



UNIT IV

Disaster Management, Social Issues, Human Population and the Environment

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Notes compiled by the Teachers

DISASTER MANAGEMENT: FLOODS, EARTHQUAKES, CYCLONES, LANDSLIDES

The Indian subcontinent is very vulnerable to droughts, floods, cyclones, earthquakes, landslides, avalanches and forest fires. 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. Major floods are mainly caused in the Ganga-Brahmaputra-Meghna basin which carries 60 percent of the total river flow of our country.

India has a long coastline of 5700 kms, which is exposed to tropical cyclones arising in the Bay of Bengal and the Arabian sea. The Indian Ocean is one of the six major cyclone prone regions of the world. In India, cyclones occur usually between April and May and also between October and December. The eastern coastline is more prone to cyclones as it is hit by about 80 percent of the total cyclones generated in the region.

Droughts are a perennial feature in some states of India. Sixteen percent of the country's total area is drought prone. Drought is a significant environmental problem as it is caused by a lower than average rainfall over a long period of time. Most of the drought prone areas identified by the Government lie in the arid and semi-arid areas of the country.

Earthquakes are considered to be one of the most destructive natural hazards. Most of the vulnerable areas are located in the Himalayan and sub-Himalayan regions.



Disaster Management Cycle



1. Response-Response measures are usually those which are taken immediately prior to and following disaster impact.

- Typical measures include :
- Implementation of plans
- Activation of the counter-disaster system

- Search and Rescue
- Provision of emergency food, shelter, medical assistance etc.
- Survey and assessment
- Evacuation measures

2. Recovery-Three main categories of activity are normally regarded as coming within the recovery segment:

- Restoration
- Reconstruction
- Rehabilitation

3. Prevention & Mitigation-

Prevention : Action within this segment is designed to impede the occurrence of a disaster event and/or prevent such an occurrence having harmful effects on communities or key installations.

Mitigation : Action within this segment usually takes the form of specific programs intended to reduce the effects of disaster on a nation or community. For instance, some countries regard the development and application of building codes (which can reduce damage and loss in the event of earthquakes and cyclones) as being in the category of mitigation.

