperatures
- Slate or ceramic tiled floors conduct heat better than timber, cork, vinyl or carpet

3.Thermal Convection is improved by airflow controls:

- Window size and position, cross ventilation breeze paths and ceiling fans
- Roof ventilation reduces roof cavity temperature
- Controlled infiltration or leakage of external air into the house
- Weather stripping, flue dampers, closeable vents including down lights or skylights

Sound Control in buildings:

Acoustic control of Buildings is the science of controlling the unwanted noise in the living environment. It is a minimization of sound transmission from one place to another place and the control of the characteristics of sound. It is an implementation of techniques for making structure soundproof.

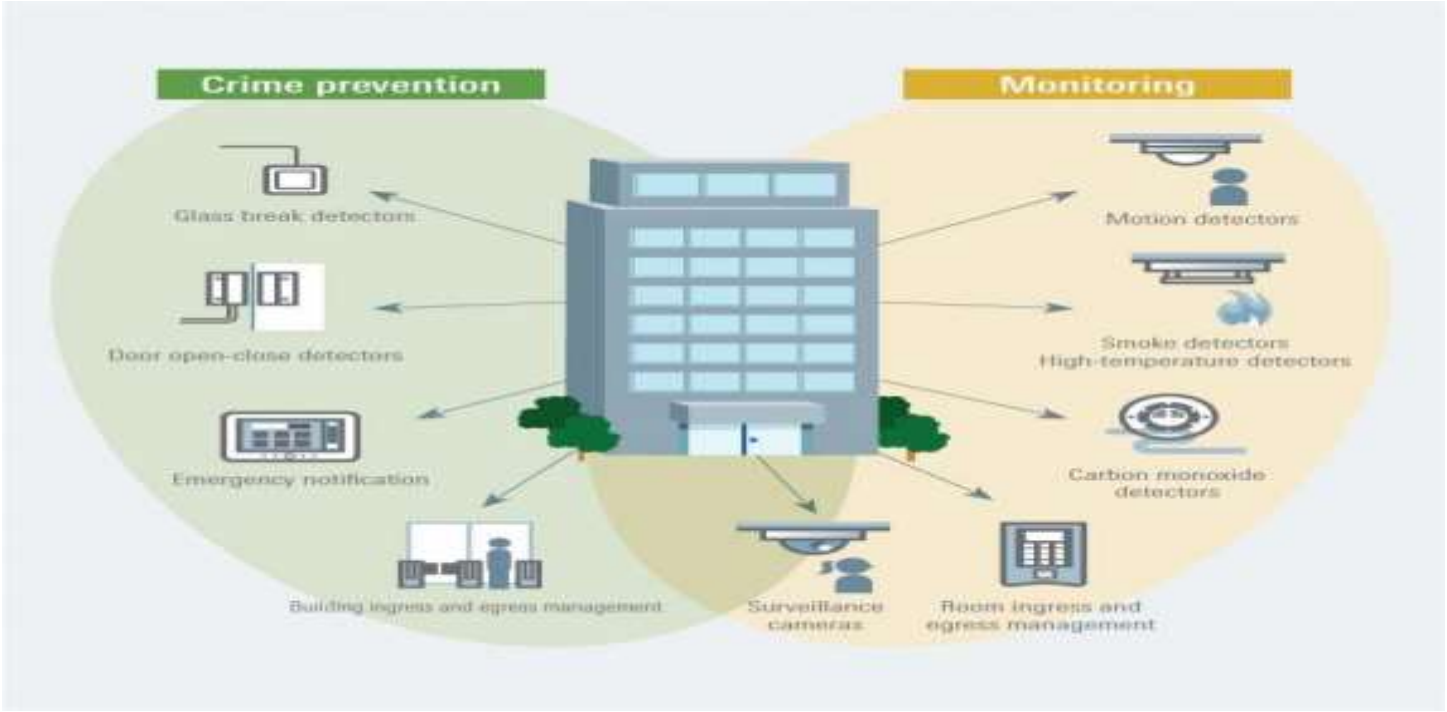
Construction Techniques for Noise Control in Buildings:

- Walls are the important structural components of the Buildings which protect the internal environment from the external noise.
- The use of cavity walls in partition proves to be very efficient for sound resistance in the Buildings.
- The more the mass of material more will be noise resistance. The concrete walls provide more sound insulation as compared to wooden walls because of its higher mass.

- Isolation blankets which can increase sound attenuation when placed in the airspace.
- Windows are one of the major sources from where the sound enters into the structures. So that is necessary to take into consideration while acoustic planning of the structures.
- The noise can be resisted by increasing the thickness of the glass. It is also necessary that proper sealing should be done in order to increase the effectiveness of soundproofing.

