

3001 ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

SCHEME OF EVALUATION

	QN. NO.	DESCRIPTION	MARK DIVISION & TOTAL MARKS		
PART A	I	1	Natural resources are materials, which living organisms can take from nature for sustaining their life. Natural resources occur naturally within environments that exist relatively undisturbed by mankind, in a natural form.	2	10
		2	The study of the interactions or interrelations of organism to each other and also to their physical environment is known as ecology or environmental biology . The term ecology was coined by combining two Greek words, oikos ('house') and logos ('the study of').	2	
		3	An ecosystem is a community of living organisms together with the non-living components of their environment, interacting as a system	2	
		4	Oxides of carbon, oxides of sulphur, oxides of nitrogen, methane and other hydrocarbons.	2	
		5	' Environmental hazard ' is the state of events which has the potential to threaten the surrounding natural environment and adversely affect people's health. This term incorporates topics like pollution and natural disasters such as storms and earthquakes.	2	
PART B	II	1	<p>Water resources are sources of water that are useful or potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities etc. 69% of worldwide water is used for agricultural purposes. It is estimated that 22% of worldwide water is used in industry and nearly 8% of worldwide water is used for household purposes, including drinking water, bathing, cooking, sanitation, and gardening.</p> <p>The usable water may be grouped into three categories. They are consumptive for irrigation, Non consumptive for hydropower generation, aquaculture and partially consumptive for industrial, thermal power plant etc.</p>	6	6
		2	Natural Ecosystem. A natural ecosystem is a naturally occurring ecosystem. (a forest, ocean, grassland etc.). It has high species diversity.		


		<p>Artificial Ecosystem: Manmade ecosystems are called Artificial Ecosystem. It has low species diversity(aquarium, dam, crop field, garden etc).</p> <p>Based on the habitat ecosystems are mainly two types. They are terrestrial and aquatic.</p> <p>In terrestrial ecosystem organisms interact with land (word "Terrestrial" means land).terrestrial ecosystem includes Desert, Forest, grassland etc. Terrestrial ecosystems are called biomes. In aquatic ecosystem organisms interact with water (word "Aquatic" means water) .Aquatic ecosystem includes pond, river, Lake Etc.</p> <p>Aquatic ecosystem is classified into two-marine (sea, estuaries etc.) and fresh water (pond, lake etc.)Fresh water ecosystem is classified into two categories- lentic and lotic. Lentic ecosystems includes stagnant water bodies like ponds, pools, swamps etc. Lotic ecosystems includes running water bodies like rivers, streams etc</p>	6	6
	3	<p>A forest ecosystem is a terrestrial unit of living organisms like plants, animals and microorganisms, all interacting among themselves and with the environment like soil, climate, water and light in which they live. A forest ecosystem community is directly related to species diversity. A forest is a system that supports interacting units including trees, soil, insects, animals, and man. Complex forest ecosystems are extremely diverse, ranging from dry desert land to large temperate rain forests. Forest biomes are broad categories of natural tree/plant communities. When the ecosystem is exploited and exploitation is maintained or when components of the forest begin to naturally die, then the maturity of the forest ecosystem declines. Management of forests for sustainability is desirable when forest diversity is threatened by overuse, resource</p> <p>exploitation, old age and poor management. Forest ecosystems can be disrupted and harmed when not properly sustained.</p>	6	6
	4	<p>Some of the main sources of air pollution are:</p> <ul style="list-style-type: none"> ➤ Automobile emissions ➤ Tobacco smoke ➤ Combustion of coal ➤ Acid rain ➤ Noise pollution from automobiles and construction ➤ Power plants ➤ Manufacturing buildings ➤ Large ships ➤ Paint fumes ➤ Aerosol sprays ➤ Wildfires ➤ Nuclear weapons etc. <p>(Any 6 points)</p>	6	6

