Unit III

Syllabus

Environmental Pollution, Introduction, Public Health Aspects, Air Pollution, Land Pollution, Soil Pollution, Marine Pollution, Water Pollution, Noise Pollution, Thermal Pollution, Solid Waste Management, Role of Individuals in Pollution Prevention, Disaster Management.

Environmental Pollution

Introduction

Pollution is defined as “an undesirable change in physical, chemical and biological characteristics of air, water and land that may be harmful to living organisms”. The Pollution Control Board, defined pollution as unfavorable alteration of our surrounding, largely as a by-product of human activities.

Pollutant

Pollutant is a substance which causes pollution. Unlimited exploitation of nature has disturbed the ecological balance between living and nonliving components in the biosphere. The major environment pollutants are deposited matter, gases, metals, fluorides, acid droplets, agro-chemicals, radioactive waste and solid waste.

Classification of pollutants

Environment pollution is of many types like air pollution, water pollution, noise pollution, soil pollution, marine pollution, etc. In developing countries major source of environment pollutions are air pollution, water pollution and soil pollution.

On the Basis of Nature

Depending upon the nature of the pollutants and their interaction with environment process, the pollution caused by different agents can be classified into the following categories:

- Solid pollutants.
- Liquid pollutants
- Gaseous pollutants
- Pollution from Waste without Weight: This type of pollution is also known as pollution by energy waste; Wastes without weight may be of the following types:
- Radio-active Substance: Despite of all possible precautions in the functioning and maintenance of nuclear reactors, it is seen that minute quantity of radio-active waste escapes out into the environment.

- Heat
- Noise

On the Basis of Decomposition

Non-Degradable Pollutants: These are not broken down by the natural processes like action of microbes.

Degradable Pollutants or Bio-degradable Pollutants: These are natural organic substances which can be decomposed, removed or consumed and thus, reduced to acceptable levels either by natural processes like biological or microbial action or by some engineered systems, like sewage treatment plants.

Public Health Aspects

- Exposure to high levels of pollution can cause a variety of adverse health outcomes.
- It increases the risk of respiratory infections, heart disease and lung cancer.
- Both short- and long-term exposure to air pollutants have been associated with health impacts.
- More severe impacts affect people who are already ill. Children, the elderly and poor people are more susceptible.
- The most health-harmful pollutants – closely associated with excessive premature mortality – are fine PM2.5 particles (PM2. 5 refers to particles that have diameter less than 2.5 micrometers - more than 100 times thinner than a human hair) that penetrate deep into lung passageways.
- Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and the rag pickers being the most vulnerable.
- Exposure to hazardous waste can affect human health, children being more vulnerable to these pollutants.

Air Pollution

Air pollution is the resultant of direct or indirect change in physical, chemical and biological characteristics of atmosphere, which mainly results from gases emission from industry, thermal power station, auto mobile and domestic combustions, etc.

Air pollutants

"Air Pollutant" can be defined as any solid, liquid or gaseous substance present in the atmosphere in high concentration more than prescribed limits that may be harmful to the living creatures.

Pollutants can be classified as primary and secondary pollutants.

- Primary pollutants are carbon dioxide, nitrogen oxides, sulphur dioxide, carbon monoxide and CFC.
- Secondary pollutants are acid rain and ozone.

Sources of air pollution

The sources of Air pollution are natural and man-made (anthropogenic).

Natural sources

The natural sources of air pollution are volcanic eruptions, forest fires, thunder storms, cyclones, typhoons, fog, biological decay, photochemical oxidation, deposition of dead matters, vegetation and animals etc. Radioactive minerals present in the earth crust are the sources of radioactivity in the atmosphere.

Man-made sources

Man-made sources include industry, thermal power stations, industrial units, vehicular emissions, automobiles, farming practices, domestic equipment, nuclear weapons and test, etc.

Major pollutants responsible for air pollution are: Sulfur dioxide (SO2), nitrogen oxides (NO2 and NO) , carbon dioxide (CO2) and carbon monoxide (CO), solid or liquid particulates (smaller than 10 µm).

Gaseous pollutants

Major gaseous pollutants are

- Sulfur dioxide (SO2)
- Nitrogen oxides
- Carbon monoxide and carbon dioxide
- Ozone, photochemical smog, hydrocarbon and fluorocarbons

Ozone (O3) is outcome of chemical reaction between nitrogen dioxide and volatile organic components. Ozone layer protects from harmful UV rays by absorbing ultra violet radiation. Ozone is the key component of photochemical smog.