Building security systems

Building security systems realize convenience and peace of mind through sensing, connectivity, and user interface technologies.



Following are the types of building security systems:

- **Monitoring Systems**

Monitoring systems may include motion sensors for crime monitoring and fire detectors, carbon monoxide detectors, and the like to monitor for emergencies within the building. The monitored information is sent via the network to a supervisor in the form of emergency signals and images. This information can also be stored and managed on a secure data server if needed.

- **Crime Prevention Systems**

Crime prevention systems may incorporate sensors such as door open-close detectors and glass break detectors to detect emergencies as well as ingress and egress management functions to enforce entrance and exit regulations and keep logs of those entering and leaving. They control the entrance and exit of persons to and from the building in conjunction with the information from the monitoring systems.

- **Communication Networks of Security Systems**

Via the network, the large volumes of data making up the security logs, operation logs, and entrance and exit logs from the monitoring and crime prevention systems are tracked on security monitoring PCs and stored and managed on secure data servers. This information may also be linked via a network to other building automation systems (air conditioning systems, lighting systems, etc.) to enable more efficient building security management.

Smart Buildings:

A smart building involves the installation and use of advanced and integrated building technology systems. These systems include building automation, life safety, telecommunications, user systems, and facility management systems.

Advantages of Smart Buildings:

- Smart buildings give smart data:

The smart buildings give us the necessary data pertaining to electricity, water consumption, Sewage recycling, etc. This data further helps the residents to take corrective action pertaining to their constructive utilization. The best part is all the data gets collected centrally and hence simplifies the entire process even further.

- Efficient consumption of energy:

One of the most important aspects of a smart building is that it offers greater efficiency. Energy gets optimized to the fullest. Smart buildings are designed in such a way that the energy gets utilized efficiently irrespective of the internal and external conditions.

- Smart buildings result in increasing the asset value:

When smart applications become a part of the building, the asset value is bound to increase. Smart energy efficiency measures ensure that the building is well maintained and hence doesn't depreciate over a period of time.

- Decreased consumption:

Greater the efficiency, lower the consumption. That’s the principal these smart buildings tag themselves with. One can always conduct energy audits and based on the inference implement effective measures to lower the consumption and hence further decrease the cost.

- Smart buildings give birth to smart equipment:

For monitoring the all activities of buildings the development of smart equipment's are developed as an advanced research.

Environment:

Water supply systems:

Water supply systems are essential for providing clean and safe water for various human needs, such as drinking, cooking, washing, and firefighting etc,.

Types of water supply systems:

1. Gridiron systems

In gridiron systems, the main water supply line goes through the central part of the area, while sub mains branch out perpendicular to the main line. This system has no dead-ends, as all of the individual pipes are interconnected.

2. Ring systems

In circular or ring systems the supply main forms a circle or ring around the area of distribution. In this system, the branches are cross-connected to the supply mains and each other.

3. Radial systems

In radial systems, the distribution area is divided into different distribution districts or zones. Each zone has an elevated distribution reservoir in the middle from which supply lines run in a radial pattern towards the distribution district periphery.

4. Dead-end systems

Dead-end water supply systems are the best choice for cities and towns without definite road patterns. In this type of system, there is one main line that runs through the town or city with sub-mains branching off from left and right. These sub-mains then divide into a number of branch lines that provide service connections.

Components of water supply systems:

- **Water source**: The sources of drinking water can come from groundwater, lakes, reservoirs, rivers, canals, rainwater, and saltwater.

- **Water purification & treatment facilities:** Different treatment systems are used depending on the source of the water.
- **Transmission & distribution systems:** The treated water is transported from the source via water mains and sub-mains to the end-users.
- **Storage systems:** these may include water tanks, reservoirs, and water towers. In smaller systems, pressure vessels and cisterns may be used.
- **Pumping stations:** in order to maintain optimal water pressure, additional pressurizing components, called pumping stations, are often used.
- **Accessories:** these may include support components such as valves, service lines, generators, meters, fire hydrants, and other accessories needed to ensure a smoothly running system.

Urban air pollution management:

"Air Pollution is the release of pollutants such as gases, particles, biological molecules, etc. into the air that is harmful to human health and the environment."

Types of Air Pollutants:

- **Primary Pollutants**

The pollutants that directly cause air pollution are known as primary pollutants. Sulphur-dioxide emitted from factories is a primary pollutant.

- **Secondary Pollutants**

The pollutants formed by the intermingling and reaction of primary pollutants are known as secondary pollutants. Smog, formed by the intermingling of smoke and fog, is a secondary pollutant.