	5	<ul style="list-style-type: none"> ➤ Noise pollution is excessive, displeasing human, animal, or machine-created environmental noise that disrupts the activity or balance of human or animal life. ➤ The source of most outdoor noise worldwide is mainly construction and transportation systems, including vehicle noise, aircraft noise, and rail noise. ➤ Poor urban planning may give rise to noise pollution, since side-by-side industrial and residential buildings can result in noise pollution in the residential areas. ➤ High noise levels can contribute to cardiovascular effects in humans, a rise in blood pressure, and an increase in stress and vasoconstriction, and an increased incidence of coronary artery disease. 	6	6
	6	<p>Tsunamis occur when there is a sudden large displacement of water. Three main causes of tsunamis are</p> <p>Seismic Activity Both tectonic and subduction earthquakes in and near the ocean may create tsunamis. During a tectonic earthquake, the sea floor becomes deformed, forcing a displacement of water. In a subduction earthquake, tectonic plates slip under each other, creating a massive disturbance, also resulting in a significant displacement of water.</p> <p>Submarine Landslides Submarine landslides can also cause tsunamis. Submarine landslides occur during earthquakes and the implosion of underwater volcanoes. The falling sediment and rock in these landslides can also trigger massive water movement, resulting in a tsunami.</p> <p>Cosmic Impacts Cosmic impacts in the ocean are the least frequent cause of tsunamis. This is similar to throwing a rock into a pond, except on a much larger scale. When the rock hits the water, it creates small ripples of water moving away from the point of impact.</p>	2 2 2	6
	7	<p>A cyclone is a rapidly-rotating storm system characterized by a low-pressure centre, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain. The main source of energy for tropical cyclones is the warm oceans in the tropical regions. To initiate a tropical cyclone the sea-surface temperature generally needs to be above 26.5°C. However, existing cyclones often persist as they move over cooler waters.</p> <p>The development of a tropical cyclone also relies on favourable broad-scale wind regimes and can persist for several days with many following quite erratic paths. They lose their source of energy when they move over land or colder oceans causing them to dissipate. Weakening may also occur if the cyclone moves into an unfavourable wind regime which disrupts the structure of the system. Sometimes a decaying tropical cyclone may interact with a weather system in higher latitudes to cause impacts far from the tropics.</p>	6	6

PART C	III	(a)	<p>Deforestation is the removal of a forest. About half of the world's original forests had been destroyed during the previous 50 years. It leads to ecological imbalance. The removal of trees without sufficient reforestation has resulted in damage to habitat, biodiversity loss and aridity. It has adverse impacts on bio-sequestration of atmospheric carbon dioxide. Deforested regions typically incur significant adverse soil erosion and frequently degrade into wasteland. Deforestation causes extinction, changes to climatic conditions, desertification, displacement of populations, ecological imbalance etc.</p> <p>Deforestation occurs due to</p> <ul style="list-style-type: none"> ➤ over population, ➤ industrialization, ➤ mining, ➤ over grazing by animals, ➤ Construction of dams and other projects. <p>Effects of Deforestation</p> <ul style="list-style-type: none"> ➤ It leads to the expansion of forests, ➤ decrease in rainfall, ➤ lowering of water table, ➤ reduction in oxygen, ➤ increase in carbon dioxide level, ➤ soil erosion, ➤ adverse climatic conditions, ➤ loss of flora and fauna, 	2	3	8
		(b)	<ul style="list-style-type: none"> ➤ Population growth: Food production in most of the developing countries, lag behind their population growth levels. ➤ Global water crisis: The water tables are falling in almost every country due to widespread over-pumping using powerful diesel and electric pumps. ➤ Poor agricultural practices: Unsustainable agricultural practices like mono-cropping, farming on steep slopes, pesticide and chemical fertilizer usage, row-cropping, and the use of surface irrigation reduce crop yield. Excessive mechanization of agriculture results in excessive soil erosion. ➤ Land degradation: Intensive farming often leads to a vicious cycle of exhaustion of soil fertility and decline of agricultural yields. ➤ Land deals/ real estate: Corporations are buying up the rights to millions of hectares of agricultural land. ➤ Hybridization, genetic engineering and loss of bio-diversity: In order to create "high yielding varieties", local governments and industry have been pushing hybridization which has resulted in several of the 	7	7	7

