Module 3-- Environmental problems

Global environmental problems

 At the dawn of the third millennium, a powerful and complex web of interactions is contributing to unprecedented global trends in environmental degradation. These forces include rapid globalization and urbanization, pervasive poverty, unsustainable consumption patterns and population growth. Often serving to compound the effects and intensity of the environmental problems described in the previous section, global environmental challenges require concerted responses on the part of the international community. Global climate change, the depletion of the ozone layer, desertification, deforestation, the loss of the planet’s biological diversity and the trans boundary movements of hazardous wastes and chemicals are all environmental problems that touch every nation and adversely affect the lives and health of their populations. As with other environment-related challenges, children are disproportionately vulnerable to and suffer most from the effects of these global trends. Moreover, all of these global environmental trends have long-term effects on people and societies and are either difficult or impossible to reverse over the period of one generation. Unless, effective global actions are taken early, we will end up plundering our children’s heritage and future in an unprecedented way. This chapter describes five major global environmental problems and points to the potential impact on children and future generations.

 Progress in global environmental change

 Since 1990 global population has grown from roughly 5.3 to 6.8 billion and sustained global economic growth, accompanied by total and per capita increases in consumption in many parts of the world, not least in Brazil, Russia, India and China. However, our world remains riven by differences in access to resources and per capita consumption both between and within countries. A review of the most highly cited papers in this journal shows significant contributions across five broad themes: the drivers and impacts of systemic and cumulative change, cross-cutting concepts such as vulnerability and resilience, approaches to management, control and policy, and different perspectives on climate change [4]. The scientific community has clearly documented and quantified global environmental change with increasing precision and improved models to understand the future consequences of our actions, although large uncertainties remain. The community has also developed tools to quantify our footprints and the effects of our lifestyles beyond our immediate surroundings (Rees, 1992; Hoekstra and Hung, 2005) and we have far greater potential to understand our interconnectedness across scales, in both biophysical and socioeconomic terms, which as Rifkin (2009) suggests may cultivate increased empathy. But it is perhaps at the interface between individual and collective perceptions and action that research has progressed the least but where there is the greatest potential to address the challenges we understand so well. Interdisciplinary research on global environmental change must engage further with psychological and behavioural sciences and ethics to understand motivation and behavioural change in its socio-economic and political context and the forms of institutions and governance that can foster new technologies and ideas of progress.

 Environmental issues at global level

 • Depletion of natural resources

 • Water pollution

 • Air pollution

 • Ground water pollution

 • Toxic chemicals & soil pollution

 • Ozone layer depletion

 • Global warming

 • Loss of bio-diversity

 • Extinction of wildlife and loss of natural habitat

 • Nuclear wastes and radiation issues

Global environmental issues list

 If asked what are the global environmental issues that the planet faces today, most people out there wouldn't be able to go beyond global warming and energy crisis. These people are not aware of the fact that there are several other issues of global concern, each of which is equally hazardous. More importantly, all these issues are related with each other by some or the other way, and hence, tackling them one by one has just become difficult.

 **Climate change**: Climate change has become more than obvious over the past decade, with nine years of the decade making it to the list of hottest years the planet has ever witnessed. The rise in temperature has also ensured that the equations on the planet have gone for a toss. Some of the most obvious signs of this include **irregularities in weather**, frequent storms, **melting glaciers, rising levels of s**ea etc. Going by the prevailing conditions, it is not difficult to anticipate that the planet is heading for a dramatic climate change, some wherein, near, future.

 Conservation of species: Yet another global environmental issue, species conservation basically deals with conservation of flora and fauna, in order to curb the extinction of species. Extinction of a single species of plant or animal results in a dramatic imbalance in the ecosystem, as a number of other species dependent on it directly or indirectly are also affected. Over the last century or so, several plants and animal species have become extinct thus resulting in a major loss for the biodiversity of the planet.

 Energy crisis: The fact that we are largely dependent on fossil fuels for our energy requirements has made us significantly vulnerable to severe energy crisis. Though, quite a few renewable energy sources have been identified, none of them have been promising enough when it comes to replacement of fossil fuels as the major source of energy for mankind. Attempts to tap the full potential of these sources are in progress, and our future by and large depends on these attempts, as fossil fuels are on the verge of exhaustion.

 Exploitation of natural resources: Our greed for more has left us empty handed in terms of natural resources in several parts of the world. Several human activities, including the likes of mining, agriculture, fishing etc., has resulted in drastic degradation of our natural resources. While mining and agriculture have triggered large-scale deforestation, over fishing has only resulted in the reduction of population of marine creatures inhabiting the planet. If the trends continue, we are bound to exhaust those natural resources on which we are dependent, and thus dig our own graves.