Causes of Air Pollution:

- Burning of Fossil Fuels

The combustion of fossil fuels emits a large amount of sulphur dioxide. Carbon monoxide released by incomplete combustion of fossil fuels also results in air pollution.

- Automobiles

The gases emitted from vehicles such as trucks, cars, buses, etc. pollute the environment. These are the major sources of greenhouse gases and also result in diseases among individuals.

- Agricultural Activities

Ammonia is one of the most hazardous gases emitted during agricultural activities. The insecticides, pesticides and fertilisers emit harmful chemicals in the atmosphere and contaminate it.

- Factories and Industries

Factories and industries are the main source of carbon monoxide, organic compounds, hydrocarbons and chemicals. These are released into the air, degrading its quality.

- Mining Activities

In the mining process, the minerals below the earth are extracted using large equipment. The dust and chemicals released during the process not only pollute the air, but also deteriorate the health of the workers and people living in the nearby areas.

- Domestic Sources

The household cleaning products and paints contain toxic chemicals that are released in the air. The smell from the newly painted walls is the smell of the chemicals present in the paints. It not only pollutes the air but also affects breathing.

Effects of Air Pollution:

- **Diseases**

Air pollution has resulted in several respiratory disorders and heart diseases among humans. The cases of lung cancer have increased in the last few decades. Children living near polluted areas are more prone to pneumonia and asthma. Many people die every year due to the direct or indirect effects of air pollution.

- **Global Warming**

Due to the emission of greenhouse gases, there is an imbalance in the gaseous composition of the air. This has led to an increase in the temperature of the earth. This increase in earth's temperature is known as global warming. This has resulted in the melting of glaciers and an increase in sea levels. Many areas are submerged underwater.

- **Acid Rain**

The burning of fossil fuels releases harmful gases such as nitrogen oxides and sulphur oxides in the air. The water droplets combine with these pollutants, become acidic and fall as acid rain which damages human, animal and plant life.

- **Ozone Layer Depletion**

The release of chlorofluorocarbons, halons, and hydrochlorofluorocarbons in the atmosphere is the major cause of depletion of the ozone layer. The depleting ozone layer does not prevent the harmful ultraviolet rays coming from the sun and causes skin diseases and eye problems among individuals.

- **Effect on Animals**

The air pollutants suspend in the water bodies and affect aquatic life. Pollution also compels the animals to leave their habitat and shift to a new place. This renders them stray and has also led to the extinction of a large number of animal species.

Air Pollution Control:

- **Avoid Using Vehicles**

People should avoid using vehicles for shorter distances. Rather, they should prefer public modes of transport to travel from one place to another. This not only prevents pollution, but also conserves energy.

- **Energy Conservation**

A large number of fossil fuels are burnt to generate electricity. Therefore, do not forget to switch off the electrical appliances when not in use. Thus, you can save the environment at the individual level. Use of energy-efficient devices such as CFLs also controls pollution to a greater level.

- **Use of Clean Energy Resources**

The use of solar, wind and geothermal energies reduce air pollution at a larger level. Various countries, including India, have implemented the use of these resources as a step towards a cleaner environment.

Solid waste management:

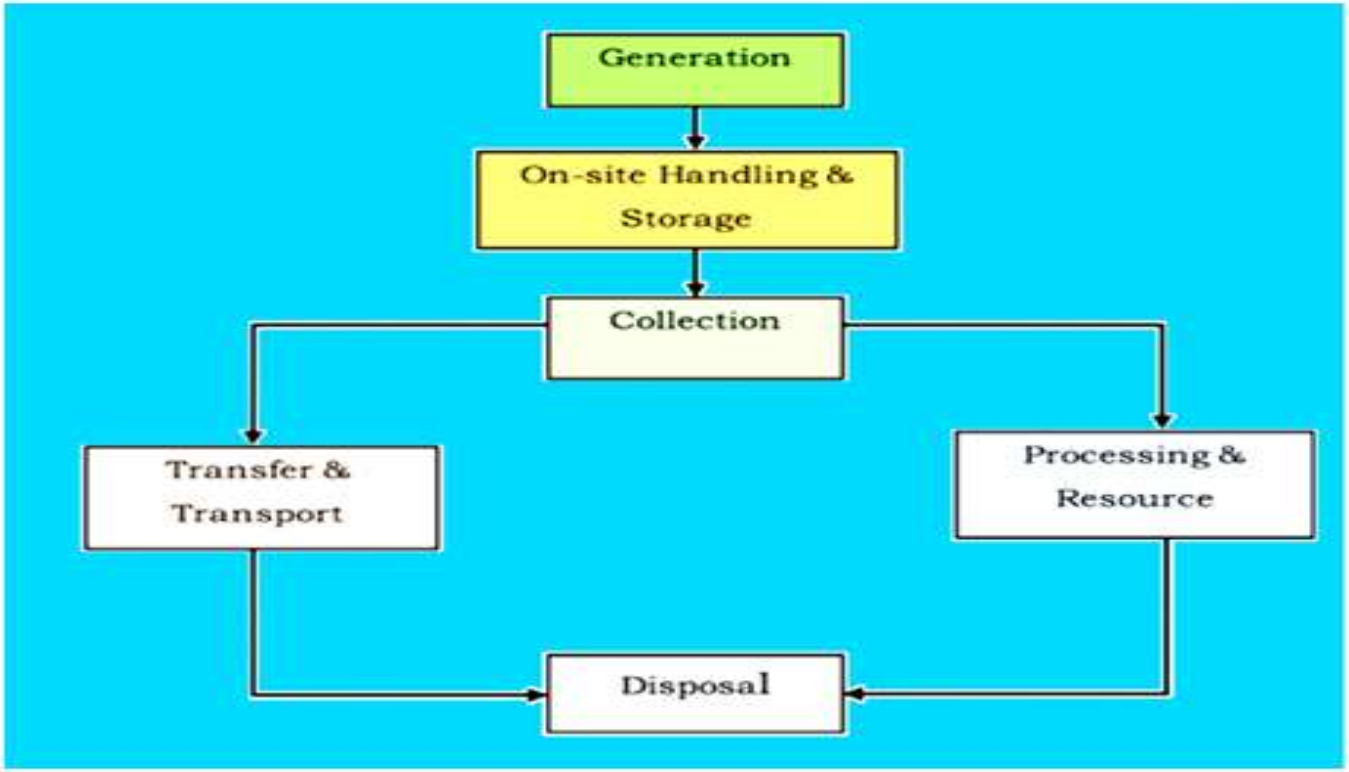
Solid waste management is the process of handling and disposing of the unwanted materials produced by human activities.

Sources of Solid Waste

1. Residential (domestic or household)
2. Commercial
3. Institutional
4. Construction Demolition
5. Treatment plant sites
6. Solid Industrial Waste
7. Solid Agricultural Waste

Functional Elements of Solid Waste Management:

1. **Waste generation-** The materials that are identified and collected are thrown away or gathered for disposal.
2. **On-site handling, storage, and processing-** The activities associated with the handling, storage, and processing of solid wastes at or near the point of generation.
3. **Collection-** The collection and disposal of solid waste from various locations.
4. **Transfer and transport-** The transfer of wastes from the smaller collection vehicle to the larger transport equipment, to the disposal site.
5. **Processing and recovery-** Those techniques equipment and facilities are used both to improve the efficiency of the other functional elements and to recover usable materials, conversion products, or energy from solid wastes.
6. **Disposal-** The dumping of waste in a specific place for segregation.


Generation
On-site Handling & Storage
Collection
Transfer & Transport
Processing & Resource
Disposal

Common Solid Waste Disposal Methods

1. **Composting:** Composting type of waste reduction is used in both urban and rural areas to minimize waste. Its organic components break down into simpl

2. Controlled Tipping/Burying:

Solid wastes that are not recycled or used should be disposed of. Disposal is affected in many ways. A method that satisfies this is known as controlled tipping. It is a way of isolating any type of waste without bothering to sort or separate it.

3. Ploughing in the Fields: Ploughing of lands helps the segregation of the organic waste that is biodegradable waste helps the recovering and reusing of waste for soil conditioning.

4. Incineration:

Incineration is a high-temperature dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and resulting in a very significant reduction of waste volume and weight.

Urban flooding:

Urban floods are an immersion of land in a built setting, especially in thickly populated regions. It happens when precipitation or allied situations exceeds the capacity of sewerage systems. Urban floods are a significant issue in many regions of the world and are natural disasters that happen each year.

Some of the reasons of Urban floods are

- Melting of snow
- Heavy rain fall and floods
- Overflow from drainage
- Water discharged from damaged drain systems

Impacts of Urban Floods:

- **On Transport And Communication:**

Disruption in communication- impact on the telephone lines, internet cables

Increased traffic congestion, disruption in rail services

- **On The Environment:**

Impact on animals in the zoo, Loss of tree cover, loss of habitat.

- **On Economy:**

Post-disaster rescue and rehabilitation add to the financial burden of the government

i. Impact on heritage or archaeological site
ii. Disruptions to utility supplies
iii. Disruptions to industrial production
iv. Damage to buildings, roads, and other infrastructures

- **On Human Life:**

i. A rise in mosquito-borne diseases
ii. Contamination of water supplies leading to diseases
iii. Increased stress, psychological problems
iv. Loss of life & physical injury

THANK YOU