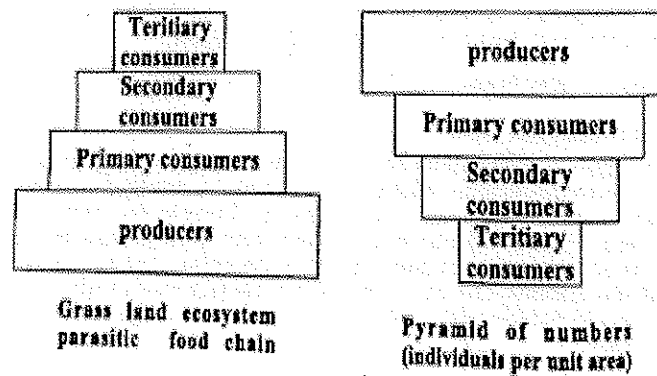
		<p>indigenous breeds becoming extinct.</p> <ul style="list-style-type: none"> ➤ Climate change: Climate change affects food production directly through changes in agro-ecological conditions and indirectly by affecting growth and distribution of incomes, and thus demand for agricultural produce. 		
IV	(a)	<p>Human Induced Causes of Soil Erosion.</p> <ul style="list-style-type: none"> ➤ Human exploitation of nature is one of the most hazardous causes of soil erosion, which has increased over the last decade. ➤ Human activities, such as faulty farming systems, deforestation caused by overgrazing, clearance of land for agricultural purposes and construction, dam construction and diversion of the natural course of river, and mining activities are some among the various human activities which have either directly or indirectly weakened the topmost layer of the earth, thus making it vulnerable to excessive wearing away by the various agents of erosion. <p>Natural Causes of Soil Erosion</p> <ul style="list-style-type: none"> ➤ Gradient of Slope: Gradient of the slope is an important factor when it comes to soil erosion. The steeper the gradient, higher is the rate of erosion and vice versa. ➤ Soil Properties: The vulnerability of a piece of land to soil erosion depends on the physical and chemical properties of the soil as well. ➤ Water Flow: Hydrological cycle, especially the surface flow as well as underground flow also play a major role in soil erosion. ➤ Climate: Climate determines the precipitation levels and wind velocity, which in turn effect soil erosion. 	4	8
	(b)	<p>A forest can be defined as an ecosystem with dense growth of plants especially trees and animals, covering a large area of land.</p> <p>India's Forest area has been assessed as 23.02% in 2010, according to a World Bank report published in 2012.</p> <p>Uses of forests</p> <ul style="list-style-type: none"> ➤ Provides food for human beings and animals ➤ Provides wood, which is used as fuel for domestic and industrial purposes. ➤ Provides products like gums, resins, dyes, fibers etc. ➤ Provides plants for the preparation of medicines. ➤ Timber is used in buildings, for making furniture, used in packing articles, sports goods etc. ➤ Used as raw material for manufacture of pulp for paper, plywood etc. ➤ It plays an important role in biogeochemical cycles of water, carbon, nitrogen, oxygen, phosphorus etc. ➤ It has been used to make sculptures and carvings 	7	7

	V	<p>(a)</p> <p>There are mainly two types of components in an ecosystem- Biotic component and Abiotic components.</p> <p>Biotic components are living organisms like plants, animals and microbes. Biotic components are further divided in three- Producers, Consumers and De-composers.</p> <p>Producers- Producers are organisms which produce the food for themselves and others. Eg:-green plants They are able to manufacture food from simple inorganic substance with the help of sunlight. Green plants prepare their own food with the help of water, carbon-dioxide, chlorophyll (green pigment in plants) in the presence of sunlight is called photosynthesis. Chemo-synthetic bacteria, photosynthetic bacteria, algae, mosses etc are producers.</p> <p>Consumers- These are the heterotrophic organisms which dependent on others for food. They eat other organisms or organic matter. They are mainly animals. They are also called as Macro Consumers. Consumers are of four types. They are primary Consumers (herbivores) which are animals that directly feed on plants (cow, goat, deer, grasshopper etc.). Secondary Consumers (small carnivores) are animals which feed on primary consumers (fox, snakes, cat etc.). Tertiary Consumers (Large carnivore) are animals which feed on secondary Consumers (hawk, vulture etc.). Quaternary Consumers (Largest carnivore) are animals which feed on tertiary Consumers (Tiger, lion etc.).</p> <p>De-composers- These are also heterotrophic components like bacteria and fungi. They breakdown the complex compounds of dead protoplasm, absorb some of the products and releases simple substances which are again usable by producers. They are also called as micro consumers.</p> <p>Abiotic components- Abiotic components are non living components like soil, air, water, light, climate etc. The inorganic components are utilized by 'producers' for preparing their food. Both Biotic component and Abiotic components are interrelated.</p>	6	8
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	(b)	<p>The transfer of food energy from producers to decomposers through a series of organisms is called food chain. A food chain consists of producers (green plants), consumers (animals and man) and decomposers (micro organisms). It is the single straight pathway through which food energy travels in the ecosystem. Various steps in a food chain are called trophic levels. Basically there are two types of food chains: grazing food chain and detritus food chain.</p> <p>Producers — primary consumer — secondary consumer — decomposers</p> <p>Grass — grass hopper — bird — microorganisms</p>  <p style="text-align: center;">A food chain</p> <p>In nature, basically two types of food chains recognized—grazing food chain and detritus food chain.</p> <p>1. Grazing food chain</p> <p>This type of food chain starts from the living green plants, goes to grazing herbivores and on to the carnivores. Ecosystems with such type of food chain are directly dependent on sun. This type of food chain depends on autotrophic energy capture and the movement of this energy to herbivores. Most of the ecosystems in nature follow his type of food chain.</p> <p>Grass — grass hopper — frog — snake — microorganisms</p> <p>2. Detritus food chain</p> <p>The organic wastes and dead matter derived from the grazing food chain are termed detritus. This food chain starts with dead organic matter and then to organism feeding on detritus feeders. In the detritus food chain the energy flow remains as a continuous passage rather than as a stepwise flow between discrete entities. The organisms of the detritus food chain are many and include algae, bacteria, slime molds, fungi, insects, mites etc.</p>	7	7
VI	(a)	<p>Ecological pyramid is a graphical representation of an ecological parameter like biomass, number and energy at different trophic levels in a food chain in an ecosystem. The idea of ecological pyramid was developed by Charles Elton(1927), These pyramids are also called Eltonian pyramid. Ecological pyramid are of three general types.</p>		