4. Preparedness-Examples of Preparedness measures are :

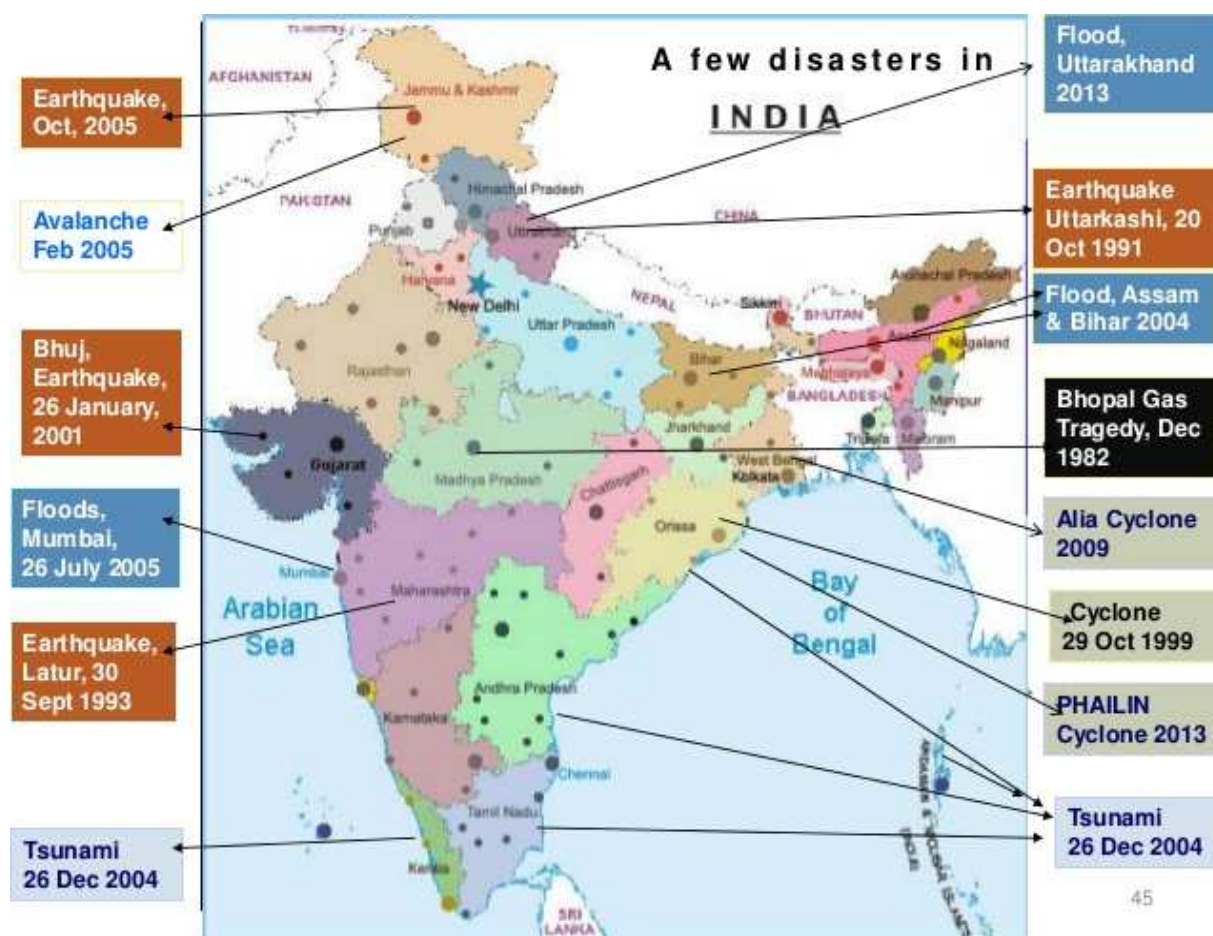
- The formulation & maintenance of valid, up-to-date counter-disaster plans
- Special provisions for emergency action
- The provisions of warning systems
- Emergency communications
- Public education and awareness
- Training programs, including exercises and tests.

From Management to Mitigation of Disasters

Disaster management is a multidisciplinary area in which a wide range of issues that range from forecasting, warning, evacuation, search and rescue, relief, reconstruction and rehabilitation are included. It is also multi-sectoral as it involves administrators, scientists, planners, volunteers and communities. These roles and activities span the pre-disaster, during disaster and post disaster plans.

The main elements of a mitigation strategy are as follows:

1. Risk assessment and Vulnerability analysis- This involves identification of hot spot areas of prime concern, collection of information on past natural hazards, information of the natural ecosystems and information on the population and infrastructure.
2. Applied research and technology transfer- There is a need to establish or upgrade observation equipment and networks, monitor the hazards properly, improve the quality of forecasting and warning, disseminate information quickly through the warning systems and undertake disaster simulation exercises.
3. Public awareness and training- One of the most critical components of a mitigation strategy is the training to be imparted to the officials and staff of the various departments involved at the state and the district level.
4. Institutional mechanisms- The most important need at the National level is to strengthen or develop the capacity to undertake disaster mitigation strategies.
5. Incentives and resources for mitigation -To a very large extent the success of mitigation programs will depend upon the availability of continued funding.
6. Landuse planning and regulations -Long term disaster reduction efforts should aim at promoting appropriate land-use in the disaster prone areas.
7. Hazard resistant design and construction- In areas that are prone to disasters protection can be enhanced by careful selection of sites and the way the buildings are built. Thus it is essential to promote the knowledge of disaster resistant construction techniques and practices among engineers, architects and technical personnel.
8. Structural and Constructional reinforcement of existing buildings- It is also possible to reduce the vulnerability of existing buildings through minor adaptations or alterations thereby ensuring their safety.