 Land degradation: Land pollution, owing to human activities, and desertification, due to loss of vegetation has left the surface of the planet unsuitable for human use. Land degradation can be attributed to the fact that we have become too laid-back in terms preservation of the nature. Improper soil use, haphazard waste disposal, large-scale deforestation and other such human activities harmful for nature are on the rise, something which is invariably taking a toll on our natural surroundings.

 Land use: Global environmental problems pertaining to the land are not just restricted to haphazard waste disposal or large-scale deforestation, but also to improper use of land. Natural environment is being destructed to make way for urban sprawl, which is indirectly resulting in loss of habitat for several species. Fragmentation of land owing to construction is also a major factor when it comes to improper land use. All these factors together result in several problems, including soil erosion, degradation of land and desertification.

 Nuclear issues: Nuclear power does have high potential, but the problems associated with it are no less. Radioactive waste from nuclear power plants is one of the major problems we are likely to face, especially if safety regulations are not followed properly. Chernobyl tragedy has set an example of how nuclear waste can lead to disaster for mankind, and no one would like to see another Chernobyl happening. It doesn't end here as the threat of some nation diverting its nuclear power to produce nuclear arsenal is always looming over the mankind. And it won't take an Einstein to imagine the amount of damage these nuclear weapons would cause.

 Overpopulation: Yet another major global environmental issue is overpopulation. As the population of world continues to soar at an alarming rate, the pressure on the resources of the planet is increasing. These problems associated with overpopulation range from food and water crisis to lack of space for natural burial. Overpopulation also results in various other demographic hazards. Incessant population growth will not just result in depletion of natural resources, but will also put more pressure on the economy. After all sustaining a huge population requires quite a mammoth effort for a nation, as far as finance is concerned.

 **Pollution:** This is perhaps the most obvious, yet most ignored global environmental issue in this list of environmental problems. The term 'population' in itself have several other aspects, prominent ones among which include air pollution, water pollution and land pollution. On one hand air pollution can be attributed to the large amount of carbon dioxide pumped into the atmosphere by industries and vehicles, water pollution and land pollution is caused as a result of waste disposal from factories, oil-carrying vessels etc. Basically, mankind is to be blamed for this issue as our activities tend to hamper the environment at an alarming rate. If this trend continues, we will be very soon left without any fresh air to breathe, and clean water to drink.

**Waste management**: As population increases, human activities increase, which eventually increases the amount of waste produced. This waste doesn't just include those harmful gases let out in the atmosphere or toxic waste released in water bodies, but also includes nuclear waste, e-waste, medical waste (Abhijit Naik) and even the waste from our homes. With limited area available on the planet, and most of it being inhabited by us, we are left with no space to dispose this waste. The rate at which this waste is produced is far more than the rate at which it is being treated, and this just results in piling up of waste, which eventually pollutes the environment.

 These were some of the major global environmental issues and problems which have been threatening the planet for quite some time now. However, the environmental issues the planet faces today are not just restricted to the list given above. Several issues, including problems due to construction of dams, genetic pollution, nanotoxicology, etc., are surfacing every other day, thus making the list of global environmental issues longer with time. If we don't start attending to these issues one by one, the moment is not far when we will have no option left but to surrender to these environmental issues.

 Ecosystem Roles and Responses

Ecosystems and their responses to environmental change may play various roles in a climate and global change context. Ecological control of reservoir size or rates of flux for climate-influencing materials such as C02 is a potentially important factor. In relation to human society, ecosystem sensitivity-or-vulnerability is an important issue; ecosystem collapse in response to environmental change may result in loss of resources; degradation could, in principle, serve as an early warning of increasing stress. From a scientific standpoint, largescale environmental changes represent a natural experiment that may permit investigation and understanding of ecosystem structure and function not possible on a laboratory scale or in a stable environment. In this section we discuss these three issues before turning to a more detailed inventory of coral reef responses to individual environmental forcing functions.

**Climate Change**

It is now widely recognized that global warming over the past 50 years is largely due to human activities that have released green- house gases into the atmosphere. The most recent assessment report by the Intergovernmental Panel on Climate Change (IPCC) concludes that the global average surface temperature has increased by about 0.6°C during the 20th century. The seemingly small rise of mean temperature is already showing adverse effects. One of the consequences has been a rise in the global average sea level. Another effect has been more frequent and intensified droughts in recent decades in parts of Asia and Africa. Additionally, in most mid and high latitudes of the Northern Hemisphere continents, precipitation has increased by 0.5 to 1.0 per cent per decade in the 20th century. The world’s emissions of greenhouse gases, notably carbon dioxide, continue to increase. The most recent estimates are that atmospheric concentrations of the greenhouse gas carbon dioxide (CO2) will double or triple pre-industrial levels by the end of this century. As a result, global surface temperature is expected to increase by 1.4 to 5.8 degrees Celsius from 1990 to 2100. The repercussions of climate change will disproportionately affect those who are least able to adapt - the poor and the most vulnerable sections of society, including children. For example, scientists project that this level of warming could, among other things:

• Greatly exacerbate the range, frequency and intensity of natural disasters, from flooding, to droughts, to torrential rains, ice-storms, tornadoes and hurricanes;

• Cause sea levels to rise by between nine and 80 centi-meters by 2100 due to the expansion of warming waters and the melting of polar icecaps and other glaciers, which in turn may produce deadly flooding in many low-lying areas and small island States, displacing millions from their homes;

• Increase the number of environmental refugees resulting from weather-related disasters;

• Augment the risk of disease migration and disease out-breaks; and

• Render large areas of the world “uninsurable” due to the magnitude of property damage from disasters.

It is widely recognized that climate change, by altering local weather patterns and by disturbing life-supporting natural systems and processes, has significant implications for human health. While the range of health effects is diverse, often unpredictable in magnitude, and sometimes slow to emerge, children remain among the most vulnerable to these threats. Higher temperatures, heavier rainfall, and changes in climate variability would encourage vectors of some infectious diseases (such as malaria, schistosomiasis, dengue fever, yellow fever and encephalitis) to multiply and expand into new geographical regions, intensifying the already overwhelming threats to children from such diseases. There is also evidence that El Niño - a vast natural climatic phenomenon that can bring intense floods and droughts in many parts of the globe - is becoming more frequent as a result of global warming and could further aggravate health problems in many parts of the world. Excessive flooding is, for example, a prime cause of cholera and other water-borne and food-borne infections to which children are particularly susceptible. While heavy rains will become more frequent, there will also be more periods of drought and increased spreading of the deserts. Scientists predict that a lack of rain, warmer temperatures and increases in evaporation could have severe implications in terms of water availability and food security, reducing crop yields in Africa, further compromising child nutrition. There are also numerous health effects, both in terms of disease and injury, associated with extreme weather events, such as heat waves, storms and floods. Extreme weather events can exacerbate health issues such as asthma and respiratory problems due to worsening air pollution, precisely those diseases that most significantly burden children.

 Ozone Layer Depletion

 Ozone in the atmosphere’s upper layer, the stratosphere, protects humans, animals and plants from the damaging effects of UV-B radiation from the sun. Without it, all life on earth would cease to exist. However, the use of chlorofluorocarbons (CFCs) and other Ozone- Depleting Substances (ODS) are slowly eating away at the stratospheric ozone layer, creating a major potential health hazard. While the concentrations of ODS in the lower atmosphere peaked in about 1994 and is now slowly declining due to worldwide efforts to phase out the use of CFCs and other damaging sub- stances, significant health threats relating to ozone depletion persist.

 Past (and current) emissions of ODS result in increases of ultraviolet radiation reaching the Earth’s surface which can pose sever- al health effects

 • Increase of melanoma and non-melanoma skin cancers;

 • Cause or acceleration of eye cataracts development;

 • Reduce effectiveness of the immune system;

 • Impact on nutrition (e.g. reduced plant yield);

 • Damage to ocean ecosystems and reduced fish yield (by killing microbial organisms in the ocean).

Skin cancer is the most worrisome health impact of ozone depletion. Overexposure to the sun’s harmful Ultra-Violet (UV) light may damage children’s skin. Recent studies indicate that excessive sunburns experienced by children 10 to 15 years of age increase by threefold the chance of developing malignant melanoma, the most deadly kind of skin cancer, later in life In Europe, evaluations of ultraviolet-related skin cancers suggest that, despite the decline in ODS concentrations, skin cancer incidences will not begin to fall until about 2060.The international response to this issue is embodied in the Convention for the Protection of the Ozone Layer, which was concluded in Vienna in 1985. The Vienna Convention set an important precedent because nations for the first time agreed in principle to tackle a global environmental problem before its effects were felt. The Convention’s 1987 Montreal Protocol on Substances that Deplete the Ozone Layer has been remarkably successful. Production of the most damaging ozone-depleting substances was eliminated, except for a few critical uses, by 1996 in developed countries and should be phased out by 2010 in developing countries. Thanks to these measures, it is currently estimated the CFC concentration in the ozone layer is expected to recover to pre-1980 levels by the year 2050.

Glaciers are huge blocks of ice that move along the landscape, carving distinct features along the way. Learn about the glacial erosion processes, plucking and abrasion, and the features they create, including cirque, horns, arête and roche moutonnee.

Glaciers & Glacial Erosion

If a block of ice the size of a mountain is moving toward you, what should you do? Well, if it were me, I would get out of the way. These moving mountains of ice do exist, and we call them glaciers. They tend to move very slowly, often only a few centimeters per day, so it would be a rare occasion for a human to get struck by a glacier. This is not true, however, for the landscape that lies in the path of a moving glacier. Land and rock cannot move out of the path of a glacier, so they are subjected to glacial erosion, which is simply the carving and shaping of the land beneath a moving glacier. Glacial erosion and the interesting landforms that result from this process are the subjects of this lesson.