1. Pyramid of number:

In a pyramid of numbers, the number of consumers at each level decreases significantly, so that a single top consumer, (e.g. a polar bear or a human), will be supported by a much larger number of separate producers. It depicts the number of individual organisms at different trophic levels of food chain. The animals at the lower end (base of pyramid) of the chain are the most abundant. Successive links of carnivores decrease rapidly in number until there are very few carnivores at the top. The pyramid of number ignores the biomass of organisms and it also doesn't indicate the energy transferred or the use of energy by the groups involved. The lake ecosystem provides a typical example for pyramid of number.



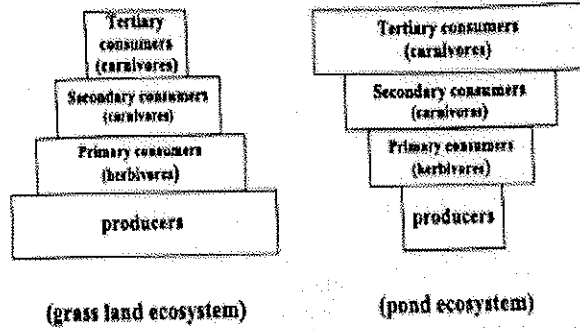
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2. Pyramid of biomass

The biomass of the members of the food chain present at any one time forms the pyramid of the biomass. Pyramid of biomass indicates decrease of biomass in each trophic level from base to apex. For example, the total biomass of the

producers ingested by herbivores is more than the total biomass of the herbivore in an ecosystem. The total biomass of the primary carnivores (or secondary consumers) will be less than the herbivores and so on.

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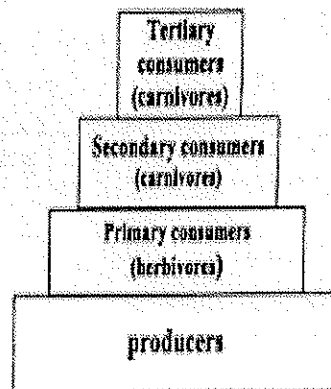
Pyramid of biomass
(dry weight per unit area)

3. Pyramid of energy (always upright)

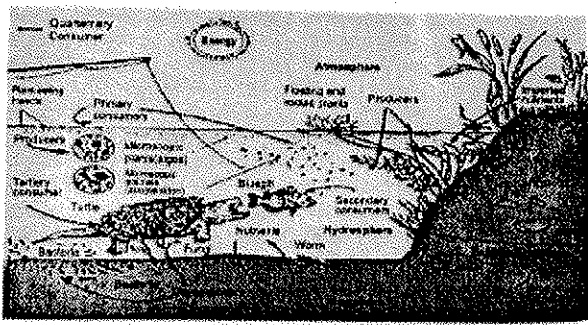
When production is considered in terms of energy, the pyramid indicates not only the amount of energy flow at each level, the actual role the various organisms play in the transfer of energy. The base upon which the pyramid of energy is constructed is the quantity of organisms produced per unit time, or the rate at which food material passes through the food chain. Some organisms may have a small biomass, but the total energy they assimilate and pass on, may be considerably greater than that of organisms with a much larger biomass. Energy pyramids are always upright because less energy is transferred from each level than was paid into it. In cases such as in open water communities the producers have less bulk than consumers but