Photochemical smog: Nitric oxide in the atmosphere with ozone causes elimination of ozone layer. Thinning or hole of ozone layer can cause skin cancer. It is estimated that 1% reduction in ozone increases UV radiation by 2%.

The main *hydrocarbon* are benzene, and methane and it emerges from motor vehicles. Hydrocarbons combine with nitrites under UV radiation and form other pollutants known as photochemical products.

On the other hand, *fluorocarbons* at higher level are toxic and creates problem of fluorosis, the source of fluoride in the environment are industrial process of phosphate fertilizers, aluminum, fluorinated plastics, uranium and other metals

Particulate matters

Discrete mass of any material which exist as a solid or liquid droplets and microscopic, sub microscopic dimension is known as particulate matter(PM).The main source of particulate matter are fuel combustions and industrial operations like mining, smelting, polishing, pesticides, fertilizer and chemical fertilizers,

Particulate matters can have adverse effect on human health and are generally less than 10 µm size.

Effects of air pollution

Nitrogen dioxide has more harmful effect as compare to nitric oxide. Exposure to NO2 causes resistance in air movement in lungs.

Nitric oxide and carbon monoxide can combine hemoglobin to reduce oxygen caring capacity of blood. These pollutants affect plants by entering through stomata. Particulate pollutants affect the photo synthetic activity which may damage the plants and can affect productivity. Air pollutants can enhance the acidity of water resources therefore can adversely affect aquatic life. Material can be damaged due to effect of pollutants when exposed to the environment

Steps to control and prevention of air pollution

- Engineers should consider the possibility by changing the manufacturing process. For example, to minimize the high level of lead in air simple solution is to eliminate lead in gasoline (supply of unleaded petrol)
- Use CNG (compressed natural gas) as an alternative fuel.
- Use gas additives to improve combustions.
- Control devices: The following items are commonly used as pollution control devices by industry or transportation devices. They can either destroy contaminants or remove them from an exhaust stream before they are emitted into the atmosphere.
- Mechanical collectors (dust cyclones, multicyclones)

- Wet scrubber is a form of pollution control technology. The term describes a variety of devices that use pollutants from a furnace flue gas or from other gas streams.

Noise Pollution

Noise can be defined as wrong sound in wrong place at wrong time. Sound at undesirable level creates pollution because it causes discomfort to the people. There are two basic properties of sound i.e., loudness and frequency. Loudness is strength of sensation of sound perceived by individual and is measured in terms of decibel, whereas frequency of sound defined as number of vibrations per second and measured as hertz (Hz).

Human ear is sensitive to frequency between 20-20000 Hz. whereas best range of hearing is 2000-10000 Hz

Sources of noise pollution

Major sources of noise pollution are industries, transportation, and community, religious and cultural activities. Loudspeaker and amplifiers used in different occasions is another source of noise pollution

Effects of noise pollution

Noise pollution is harmful to body and mind. It causes irritation and headache. It may cause number of physiological disorders like neurosis anxiety, insomnia, hyper-tension, behavior and emotional stress.

Control of noise pollution

- Eliminate the noise at source by use of silencing devises.
- Control the noise transmission level using sound absorbers and acoustic tiles.
- Using self-precaution measures such as ear plugs and earmuffs.
- Creating buffer zone between high noise level zone and residential areas by afforestation.
- Taking strict statuary measure to govern the noise level in sensitive areas like schools, hospitals, etc.

Water Pollution

Water pollution is referred as a presence of foreign substances or impurities which can contribute to health hazards by lowering water qualities and making it unfit for use.

Sources of water pollution

Main sources of water pollution are

- Pollution due to decaying of plants, animals and organic matter in water bodies.
- Addition of soil-silt washings, insecticides, herbicide and fungicides are agricultural sources can be water pollution.
- Ore washing, inert suspended solid and soluble toxic materials.
- Sewage obtained from domestic promises, institutions and industrial buildings are main sources of pollution of water in cities.
- Industrial Effluents are one of the important agents of water pollution.
- Accidental spillage of chemical or petroleum products also contributes towards water pollution.
- Ground water pollution with arsenic, fluorides and nitrites which are poisonous in nature are posing serious health problems.
- Major point sources of water pollution are industries, power plants, underground coalmines, offshore oil wells etc.

Water pollutants

Major water pollutants are

Organic pollutants: Water carrying organic pollutants have decreased level of oxygen and such organic pollutants promote disease causing agent.