Glacial Erosion

There are two main processes of glacial erosion. The first that we will talk about is plucking, which is defined as the erosion and transport of large chunks of rocks. As a glacier moves over the landscape, water melts below the glacier and seeps into cracks within the underlying bedrock. This water freezes and melts, weakening the bonds holding pieces of bedrock in place. These pieces of rock can now be picked up or plucked from their rocky base and carried along with the moving glacier. If you ever put an ice cube on your finger and felt the skin on your finger stick to the ice cube, then you have a fairly good idea of how plucking works.

Abrasion

Plucking removes rocks and by itself creates changes in the landscape, but plucking also contributes to the second process of glacial erosion, known as abrasion. Abrasion is defined as the erosion that occurs when particles scrape against each other. The enormous weight of the glacier, along with rocks and sediment plucked up and clinging to its belly scratch and carve the rock surface below. It's almost as if the moving glacier is sanding the rocks with abrasive sandpaper. As the glacier sands the rock, it leaves behind long scratches that form in the direction of the glacial movement called glacial striations. Seeing these scratch marks is a sure sign that a glacier once covered the land.

Physical geography deals with the role of various geological agents in shaping the land forms and landscapes. Among these landforms glacial landforms are very unique features. In this session, let us understand the GLACIAL LANDFORMS. Hydrosphere is the sphere of water on the earth. It holds the total volume of water existing in liquid, solid and gaseous states. The world’s water is distributed in the form of oceans, ice, groundwater, lakes, rivers, soil moisture and water vapour. If we look at the percentage-wise occurrence of these, the ice occupies about 2.15 % of the world’s water, next to the oceans. Source Cu.Km % of total Volume Oceans 1,310,302 97.3 Ice 29,492 2.15 Groundwater 6,733 0.5 Inland Lakes 242 0.02 Soil Moisture 74 0.005 Atmospheric Water Vapor 14 0.001 Rivers 1.3 0.0001 Ice and glaciers refer to the frozen part of the hydrosphere. The global distribution of temperature has a profound effect on the water masses. The earth’s temperature varies with reference to latitude, altitudes and seasons. There is major a variation of temp from the equator to the poles. The temperature drops at the rate of 0.5 to 0.6 Deg. C per 100 m of altitude. The polar regions are fully considered as a frigid zone. The permanent body of ice that forms over land is known as a glacier. It is formed due to the compaction and crystallization of snow. Glaciers are the moving masses of ice. They accomplish great destructive and constructive work along their flow paths. They originate due to the accumulation of snow. Low temperature and sufficient snowfalls are the two major pre-requisites for the formation of a snowfield . Glaciers cover about 10% of the Earth's land surface, with the Greenland and Antarctica ice sheets accounting for about 96% of the land covered. Glaciers are the largest reservoirs of fresh water on earth. Glaciers also participate in the exogenous geological processes on the surface of the earth. Glaciers have the power and force to erode, transport and deposit the surface materials similar to wind or rivers. Hence they are also called as geological agents. Glaciers are very unique geological bodies. Their formation to melting are fully controlled by many global climatic parameters. Periods of extensive glaciations on the globe are called as ice ages. Understanding the role of glaciers is necessary to know their effects in creating landforms and also other effects on life. In this episode, the following aspects of glaciers and their landforms are highlighted:

 1. ORIGIN AND TYPES OF GLACIERS

The word glacier comes from French. It is derived from the Latin word glacies meaning ice. Glacial ice are formed naturally by the recrystallization of snow. Ice is a mineral, and glacial ice is a rock. The processes and features caused by glaciers and related to them are referred to as glacial. The process of glacier formation, growth and movement is called glaciation. Glaciation has occurred several times during the earth’s geological history. But, the Pleistocene glaciations is the most recent and extensive one showing clear records to study the world. Almost 99% of glacial ice on Earth, is contained within vast ice sheets in the polar regions, but the glaciers may be found in mountain ranges of every continent except Australia. In the tropics, glaciers occur only on high mountains. The conversion of snow into ice involves three major steps as: a) Accumulation of snow. b) Formation of ice granules c) Formation of glacial ice. a) Accumulation of snow is the first stage. Snowfields grow in areas above the snow line where more snow accumulates in the winter and then melts during the summer. Freshly fallen snow has about 80% void space. b) Formation of ice granules is the second stage. As the snow accumulates and gets thicker, sublimation happens (transformation of solid to gas) and pressure change it into firn (ice granules). c) Formation of glacial ice is the third stage. With further accumulation, compaction and pressure melting (released water that refreezes to cement ice granules together) cause fern to be transformed into glacial ice (mass of interlocking crystals). Ice has only about 10% void space. When ice reaches a thickness of about 40 meters, it begins to flow and becomes a glacier. Glacier is a natural, moving body of crystalline ice of great dimension. They Cover about 16.3 million sq. Km area in the world. Mostly they exist, in the polar regions and also in the mountains of central Asia. The surface of the glaciers is always rough, pitted and broken by crevasses. Glaciers can only form at latitudes or elevations above the snowline, which is the elevation above which snow can form and remain present all through the year. The snowline, at present, lies at sea level in polar latitudes and rises up to 6000 m in tropical areas. Snow-line forms the lower boundary of snow cover. The level below which the snow melts in summer and above which it persist. Snowline is the lowest line and coincides with the sea-level in Antarctica. According to the stage of development, form and relationship with the supply and waste areas, glaciers are classified into 3 types: 1) Mountain or Valley glaciers 2) Continental glaciers ( ice-sheets) 3) Intermediate Glaciers(Scandinavian)- plateau glaciers & piedmont glaciers. The Valley Glaciers flow down the valleys in mountainous areas, and are fed by the snow fields of high mountain ranges. They usually consist of a main ice mass with smaller tributary glaciers feeding into it.

 The Mountain Glaciers are relatively small glaciers. The smallest of these occupy hollows or bowl-shaped depressions on sides of mountains. Such types are called as cirque glaciers. When the cirque glaciers grow larger and larger, they may spread into valleys and flow down the valleys as valley glaciers. The moving paths these valley glaciers take are controlled by the existing topographic conditions. If a valley glacier extends down to the sea level then it may carve a narrow valley into the coastline. These are called fjord glaciers. The narrow valleys they carve, if filled with seawater after the ice has melted, are called as fjords. If a valley glacier extends down a valley and then covers a gentle slope beyond the mountain range, then it is called as piedmont glacier. If all of the valleys in a mountain range become filled with fully glaciers, and the glaciers cover the entire mountain range, then they are called as ice caps. Ice caps are very extensive fields of ice or very large magnitude and dimension. The Continental glaciers represent the great ice sheets. They normally obscure the topography over large sections (at least 50,000 km2) of a continent. The Continental glaciers are the largest types of glaciers on Earth. Modern ice sheets cover mainly both the Greenland and the Antarctica. These two ice sheets comprise of about 95% of all glacial ice currently on Earth. They have an estimated volume of about 24 million km3. If melted, they contain enough water to raise sea level about 66m. Glaciers expand in response to the accumulation and contract from wastage (loss of ice). Glaciers can be divided into two zones as zone of accumulation and zone of wastage. The Ice caps are similar to continental glaciers, but smaller in size (<50,000 km2). These ice masses may be formed by the merger of valley glaciers on fairly flat terrain at high latitudes. The Zone of accumulation is the zone above the snow line where snow accumulates faster than it is removed by melting and evaporation. The Zone of wastage (ablation) is the zone below the snow line (or firn limit) where wastage exceeds accumulation. The firn limit may change its position from year to year. Glaciers are characterized by crevasses at the surface of the ice. These are fracture-like cracks formed due to strains. These crevasses may be longitudinal or transverse depending upon the bends. Wastage processes include three mechanisms as melting, sublimation and calving. : Melting is caused by friction at sides and bottom of ice mass and by warming during the summer months. Sublimation is the conversion of ice directly to water vapor without an intermediate liquid phase. Calving is the breaking off of blocks of ice at ends of glaciers that reach the ocean, where icebergs are produced

GLACIAL EROSION :

Glaciers can erode and transport very huge quantities of materials. Glacial erosion happens in two processes as plucking and abrasion. Glaciers can erode a vast amount of rock materials and modify the landscape. The sediments that are transported by the glaciers are deposited whenever and where the ice gets melted. The eroded materials are carried away in suspension within the ice and deposited near the margin of the glaciers during melting. Plucking (which is also called as Quarrying) is similar to the frost wedging. The melt water penetrates into the bedrock cracks and refreezes, prying angular blocks of rock to loose. These blocks may be incorporated into the ice, producing boulders known as glacial erratic which may be transported to long distances. In Abrasion, the rock fragments carried by ice, function like "sandpaper" that scours the surface over which the ice moves. This process produces rock flour (very fine particles of pulverized rock), striations (long grooves and