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the energy they store and pass on must be greater than that of the next level. . Eventually, all the energy in a food chain is dispersed as heat.



Pyramid of energy (k.cal. per unit area within
unit time in any ecosystem)

	(b)	<p>The pond is a small body of standing water and the pond ecosystem is complex interactions between its biotic and abiotic components.</p> <p>Abiotic component of pond ecosystem are includes Environmental factors like light, temperature, water, edaphic factors like Soil, Inorganic Components like O_2, CO_2, N_2, nitrates, phosphates, carbonates etc. and Organic components like carbohydrates, proteins, amino acids, fats, nucleic acids.</p> <p>Biotic components include Producers, They are the aquatic green plants, which may be divided into two groups.</p> <p>Microphytes (phytoplanktons) : They are microscopic autotrophs, which fix solar energy. eg. Spirogyra, Volvox, Oedogonium (algae).</p> <p>Macrophytes : They are large plants, which manufacture complex food. They are of following types.</p> <p>Submerged plants: Those, which are submerged in water, are submerged plants eg. Hydrilla and Utricularia.</p> <p>Floating plants: Those, which float freely in water surface, are called floating plants eg. Pistia, Nymphaea and Azolla.</p> <p>Rooted submerged plants: Those, which are rooted but emergent, are called rooted submerged plants. Eg. Ranunculus, Sagittaria and Typha.</p> <p>Consumers The consumers are those heterotrophic organisms, which consume producers as food. They are also following types</p> <p>Primary consumers: These herbivorous animals depend upon autotrophic organisms such as microscopic plant eaters or zooplanktons, Mollusks, Beetles, Daphnia etc.</p> <p>Secondary consumers: These are primary carnivores, which depend upon herbivorous animals for food eg. Insects, fishes, frogs, crab etc.</p> <p>Tertiary consumers: They feed upon plants or animals (secondary consumer) therefore are called omnivores. eg. Large fishes and frogs.</p> <p>Top consumers: These are carnivores, which feed upon primary, secondary, and tertiary consumers eg. Water snake, water birds etc.</p> <p>Decomposers These include heterotrophic microorganisms such as bacteria fungi, which break down the organic complex food from dead producers and consumers into simple inorganic compounds made available to the producers.</p>  <p style="text-align: center;">Pond Ecosystem</p>	6	6
VII	(a)	<p>Some of the main sources of water pollution are:</p> <ul style="list-style-type: none"> ➤ Factories ➤ Refineries ➤ Waste treatment facilities ➤ Mining ➤ Pesticides, herbicides and fertilizers 		

	<ul style="list-style-type: none"> ➤ Human sewage ➤ Oil spills ➤ Failing septic systems ➤ Soap from washing ➤ Oil and antifreeze leaking from automobiles. ➤ Household chemicals ➤ Animal waste etc. 	8	8
(b)	<p>pollution?</p> <p>The role of an individual in maintaining a pollution free, pure and congenial environment and in preserving its resources is actually the need of the hour. Individuals can, however, play an important role in abatement of air, water, soil or noise pollution</p> <p>in the following simple manners:</p> <ul style="list-style-type: none"> ➤ Use low-phosphate, phosphate-free or biodegradable dishwashing liquid, laundry detergent, and shampoo. ➤ Don't use water fresheners in toilets. ➤ Use manure or compost instead of commercial inorganic fertilizers to fertilize gardens and yard plant. ➤ Use biological methods or integrated pest management to control garden, yard, and household pests. ➤ Don't pour pesticides, paints, solvents, oils, or other products containing harmful chemicals down drain or on the ground. Contact the authorities responsible for their disposal. ➤ Recycle old motor oil and antifreeze at an auto service center that has an oil recycling program. ➤ If you get water from a private well or suspect that municipal water is contaminated, have tested by an EPA certified laboratory for lead, nitrates, tri halo methane, radon, volatile, organic compounds and pesticides. ➤ Run water from taps for several minutes every morning before using the water for drinking or cooking. Save it and use it to water plants. If you have a septic tank, monitor it yearly and have it cleaned out every three to five years by a reputable contractor so that it won't contribute to groundwater pollution. Do not use a septic tank cleaner, which contain toxic chemicals that can kill bacteria important to sewage decomposition and that can contaminate groundwater if systems malfunction. ➤ Support ecological land-use planning in your community and form groups to help monitor, protect, and restore them. 	7	7