Floods and Mitigation measures

- Prevention of over-bank spilling by the construction of embankments and floodwalls.
 - Improvement of flow conditions in the channel and anti-erosion measures.
 - Improved drainage.
- The non-structural measures include:
 - Flood plain management such as Flood Plain Zoning and Flood Proofing including Disaster Preparedness
 - Maintaining wetlands
 - Flood forecasting and warning services
 - Disaster relief, flood fighting and public health measures
 - Flood insurance

Earthquakes and Mitigation measures

The coordination between Government, local NGOs and local community initiatives both for rescue as well as rehabilitation needs to be strengthened as this can cause delays, overlaps and waste of relief material and efforts.

Cyclones and Mitigation measures

- Installation of early warning systems
- Developing communication infrastructure
- Developing shelter belts
- Developing community cyclone shelters
- Construction of permanent houses: There is a need to build appropriately designed concrete houses that can withstand high winds and tidal waves.
- Training and education: Public awareness programs that inform the population about their response to cyclone warnings and preparedness can go a long way in reducing casualties.

Landslides and Mitigation measures

Landslides are recurring phenomena in the Himalayan region. In the recent years however intensive construction activity and the destabilizing forces of nature have aggravated the problem. Landslides occur as a result of changes on a slope, sudden or gradual, either in its composition, structure, hydrology or vegetation. The changes can be due to geology, climate, weathering, land-use and earthquakes.

A significant reduction in the hazards caused by landslides can be achieved by preventing the exposure of population and facilities to landslides and by physically controlling the landslides. Developmental programs that involve modification of the topography, exploitation of natural resources and change in the balance load on the ground should not be permitted. Some critical measures that could be undertaken to prevent further landslides are drainage measures, erosion control measures such as bamboo check dams, terracing, jute and coir netting and rockfall control measures such as grass plantation, vegetated dry masonry wall, retaining wall and most importantly preventing deforestation and improving afforestation.

Disasters cannot be totally prevented. However early warning systems, careful planning and preparedness on part of the vulnerable community would help in minimizing the loss of life and property due to these disasters.

CASE STUDIES (Self learning by students) Related with disasters in Indian Scenario.

Nuclear accidents and holocaust

Though nuclear energy is an alternate source of clean and cheap energy compared to fossil fuels; a single nuclear accident causes loss of life, long-term illness and destruction of property on a large scale and for a long period of time. Radioactivity and its fall out leads to cancer, genetic disorders and death in the affected area for decades after.

A nuclear and radiation accident is defined by the International Atomic agency as an “event that has led to significant consequences to people, the environment or the facility”. Examples include lethal effects to individuals, large radioactivity release to the environment, or “reactor core melt.”

major nuclear accident-Chernobyl Nuclear Disaster:

26th of April 1986 witnessed one of the world’s worst Nuclear Disaster ever in Chernobyl. Chernobyl is approximately 80 miles (which is 120 kilometers) north of the capital city of the Ukraine, Kiev. The accident took lives of 30 people immediately and vast evacuation of 135000 people within 20 mile radius of the power plant was carried out after the accident.

Consequences of the Accident:

1. Environmental consequences
2. Health effects
3. Psychological consequences
4. Economic, political and social consequences

SOCIAL ISSUES AND THE ENVIRONMENT

FROM UNSUSTAINABLE TO SUSTAINABLE DEVELOPMENT

Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

We as citizens of our Nation, and increasingly as citizens of one common future at the global level, must constantly monitor the pattern of development. If we see that a development project or an industry is leading to serious environmental problems, it is our duty to bring this to the attention of authorities such as the local administration, the Forest Department or the Pollution Control Board, to look into the issue. We cannot support the economic growth of one sector of society while we permit environmental degradation to destroy the lives of the less fortunate.