 scratches cut into bedrock), and glacial polish (a very smooth surface produced by fine abrasion of bedrock by rock flour). There is yet another mechanism called as Bulldozing in which the glacier pushes the loose material along its path. These erosional processes produce many distinct erosional landforms. The erosional landforms of valley or continental glaciers vary very widely. Valley Glaciers are associated with the following landforms: a) The valley bottoms of glaciers are rounded to become U-shaped. Glaciers always follow the pre-existing stream valleys, making them broader and deeper. Widening, deepening and straightening are the processes responsible for this modification. b) The Truncated spurs are triangular-shaped cliffs that are formed by the glacial erosion of ridges. c) Paternoster lakes are glacier-formed lakes produced when water fills the rock basins (bedrock depressions produced by glacial plucking) in the valley floor. d) Fiords are deep sea inlets formed by the flooding of glacial valleys. These are restricted to high latitudes. Fiords can be up to 1,300 meters deep. e) Glacial mountains are characterized by hanging valleys. These are tributary glacier valleys. They are formed where the main glacier cuts its valley deeper than the tributary glaciers. After the ice melts, smaller valleys are left hanging above the main glacier valley. Streams in hanging valleys form waterfalls. f) The very important feature of a glaciated region is the formation of Cirques. Cirques are bowl-shaped depressions at the head of a glacial valley formed by glacial plucking and enlarged by abrasion, plucking, and mass wasting. Cirques may be occupied by small lakes called tarns. Where two cirques on opposite sides of a mountain meet they form a sharp, steep ridge called an arete. Where three of more cirques are backed-up against one another they produce a steep, high sculpted peak called a horn. g) Horns are steep, pyramid-like peaks formed where at least three cirques approach a summit crest. h) Aretes are narrow, sharp-edged ridges between glacial valleys produced by plucking, abrasion, and mass movement. Aretes form from headward erosion of two cirques on opposite sides of a ridge or from erosion in two parallel glacial troughs. i) Cols are glaciated mountain passes formed when two adjacent glaciers erode away the wall between their cirques. j) Roche Moutonnees are very important features in glaciated terrains. They are asymmetric bedrock knobs, formed by glacial abrasion and plucking. They have gentle slopes that face the sides of glacial advances. Corries are spoon-shaped depressions found in glaciated regions

EFFECTS OF GLACIATION. The subject glaciology deals with the study of origin, occurrence, distribution, movement, and the geomorphic activities of glaciers. Glaciers are important components of the global cryosphere. The term cryosphere is used to refer the earth’s layer of snow and ice. A lot of studies have been made on the global distribution of glaciers. Inventory of glaciers has also been done at international levels. The World Glacier Inventory (WGI) contains information for over 100,000 glaciers throughout the world. Parameters like geographic location, area, length, orientation, elevation, and classification of morphological type, and moraines are all the items included within the inventory databases. Glaciers occur on every continent and approximately in 47 countries. Extensive glaciers are found in Antarctica, Chilean Patagonia, Canada, Alaska, Greenland and Iceland. Mountain glaciers are widespread, e.g., in the Andes, the Himalaya, the Rocky Mountains, the Caucasus, and the Alps. The South Island of New Zealand has many glaciers including Tasman, Fox and Franz Josef Glaciers. In New Guinea, small, rapidly diminishing, glaciers are located on its highest summit massif of Puncak Jaya. Africa has glaciers on Mount Kilimanjaro in Tanzania, on Mount Kenya and in the Ruwenzori Range. Most of these glacial masses are affected by long-term climate changes, e.g., precipitation, mean temperature, and cloud cover, glacial mass changes are considered among the most sensitive indicators of climate change. Melting of glaciers will have a major impact on the sea level. There are many direct and indirect effects of glaciations. The Indirect Effects of Glaciation are  Causing important climatic changes.  Changed sea levels. Glaciers stored more than 70 million km3 of water, lowering sea level 130 meters. If all glacial ice were to melt, the sea level would rise by about 70 meters, flooding almost all the densely populated coastal zones.  Forced plants and animals to migrate.  Diverted stream drainage patterns and caused downcutting by streams.  Weight of ice depressed continental crust.

**Loss of Biodiversity**

**Biodiversity definition: the totality of genes, species and ecosystems in a defined area.**

 **Loss of biodiversity definition: refers to either the ongoing extinction of species at a global level or the local reduction or loss of species in a given habitat. The scale of the problem: in the last 40 years, we have lost 52% of planetary biodiversity & lost 58% of vertebrates on land, sea and air - the vertebrate figure could rise to 66% by 2020.**

**Causes of loss of biodiversity**

**The answer to what causes biodiversity loss in most cases is simple. Mankind. Over 99% of species currently extinction-threatened are so because of human activity.**

**Natural causes of biodiversity loss**

**Destruction of habitat: natural forces can act to destroy habitat, species and individual organisms. Obvious examples include volcanic eruptions, floods and fire.**

**The same factors can also drive habitat fragmentation. Fragmentation can isolate populations, reduce gene pools and weaken species 'fitness' or ability to survive and reproduce.**

**Volcanic eruption**

**On May 18, 1980, a major volcanic eruption occurred at Mount St. Helens, a volcano located in Skamania County, in the state of Washington, United States.**