VIII	(a)	<p>➤ Land fill</p> <p>Disposal of waste in a landfill involves burying the waste, and this remains a common practice in most countries. Landfills were often established in abandoned or unused quarries, mining voids or borrow pits. A properly designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials.</p> <p>➤ Incineration</p> <p>Incineration is a disposal method in which solid organic wastes are subjected to combustion so as to convert them into residue and gaseous products. This method is useful for disposal of residue of both solid waste management and solid residue from waste water management. Incineration is carried out both on a small scale by individuals and on a large scale by industry.</p> <p>➤ Recycling</p> <p>Recycling is a resource recovery practice that refers to the collection and reuse of waste materials. The materials from which the items are made can be reprocessed into new products. The most common consumer products recycled include aluminium such as beverage cans, copper such as wire, steel food and aerosol cans, old steel furnishings or equipment, polyethylene and PET bottles, glass bottles and jars, paperboard cartons, newspapers, magazines and light paper, and corrugated fiberboard boxes.</p> <p>➤ Sustainability</p> <p>The management of waste is a key component in a business' ability to maintaining ISO14001 accreditation. Companies are encouraged to improve their environmental efficiencies each year by eliminating waste through resource recovery practices, which are sustainability-related activities.</p> <p>➤ Biological reprocessing</p> <p>Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes.</p> <p>➤ Energy recovery</p> <p>The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel. Thermal treatment ranges from using waste as a fuel source for cooking or heating and the use of the gas fuel to fuel for boilers to generate steam and electricity in a turbine.</p> <p>➤ Pyrolysis and gasification</p> <p>They are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process usually occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid and gas products. The liquid and gas can be burnt to produce energy or refined into other chemical products (chemical refinery).</p> <p>Avoidance and reduction methods</p> <p>An important method of waste management is the prevention of waste material being created, also known as waste reduction.</p>	1.5 1.5 1.5 1.5 1.5 1.5 1	10
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	(b)	<p>Some of the main sources of land pollution are:</p> <ul style="list-style-type: none"> ➤ Chemical and nuclear plants ➤ Industrial factories ➤ Oil refineries ➤ Human sewage ➤ Oil and antifreeze leaking from automobiles. ➤ Mining ➤ Littering ➤ Overcrowded landfills ➤ Deforestation 	5	5	
IX	(a)	<p>The causes of natural disasters are many. Human activities play a role in the frequency and severity of disasters. A natural disaster is a disruption in the balance of the environment. The human factor raises the cost, in both property damage and loss of life. Some of them are discussed below.</p> <p>Floods</p> <p>Floods are a factor in 90 percent of natural disasters. Flood events have both natural and man-made causes. Storm events can create flood waters that exceed the capacity of the environment or man-made structures.</p> <p>Fires</p> <p>Fires are nature's environmental managers. They create and maintain ecosystems such as prairies and pine forests. In fact, prairies evolved with the presence of fire. The health of the ecosystem is dependent on this disturbance. Fires remove a buildup of litter on the soil surface, allowing nutrients to be released into the environment. It also creates favorable conditions for seed germination.</p> <p>Drought</p> <p>Drought has had more widespread effects than any other natural disaster. It's safe to say that droughts have greater impacts in modern times. More people are affected by loss of land and food crops as well as environmental damage. The immediate effects are overshadowed by secondary issues. Compacted, dry soils are vulnerable to topsoil loss and erosion.</p> <p>Weather Events</p> <p>An increase in development leads to a decrease in wetlands and an increase in impervious surfaces such as roads and driveways. This creates a scenario for floods and flash flooding.</p>	2	2	8
	(b)	<p>Preparedness is how we change behaviour to limit the impact of disaster events on people communication plans with easily understandable terminology and methods.</p> <ul style="list-style-type: none"> ➤ proper maintenance and training of emergency services, including mass human resources such as community emergency response teams. 	7	7	