Inorganic pollutants: Inorganic pollutants include inorganic salts, metallic compounds, trace elements and organ metallic compounds.

Thermal pollutants: Main source of thermal pollutants are coal water plants, nuclear water plants and other industrial process.

Water pollution makes the drinking water unfit for domestic use. Industrial effluents have harmful effect on living organism and can lead to death. *Radioactive substances* present in the water may cause cancer, eye, cataract and DNA breakage; it may also destroy biological immune system. Residual toxic compounds of pesticides may cause many health problems.

Sediments reduce the light penetration in water which lowers the photosynthetic activity of aquatic plants. Toxic substances observed into tissues from polluted water can cause injuries leading death of the plant.

Eutrophication: It is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system. One example is the "bloom" or great increase of phytoplankton in a water body as a response to increased levels of nutrients. Negative environmental effects include hypoxia, the depletion of oxygen in the water, which induces reductions in specific fish and other animal populations. Eutrophication can be human-caused or natural. Untreated sewage effluent and agricultural run-off carrying fertilizers are examples of human-caused eutrophication. However, it also occurs naturally in situations where nutrients accumulate (e.g., depositional environments), or where they flow into systems on an ephemeral basis.

Prevention and control of water pollution

It is said that prevention is better than cure. Strict legislation can help to reduce water pollution and policy maker should formulate strategies to prevent water pollution sources.

Following measures can help to control water pollution

- Prevent generation of pollutants at first place. Control the pollutants to minimize its effects on water pollution.
- Domestic and industrial waste water should be disposed of only after treatment.
- Enforce pollution control laws strictly.
- Use treatment plants to clean discharged industrial waste water and utilize it for irrigation purpose.
- Discourage excess use of pesticide and insecticide.
- Water bodies should be regularly cleaned of aquatic weed and wild plants
- Create public awareness regarding water pollution
- Afforestation will help to reduce the pollution and water erosion
- Use methods of biological nitrogen fixation to improve soil health and adopt integrated pest management to minimise chemical contamination in water.

Thermal Pollution

Thermal pollution, also known as heat pollution, is releasing of heat in air or water causing undesired changes to environment. It can be both natural as in case of forest fires and heat emanating from volcanoes, or it can be from manmade sources.

Sources of thermal pollution

There are several discrete sources of Thermal Pollution

- Thermal Power Plants
- Industries
- Release of domestic sewerage
- Nuclear Sources

Effects of thermal pollution

Solubility of oxygen has inverse proportionality relationship with temperature. That is, with increase in temperature of water bodies, oxygen content of water decreases. Dissolved oxygen is essential component for survival for aquatic life. High surface water temperature also has detrimental effect on penetration of oxygen in deep cold water. Thus, it also have effect on deep sea species.

Increase in water temperature has harmful effect on population of aquatic species who are sensitive to temperature changes. On the other hand it propagates temperature change tolerant species. Thus, adversely affecting balance of the aquatic ecosystem.

Control of thermal pollution

- Cooling towers

Water from water body affected is directed pumped towards the cooling tower having condensers, usually with temperature control. After bringing water temperature to desire level, it is returned to the source. Use of condenser makes this method expensive.

- Cooling ponds

These are the most cost effective way to tackle thermal pollution. In this method, heat of heating effluents on surface of the water is dissipated in atmosphere.

- Artificial lake

These are the man made bodies of water .Effluents are discharged into the lake and heat is gradually lost to the atmosphere through evaporation.

Marine Pollution

Marine Pollution refers to degradation of marine ecosystem by discharge of pollutants in large water bodies, in particular the sea and the oceans.

Sources of marine pollution

Major concern for Marine ecosystem is oil spills. Origin of oil spills can be attributed to natural phenomenon and also due to human activities. Natural sources are oil seeps at geographical fault lines in the ocean floors. Human activities leading to oil spills include leaking of oil tankers, well blowouts, drilling oil rigs, etc.

- Addition of pollutants to sea by rivers flowing into seas.
- Addition of pollutants due to human activities such as industrial activities, agriculture practices and tourism along coastline.
- Over exploitation of aquatic resources such as excessive fishing in particular region can adversely affect marine ecology.
- Mining of minerals at coast and sea-bed near coast results in defiling the marine ecological system.