**An eruption column rose 80,000 feet (24 km; 15 miles) into the atmosphere and deposited ash in 11 U.S. states. Hundreds of square miles were reduced to wasteland.**

**Natural climate change: environmental stress applied through heat loss or drought.**

**Invasive species and disease: species newly introduced through natural means out-compete the local species for resources.**

**Man-made causes of biodiversity loss**

**Climate change: see global warming pages. Induced through man-made activities although to provide a balanced view, species can gain environmental advantage or lose it when the climate changes.**

**Pollution on land, in air and water. Water systems suffer aquatic nutrient load from fertilisers and agricultural by-products. Oceans are seeing rising acidity levels caused by man-made pollutant activity.**

**Habitat destruction and degradation: mining, agriculture, settlement, industries, highways and construction being primary examples. Degradation casued through poor land use and deforestation.**

**Habitat fragmentation: fragmentation is one of the most serious causes of erosion of biodiversity. Fragmentation leads to artificially created ‘terrestrial islands’ with microclimatic effects markedly different from those that existed in the large tracks of habitats before fragmentation.**

**Over-exploitation: overfishing has reduced some commercial fish stocks by more than 90%.**

**Introduction of invasive (aka 'exotic') species: any species which is not a natural inhabitant of the locality but is deliberately or accidentally introduced into the system may be designated as an exotic species. Native species are subjected to competition for food and space due to the introduction of exotic species.**

**There are many well-documented extinctions caused by the introduction of exotic species.**

**The introduction of Nile perch to Lake Victoria, Africa’s largest lake, has driven almost half of the 400 original fish species of the lake to near extinction.**

**Human overpopulation: humans may be considered the 'worst-case' exotic species for most organisms. Human activity and an increasingly 'consumption-intensive' lifestyle means that future human population growth spells disaster going forward unless attitudes, behaviours and lifestyles change.**

**Recreational hunting and collecting: hides, skin, tusk, meat, fur, chemical content taken for monetary or aesthetic value or simply ego in the case of hunting with no purpose other than the thrill of the kill.**

**In the last decade, over one third of African elephants have been killed by hunters and poachers to fuel the ivory trade.**

**Fashion: fur clothing and reptile skins for bags and accessories are just two of the more obvious fashion-driven pressures on the natural world.**

**Medicinal or traditional medicinal demand: traditional medicines often drive significant demand for animal and plant material which can only be obtained by killing the providing life form.**

**Rhino horn is highly prized in Asian cultures for its claimed medicinal properties. Unfortunately, Rhino poaching is now pushing Rhino populations to the brink of extinction.**

**Impact of biodiversity loss on the environment**

**Food chain impact and ecosystem weakening: biodiversity is the web of life. Reductions in biodiversity damage this delicate web. Some species appear to be "keystones in the arch," supporting entire ecosystems, such as the sea otter in the Pacific coastal ecosystem. When these keystone species disappear, the web of life unravels as complex interrelationships of predator, prey, parasite, or mutual benefit are lost.**

**Ecosystem services: while we know a great deal about how many ecosystems function, they involve unfathomable complexity and scale. For example, the breakdown and decomposition of dead organisms and wastes; the recycling of nutrients for new life on land, in rivers, lakes, and streams, and in the oceans; and the regulation of climate.**

**Consider temperate forests: Forest serve as sinks for CO2 by storing carbon in trees and soils, thereby helping to mitigate human-caused climate change; maintain the water cycle and precipitation levels, thereby stabilising local climates, through the uptake of water by tree roots, transport through the trees, and evaporation from the leaves back to the atmosphere; reduce soil erosion by dampening the power of rain, and by tree roots binding soils; purify air by filtering particulates and providing chemical reaction sites on leaf surfaces where pollutants can be converted into harmless compounds; purify water by soils acting as massive filters that bind toxic substances**

**Bacteria break down organic material, thus building and fertilising the soil. Wetlands filter pollutants from drinking water. Insects pollinate many of our crop species. Bats, spiders, and other insectivores eat harmful pests. Trees and plants return oxygen to the air. Vast South American forests create rainfall on a continental scale and store carbon as a buffer against global climate change.**

**Impact of biodiversity loss on humans**

**Basic human sustenance: people rely heavily on biodiversity in their day-to-day lives. This reliance is not always obvious or appreciated.**

**Human health: human health depends massively upon ecosystem products and outputs such as availability of food, fresh water and fuel sources.**

**Traditional medicine continue to play an essential role in health care, especially in primary health care. Traditional medicines are estimated to be used by 60% of the world’s population and in some countries are extensively incorporated into the public health system.**