		<ul style="list-style-type: none"> > development and exercise of emergency population warning methods combined with emergency shelters and evacuation plans. > Implement and maintain an emergency communication system that can help identify the nature of an emergency and provide instructions when needed. > stock piling, inventory, streamline foods supplies, and maintain other disaster supplies and equipment. > Develop organizations of trained volunteers among civilian populations. Professional emergency workers are rapidly overwhelmed in mass emergencies so trained, organized, responsible volunteers are extremely valuable. Organizations like Community Emergency Response Teams and the Red Cross are ready sources of trained volunteers. > Personal preparedness focuses on preparing equipment and procedures for use when a disaster occurs, i.e., planning. Preparedness measures can take many forms including the construction of shelters, implementation of an emergency communication system, installation of warning devices, creation of back-up life-line services (e.g., power, water, sewage), and rehearsing evacuation plans. 		
X	(a)	<p>One of the most important activities of preparing the Disaster management plan is the mapping of risk, vulnerabilities and capacities of the area by the community itself as it is a simple and cost effective tool for collecting ground level data. This is done through Participatory Rural Appraisal (PRA) exercise. This mapping exercise aims to provide a pictorial base to the planning process especially to the semi-literate populace and ensures maximum community involvement across gender, caste and other divides. The villagers/community members are encouraged to draw the maps on the ground using locally available resources such as stones, colour powders etc. for different items and indicators. The types of maps are as follows:</p> <p>Social Mapping</p> <p>The villagers/community need to pictorially show the overall layout of the locality. The map shows</p> <ul style="list-style-type: none"> > Location of the habitat with respect to natural topography. > Number of houses > Other common infrastructure (eg. Safe shelter, temple, 	10	10

mosque, church, drinking water facilities, school, health centre, hospital, telephone, public Mapping exercise of a village in progress addressal system, road, electricity etc).

Resource Mapping

It focuses on the locally available resources and assets that can be utilized for building the capacities of the community during and after disasters. Individual skills too can be identified in the map. The resource map is therefore not limited to a map depicting the available resources but also plotting the distribution, access and its use.

Mapping of the natural resources in the area includes:

- > Individual skills (community leaders/doctors/drivers, swimmers etc).
- > Resources around the area (boats, food stock etc).
- > Important locations such as open land/low lying and elevated areas.
- > Protection bunds
- > Drainage facilities
- > Agriculture area, Forest area, mangrove plantations, shelterbelts etc.
- > Location of hazardous industries/ electrical installations/ tall weak structures - buildings, etc.
- > Narrow roads.

Safe and alternate route mapping

In this exercise the members of the community are expected to know the places that are safe. For example in areas that are frequently affected by floods we need to know the houses that are located on raised platforms, multi-storied buildings, mounds etc. This map should also show the alternate safest approach route to the area. It could be either roadway or waterways.

Vulnerability Mapping

In this mapping exercise the members of the community are expected to know the hazards that the village is prone to and the possible areas that are likely to get affected like:

- > Household wise vulnerable groups
- > Vulnerable houses and defunct infrastructure
- > Low lying areas prone to floods
- > Landslide prone areas

	(b)	<p>19. Manmade Disasters</p> <p>Manmade disasters are also known as anthropogenic disasters and they are a result of human intent, error or as a result of failed systems.</p> <ul style="list-style-type: none"> ➤ A good example is to look at manmade disasters such as transportation. These are divided into different categories which include aviation, rail, road and space among others. ➤ Another type of disaster that falls in this category is nuclear bomb. When this occurs, it is often as a result of intent and the end results are even more catastrophic with a large percentage of those involved losing their lives or alternatively ending up with major defects or long term injuries. ➤ Other types of manmade disasters which are just as catastrophic include chemical spill, oil spill, arson and terrorism. There are also some technological hazards which include power outages structural collapse, industrial hazards and fire. ➤ Over the years, fires have come to be known as rampant manmade disasters and they are also divided into different categories such as bush fires, mine, wild and firestorms. ➤ The death toll caused by manmade disasters will also vary in accordance to geographical location and in this regard, the poorer countries are hardest hit when compared to the richer ones. Modern technology plays a very important part in the way you respond and prepare for disasters. With financial backing, it is easy to meet this end. 	5	5
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