ENVIRONMENTAL ETHICS: ISSUES AND POSSIBLE SOLUTIONS

Environmental ethics deals with issues related to the rights of individuals that are fundamental to life and well being. This concerns not only the needs of each person today, but also those who will come after us. It also deals with the rights of other living creatures that inhabit our earth.

PRESERVING RESOURCES FOR FUTURE GENERATIONS:

Our current development strategies have led to environmental resources being overused and misused by our present generation, without a thought for the needs of future unborn generations. We need to appreciate that the next generation and those that will come later also have a right to the earth’s natural resources. As they are not here today to exercise their rights, it is our

generation's responsibility to appreciate the needs of future generations. We have no right to destroy their claim to the use of the earth's resources just because of the accident of being born before them. Development strategies have not looked at the sustainable levels at which we can use resources so that the rights of future generations are protected. We are not given the earth so that we can use up its resources. It is given to us to hold in trust so that future generations are given their just share of the earth's resources.

WASTE LAND RECLAMATION

The productivity of waste lands is very low and people owning these lands are poor and are forced to earn a living from wage employment. Therefore, waste lands is regarded as a powerful tool and attacking the issues of poverty and backwardness.

Land and water are of critical importance for Agriculture development. Loss of vegetation cover leads to loss of soil through erosion, which ultimately creates wasteland. Vast tracts of the land that are degraded and brought under plough with some effort are known as waste lands.

A Technical Task Group was formed by the Planning Commission and National Wasteland Development Board (NWDB). This group has defined the wastelands as the land which is degraded and is presently lying unutilized except as current follows due to different constraints (CSIR 1990). Depending upon the casual factors the waste lands may be grouped under

1. Water-erosion
2. Wind-erosion and
3. Salinity and Alkalinity

The uncultured wastelands include barren rocky/stony waste areas, steep-sloping areas and snow covered areas.

Types of wastelands

These are of three types: easily reclaimable, reclaimable with some difficulty, and reclaimable with extreme difficulty.

- **Easily reclaimable lands:** These are used for agriculture. Salt content in this waste land can be reduced by leaching and flushing. Gypsum, urea, potash and compost should be used before planting.
- **Reclaimable lands with some difficulty:** These waste lands are used for agro forestry. Integration of trees with agricultural crops and livestock management should be done.
- **Reclaimable lands with extreme difficulty:** These are meant for regenerating as forests. So far, 11.5% of prime forest land has become degraded.

Need for wasteland development

- Wasteland development provides a source of income for the rural poor.
- It ensures a constant supply of fuel, fodder and timber for local use.
- Makes the soil fertile by preventing soil erosion and conserving moisture.
- Helps maintain an ecological balance in the area.
- Increases the forest cover maintains the local climatic conditions.
- Trees help in holding moisture and reduce surface run-off rates.

CONSUMERISM AND WASTE PRODUCTS

- Consumerism is related to the constant purchasing of new goods, with little attention to their true need, durability, product origin, or the environmental consequences of their manufacture and disposal.
- Consumerism interferes with the sustainable use of resources in a society by replacing the normal common sense desire for an adequate supply of life's necessities, with an insatiable quest for things that are purchased by larger and larger incomes to buy them.
- Especially in developed countries, landfills are being rapidly filled with cheap discarded products that fail to work within short time and cannot be repaired.
- In many cases, consumer products are made psychologically obsolete by advertising industry long before they actually wear out.
- The inordinate amount of waste that is generated by consumer-oriented societies around the world is now a serious environmental issue.
- Most human activities are related to production and consumption cycle which produce excessive amounts of waste in the form of solid, liquid and gaseous waste products.
- With the advent of industrial civilization, the highly complex technological processes for production of goods have rapidly increased problems due to inadequate waste disposal.
- With the rapid increase in population, the amount of waste in terms of quantity and quality has increased waste management pressure many-fold in recent years.
- Our health will be affected by dangerous industrial effluents, and we will be smothered by clouds of smoke and unhealthy gases. Therefore, the reuse of goods and waste utilization should become a part of the production-consumption cycle.
- For example, it is estimated that the per capita production of domestic waste is many times higher in a developed country hence compared to a developing country.
- Large quantities of solid, liquid and gaseous waste is produced by urban industrial communities in the form of plastic, paper, leather, tin cans, bottles, mineral refuse, and pathological waste from hospitals.
- Dead animals, agricultural wastes, fertilizer and pesticide overuse, and human and animal excreta are essentially rural concerns.
- This attitude towards waste has led to disastrous effects on the environment besides the overexploitation of natural resources.