Control of marine pollution

- Reducing the cases of oil spills due to leaking of tankers and well blowouts.
- Use of effective measures to control oil spills such as use of sinking material such as chalk and dispersants.
- Developing no fishing zones in areas where aquatic life has been adversely affected due to excessive fishing.
- Checking addition of toxic waste to rivers flowing into seas.
- Banning mining activities in and around coastal regions and on sea bed.
- Minimizing human activities in coastal regions adjoining areas sensitive marine ecosystem such as coral reefs.

Soil Pollution

Soil pollution is contamination of upper layer of earth's crust by chemicals or other toxic substances that lead to either reduction in fertility of soil in terms of crop production or whose addition results in detrimental effects to soil microorganism, insects, plant life and organism who consume those plants.

Sources of soil pollution

- Industrial Wastes.
- Improper Use of fertilizers, insecticides, pesticides, etc.
- Urban waste consisting of solid waste and sludge also contribute heavily towards soil pollution.
- Radioactive Pollutants

Effects of soil pollution

- Industrial effluents containing toxic chemicals dumped on land cause soil pollution and enter in food chain, which has adverse effect on human health.
- Solid waste dumped on land cause disruption in everyday life and destroys natural beauty of the landscape.
- Dumped waste and organic waste give rise to foul odor.
- Pathogenic bacteria cause diseases like cholera.
- Biomagnification: Biological magnification is the increase in concentration of a substance that occurs in a food chain. Biological magnification refers to the process whereby certain substances such as pesticides or heavy metals move up the food chain, work their way into rivers or lakes, and are eaten by aquatic organisms such as fish, which in turn are eaten by large birds, animals or humans.
- Bioaccumulants are substances that increase in concentration in living organisms as they take in contaminated air, water, or food because the substances are very slowly metabolized or excreted. There is good evidence that DDT, DDE, PCBs, toxaphene, and the organic forms of mercury and

arsenic do bio-magnify in nature. e.g endosulphon banned in some states due to overuse on cashew nut plantations.

Control measures of soil pollution

- Industries should be banned from dumping toxic chemicals on agricultural land and proper disposal methods should be used.
- Government should provide subsidies, concessions and tax exemption to companies that use recycled raw materials.
- Application of organic manures and pesticides should be encouraged in agriculture.
- Plastic carry bags should be replaced by jute bags.
- Public awareness campaigns should be organized.
- Solid waste from urban and industrial areas should be disposed of using proper techniques.
- Trees and grass should be grown to check soil erosion.

SOLID WASTE MANAGEMENT

Solid waste includes all discarded solid and semi-solid materials arising from various human activities. Municipal solid waste (MSW), consist mainly of refuse and trash. It predominantly includes food wastes, yard wastes, containers and product packaging, other miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources.

Trash refers to the bulky waste such as TV, refrigeration goods, broken furniture, etc. Refuse comprises of two components mainly garbage and rubbish. Garbage includes decayable waste such as vegetables, meats, food wastes and other readily degradable organic wastes. Rubbish consists of the non-degradable material such as glass, rubber, metals, plastics, etc and slowly degradable material such as paper products, textiles etc.

Sources of Solid Waste

Residential sources: Waste arising from day-to-day household activities is an important constituent to the solid waste. Proportion from this source is increasing day by day with rapid increase in population. Household waste includes variety of things such as food wastes, paper, cardboard, plastics, textiles, leather, etc.

Industrial Waste: Solid waste resulting from industries typically includes construction and demolition waste, rubbish, ashes and special waste.

Community Services: community services such as street cleaning, landscaping, recreational activities, water and waste water treatment plants give rise to solid waste such as wood, dirt, plastic and other general wastes.

Agricultural activities: Agricultural activities generate spoiled food wastes, agricultural wastes such as straw and sugarcane trash, hazardous wastes such as pesticides and insecticides.

Construction and demolition activities such as construction sites, road repair, renovation sites, and demolition of buildings generate solid waste like wood, steel, concrete, dirt, etc.

Effects of Solid Waste Pollution

- Diseases such as diarrhea and dysentery are spread by carriers especially fly which breed on garbage.
- Rubbish and trash can block the drains thus making breeding grounds for mosquitoes, that spread diseases like malaria and dengue.
- Rotting garbage gives out foul smell that can render a locality inhospitable.
- Dumping places are usually also home to stray animals such as abandoned cows that frequently block traffic on roads and occasionally lead to road accidents.
- Seeping of toxic chemicals from factories and garbage waste underground, can render underground water unfit for human consumption.
- Accumulation of construction and demolition waste at places lessens the aesthetic beauty of surroundings.

- Intake of solid non-biodegradable waste such as plastic by scavengers and stray animals like pigs and abandoned cows can choke their windpipes and lead to death.