THE ENVIRONMENT PROTECTION ACT

The Environment (Protection) Act, 1986 not only has important constitutional implications but also an international background. The spirit of the proclamation adopted by the United Nations Conference on Human Environment which took place in Stockholm in June 1972, was implemented by the Government of India by creating this Act.

This Act is created 'to take appropriate steps for the preservation of the natural resources of the earth which among other things includes the preservation of high quality air and ensures controlling the level of air pollution.

THE AIR (PREVENTION AND CONTROL OF POLLUTION) ACT

The Government passed this Act in 1981 to clean up our air by controlling pollution

The main objectives of the Act are as follows:

- (a) To provide for the Prevention, Control and abatement of air pollution.
- (b) To provide for the establishment of Central and State Boards with a view to implement the Act.
- (c) To confer on the Boards the powers to implement the provisions of the Act and assign to the Boards functions relating to pollution.

THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT

The Government has formulated this Act in 1974 to be able to prevent pollution of water by industrial, agricultural and household wastewater that can contaminate our water sources. The main objectives of the Water Act are to provide for prevention, control and abatement of water pollution and the maintenance or restoration of the wholesomeness of water. Governments have set up Pollution Control Boards that monitor water pollution.

Functions of the Pollution Control Boards: The Government has given the necessary powers to the PCBs to deal with the problems of water pollution in the country. The Government has also suggested penalties for violation of the provisions of the Act.

THE WILDLIFE PROTECTION ACT

This Act passed in 1972, deals with the declaration of National Parks and Wildlife Sanctuaries and their notification. The Amendment to the Wildlife Protection Act in 2002 is more stringent and prevents the commercial use of resources by local people.

Penalties: A person who breaks any of the conditions of any license or permit granted under this Act shall be guilty of an offence against this Act. The offence is punishable with imprisonment for a term which may extend to three years or with a fine of Rs 25,000 or with both.

FOREST CONSERVATION ACT

To appreciate the importance of the Forest Conservation Act of 1980, which was amended in 1988, it is essential to understand its historical background. The Indian Forest Act of 1927 consolidated all the previous laws regarding forests that were passed before the 1920's. The Act gave the Government and Forest Department the power to create Reserved Forests, and the right to use Reserved Forests for Government use alone. Act of 1980 and its amendment in 1988.

ENVIRONMENT IMPACT ASSESSMENT (EIA):

For all development projects, whether Government or Private, the MoEF requires an impact assessment done by a competent organisation. The EIA must look into physical, biological and social parameters. EIAs are expected to indicate what the likely impacts could be if the project is passed. The Ministry of Environment and Forests (MoEF) has identified a large number of projects that need clearance on environmental grounds. The EIA must define what impact it would have on water, soil and air. It also requires that a list of flora and fauna identified in the region is documented and to specify if there are any endangered species whose habitat or life could be adversely affected. Most development projects such as industries, roads, railways and dams may also affect the lives of local people. This must be addressed in the EIA. There are 30 different industries listed by MoEF that require a clearance before they are set up.

After the Environmental Protection Act of 1986 was passed, an EIA to get an environmental clearance for a project became mandatory.