Need for Reducing, Reusing and Recycling of Waste

Waste management is necessary because if it is not done the waste may lead to environmental and health problems harmful for mankind. Our planet is going to be filled with waste soon if we don't manage our garbage and trash properly.

- It cuts back on global warming.
- It makes us more energy-efficient. It often takes a great deal more energy to create something from scratch than to recycle it.
- It keeps our landfills from overflowing. We're fast running out of space for landfills—especially near cities. Seaside cities have been dumping trash into their oceans for decades to circumvent the problem
- It improves the quality of our groundwater.
- It reduces air pollution. Many factories that produce plastics, metals, and paper products release toxins into the air. Recycle these materials, and there will be less need for companies to manufacture new materials—saving on the amount of pollution dumped into our atmosphere.
- It creates jobs. From manufacturing to processing, from collection to invention—it's no secret that recycling is a growth industry, earning billions of dollars annually.
- It adds to property value. It's obvious that a landfill near your home can decrease your property values significantly. Recycling reduces the amount of land needed for landfills. This reduces the number of houses near landfills, keeping property values up and homeowners happy.

Management of Solid Waste

Best way to manage the problems associated with solid waste is by to reduce wastage itself. With higher standards of living especially in urban areas there is

tendency to declare goods outdated and obsolete. This leads to solid waste. Thus, the problem can be checked by promoting efficient utilization and reuse.

Recycling the trash and refuse greatly reduces the non-biodegradable component of solid waste. Items made up of plastic, glass, paper, metal, etc. can be recycled to form other products, thus saving raw materials and also reducing solid waste.

Disposing off the solid waste with techniques such as land filling, incineration, pulverization, etc.

Methods of Solid Waste Disposal

Land Filling: This is simple and economical method that requires no skilled labor. Method involves dumping the solid waste collected into a low-lying area usually at the outskirts of the settlement in layers. The layers are usually 1.5 to 2 meters thick are covered with a thin layer of good earth, before filling another layer of solid waste over it. The layer of solid waste is thus sandwiched between thin layers of good earth. Over time, solid waste breaks and is stabilized. After the site reaches certain height, it can be developed as parks by landscaping and planting trees.

Incineration: In this method, solid waste is burned in specially designed furnaces. Combustible waste is separated from non-combustible and fed into the furnace. Temperature conditions in furnace are carefully adjusted to burn all organic matter and oxidize all foul smell. Since, this method involves high temperature; all pathogens and pest are destroyed, though, smoke coming from furnace causes air pollution.

Composting: This method involves digesting organic matter by anaerobic process, converting it into organic manure and other stable compounds. It solves twin purpose of solid waste disposal and providing manure for farms. Composting by trenching, open window composting and mechanical composting are three widely used composting techniques.

Disposal into the sea: This method involves dumping the solid waste at sea floor. It can only be applied in coastal areas with strong currents. It is cheap method but tides can bring back some portion of solid waste dumped back to beaches.

Role Of an Individual in Prevention of Pollution

Environment protection has been burning issue in last half century. In order to tackle the threat of pollution, urgent steps have to be taken at not only global or country level, but also at local level. Effort by each individual at his or her level can have a significant effect on global level.

Aware and inspired individuals are strongest tool to tackle pollution. This is because an aware individual not only lessens the burden on state but also, he/she can tackle problem of pollution more effectively as he/she is more familiar with problems persisting at local level and he himself/herself deals with them in his/her day-to-day life. It is better and more viable to prevent pollution by educating individuals than controlling pollution. Individuals should encourage to modify their lifestyle and living habits if that are not healthy for environment.

Ways in Which a Individual can Help in Prevention of Pollution

- Individuals should minimize wastage of resources such as electricity. Every unit of electricity saved is equivalent unit of electricity.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distances to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc.) instead of using personal vehicles.
- When going to workplace, colleagues from nearby localities should pool vehicles instead of going in individual personal vehicles.
- Taking personal vehicles for periodic pollution checks at centers approved by authorities.
- Individuals should reuse items whenever possible.

- Products that are made of recycled material should be given preference.
- Use water resources efficiently.
- Use renewable resources by installing equipment such as solar heaters and using solar cookers.
- Dispose potentially harmful products such as cells, batteries, pesticide containers, etc. properly.
- Use of refrigerators should be minimized wherever possible as they are main source of CFC, which is responsible for Ozone layer depletion.
- Avoid making noise producing activities such as listening to loud music.
- Use handkerchiefs instead of paper tissues.
- Organize drives to clean streets and clean drains with help of other people of locality.
- Spread awareness and inspire other people to prevent pollution. Individuals should be encouraged to acquire information and innovations from world over and implement them locally.

Disaster Management

Disaster management refers to effective management of counter measures that are taken in order to mitigate the effect natural calamities that lead to desperate situations after calamities such as earthquakes, floods, landslides, tsunamis, etc. Although these sudden calamities are natural geographical processes that have been taking place from beginning and have played important role in shaping of earth, these geographical activities are wreak havoc and bring misfortune to people in region affected. Among the 36 states and Union territories in the country, 22 are prone to disasters. Among all the disasters that occur in the country, floods are the most frequently occurring natural disasters, due to the irregularities of the Indian monsoon. About 75 percent of the annual rainfall in India is concentrated in three to four months of the monsoon season. As a result, there is a very heavy discharge

from the rivers during this period causing widespread floods. Approximately 40 million hectares of land in the country has been identified as being prone to floods.

Every region of the world will confront disaster in some way or other. As these disasters are sudden and rarely predictable, best way to mitigate their effect is to be prepared to them. This requires preplanning and professional approach.

Disaster management revolves around preplanning, which includes

- Organizing general disaster management teams to respond to any general disaster and in any terrain.
- Organizing special quick response teams that are highly specific to nature and region of disaster.
- Most important part is identifying threats that a particular region is most vulnerable to. This involves setting up of research stations that study the terrain, climate and underground seismic activities of the region.

Major Causes for Disasters

Earthquake

In order to decrease the effect of earthquakes, these precautionary measures must be taken.

- People should evacuate buildings and stay in open until the time, tremors have ceased.
- In case people are unable to get out of the buildings, they should try and stay in corners of the rooms.
- People using transport should stop vehicles and wait for tremors to subside.
- Buildings should be made by using construction material that is recommended by authorities.

- Design of the houses and buildings must be approved by authorities. Rectangular building design is most effective design that can withstand earthquake.
- People should help each other and provide first aid to the victims and not just wait for disaster management teams to arrive.
- Temporary relief camps and rehabilitation centers should be provided to people who have been affected.
- Compensation should be given to people who lost their house and livelihood.
- People should be made aware and trained through campaigns to tackle adversities as it is not possible for disaster management teams to reach everywhere.

Cyclones

In order to abate the effect of cyclones, following measures are advised.

- With help of technology, advent and paths cyclones can be predicted to some extent. First and foremost, measure is to vacate the region that is predicted to be affected.
- People should be warned about cyclones through weather news, internet, newspapers, radio broadcast, etc.
- People should take to shelter in safe buildings during cyclones. Storm shelter should be constructed by authorities.
- Fisherman should be warned not to go to sea.
- Electricity supply should be cut off to the region that is affected.
- Temporary relief camps and rehabilitation centers should be provided to people who have been affected.
- Compensation should be given to people who lost their house and livelihood.

Floods

In order to pacify the effects of flood disaster, following steps must be taken.

- Floods in general are caused by heavy and concentrated rains. Therefore, best defense is to study and predict weather developments and issue early warnings through broadcast and print media.
- People should be evacuated to safer places and relief camps should be provided.
- People who could not be evacuated should move to relatively higher places.
- Dams and embankments must be constructed by the government to check the flow in regions frequently affected by flood disasters.
- Floods often result in breaching of canal embankments and river embankments. Strength of these embankments must be periodically evaluated by authorities so that they can withstand deluge.
- Sand bangs must be used to repair temporary breaches in canals during floods.

Landslides

In general, the chief mitigatory measures to be adopted for landslide areas are

- Drainage correction,
- Proper land use measures,
- Reforestation for the areas occupied by degraded vegetation
- Creation of awareness among local population.

Agencies Working on Disaster Management

National disaster management authority (NDMA)

NMDA is headed by the Prime Minister of India, is the Apex Body for Disaster Management in India. The setting up of the NDMA and the creation of an enabling environment for institutional mechanisms at the State and District levels is mandated by the Disaster Management Act, 2005. NDMA as the apex body is mandated to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters.

Red cross/Red crescent

National Red Cross/Red Crescent societies often have pivotal roles in responding to emergencies.

United nations

Within the United Nations system responsibility for emergency response rests with the Resident Coordinator within the affected country. However, in practice international response will be coordinated, if requested by the affected country's government.