ISO 14001:2015 ENVIRONMENTAL MANAGEMENT SYSTEM

ISO 14001 is an internationally agreed standard that sets out the requirements for an environmental management system.

It helps organizations improve their environmental performance through more efficient use of resources and reduction of waste, gaining a competitive advantage and the trust of stakeholders. Organizations using ISO 14001 have found success across a range of areas, including reduced energy and water consumption, a more systematic approach to legal compliance and an improved overall environmental performance.

ISO 14001 has recently been revised, with key improvements such as:

- The increased prominence of environmental management within the organization's strategic planning processes
- Greater input from leadership
- A stronger commitment to proactive initiatives that boost environmental performance

The new series of ISO14000 standards are designed to cover:

- ◆ environmental management systems
- ◆ environmental auditing

- ◆ environmental performance evaluation
- ◆ environmental labeling
- ◆ life-cycle assessment
- ◆ environmental aspects in product standards

Other standards in the ISO 14000 family

The ISO 14000 family comprises a number of standards that complement ISO 14001, some of which are listed below.

ISO 14004 provides guidance on the establishment, implementation, maintenance and improvement of an environmental management system and its coordination with other management systems.

ISO 14006 is intended to be used by those organizations that have implemented an environmental management system in accordance with ISO 14001, but can help integrate eco-design into other management systems.

ISO 14064-1 specifies principles and requirements at the organizational level for the quantification and reporting of greenhouse gas (GHG) emissions and removal.

HUMAN POPULATION AND THE ENVIRONMENT

POPULATION GROWTH, VARIATION AMONG NATIONS

Increase in production per capita of agricultural produce at a global level ceased during the 1980's. In some countries, food shortage has become a permanent feature. Two of every three children in South Africa are underweight. In other regions famines due to drought have become more frequent. Thus the disparity in the extent of per capita resources that are used by people who live in a 'developed' country as against those who live in a 'developing' country is extremely large. Similarly, the disparity between the rich and the poor in India is also growing.

GLOBAL POPULATION GROWTH

The world population is growing by more than 90 million per year, of which 93% is in developing countries. This will essentially prevent their further economic 'development'. If no action is taken it will become a staggering 7.92 billion.

Human population growth increased from: 1 to 2 billion, in 123 years.

2 to 3 billion, in 33 years.

3 to 4 billion in 14 years.

4 to 5 billion, in 13 years,

5 to 6 billion, in 11 years.

URBANIZATION

In 1975 only 27% of the people in the developing world lived in urban areas. By 2000 this had grown to 40% and by 2030 well informed estimates state that this will grow to 56%. The developed world is already highly urbanized with 75% of its population living in the urban sector.

ENVIRONMENT AND HUMAN HEALTH

Environment related issues that affect our health have been one of the most important triggers that have led to creating an increasing awareness of the need for better environmental management. The assumption that human progress is through economic growth is not necessarily true. We expect urbanization and industrialization to bring in prosperity, but on the down side, it leads to diseases related to overcrowding and an inadequate quality of drinking water, resulting in an increase in waterborne diseases. Thus development has created several long-term health problems.

Definition of Health Impact Assessment (HIA) by WHO: Health impact assessment is a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.

CANCER AND ENVIRONMENT

Cancer is caused by the uncontrolled growth and spread of abnormal cells that may affect almost any tissue of the body. Lung, colon, rectal and stomach cancer are among the five most common cancers in the world for both men and women. Among men, lung and stomach cancer are the most common cancers worldwide. For women, the most common cancers are breast and cervical cancer. In India, oral and pharyngeal cancers form the most common type of cancer which are related to tobacco chewing.

More than 10 million people are diagnosed with cancer in the world every year. It is estimated that there will be 15 million new cases every year by 2020. Cancer causes 6 million deaths every year – or 12% of deaths worldwide.

The prevention of certain occupational and environmental exposure to several chemicals is an important element in preventing cancer.

CASE STUDIES (Self learning by students) in Indian Scenario.

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