**Infectious diseases: human activities are disturbing both the structure and functions of ecosystems and altering native biodiversity. Such disturbances reduce the abundance of some organisms, cause population growth in others, modify the interactions among organisms, and alter the interactions between organisms and their physical and chemical environments. Patterns of infectious diseases are sensitive to these disturbances.**

**Agriculture: biodiversity plays a crucial role in human nutrition through its influence on world food production, as it ensures the sustainable productivity of soils and provides the genetic resources for all crops, livestock, and marine species harvested for food. Nutritional composition between foods and among varieties/cultivars/breeds of the same food can differ dramatically, affecting micronutrient availability in the diet. Healthy local diets, with adequate average levels of nutrients intake, necessitates maintenance of high biodiversity levels.**

**Spiritual and cultural: biodiversity loss and the current state of species decline is a planetary scandal and yet it still fails to in still any significant change in human activity.**

**Business: many industrial materials derive directly from biological sources. These include building materials, fibres, dyes, rubber and oil. Biodiversity is also important to the security of resources such as water, timber, paper, fibre and food.**

**Leisure and tourism: ecotourism is big business. The Great Barrier Reef is estimated to contribute nearly AUS$6 billion to the country’s economy - according to www.greenbiz.com, counting only the value of tourism, other recreational activities and commercial fishing. Ironically, the reef itself is under severe threat of obliteration. Ocean acidification is taking its toll on this globally iconic natural wonder.**

**Global Warming**

Global warming is a phenomenon of climate change characterized by a general increase in average temperatures of the Earth, which modifies the weather balances and ecosystems for a long time. It is directly linked to the increase of greenhouse gases in our atmosphere, worsening the greenhouse effect.

 Global warming is the unusually rapid increase in Earth’s average surface temperature over the past century primarily due to the greenhouse gases released by people burning fossil fuels. Archaeological sites and some buildings have survived at least two periods of global warming and intervening cold periods. With international scientific evidence mounting and the reliability of future climate predictions increasing. Heritage commissioned research to gather evidence on climate change as a possible cause of environmental instability of cultural heritage and to inform present and future planning

Global warming

**causes**

The greenhouse effect is a natural phenomenon. However, the increase in greenhouse gases is linked to human activities. It is thus no surprise that the world's leading climate scientists believe that human activities are very likely the main cause of global warming since the mid-twentieth century, mostly because of:

FOSSIL FUELS

The massive use of fossil fuels is obviously the first source of global warming, as burning coal, oil and gas produces carbon dioxide - the most important greenhouse gas in the atmosphere - as well as nitrous oxide.

DEFORESTATION

The exploitation of forests has a major role in climate change. Trees help regulate the climate by absorbing CO2 from the atmosphere. When they are cut down, this positive effect is lost and the carbon stored in the trees is released into the atmosphere.

INTENSIVE FARMING

Another cause of global warming is intensive farming, not only with the ever-increasing livestock, but also with plant protection products and fertilizers. In fact, cattle and sheep produce large amounts of methane when digesting their food, while fertilizers produce nitrous oxide emissions.

WASTE DISPOSAL

Waste management methods like landfills and incineration emit greenhouse and toxic gases - including methane - that are released into the atmosphere, soil and waterways, contributing to the increase of the greenhouse effect.

MINING

Modern life is highly dependent on the mining and metallurgical industry. Metals and minerals are the raw materials used in the construction, transportation and manufacturing of goods. From extraction to delivery, this market accounts for 5% of all greenhouse gas emissions.

OVERCONSUMPTION

Finally, overconsumption also plays a major role in climate change. In fact, it is responsible for the overexploitation of natural resources and emissions from international freight transport, which both contribute to global warming

 Roles of WWF to Protect from Global Warming

 WWF-India is one of the largest conservation organizations engaged in wildlife and nature conservation in the country. A part of WWF International, the organization has made its presence felt through a sustained effort not only towards nature and wildlife conservation, but sensitizing people by creating awareness through capacity building and environ-legal activism. A challenging, constructive, science-based organization WWF addresses issues like the survival of species and habitats, climate change and environmental education.

 Some Facts and Figures about Global Warming

 According to the report of WTO International Organization 2007 the following things are take place in the world and affecting the natural disaster. The biggest ice cap in the arctic region, the ward hunt ice shelf broke into Fragments as a result of global warming, reported NASA. More average shoreline in Fiji receding by half a foot every year. Adeline penguin populations in Antarctica reduce in size by 33%. 20- 30% of the world’s reefs wiped out. The above mentioned facts are the tip of the iceberg as far as disastrous effects of global warming.

Global warming effects

Here are some consequences that are documented in the Intergovernmental Panel on Climate Change Special Report on Global Warming:

1. On biodiversity

The increase of temperatures and the climate upheavals disturb the ecosystems, modify the conditions and cycles of plant reproduction. The scarcity of resources and climate change are changing life habits and migratory cycles of animals. We are already witnessing the disappearance of many species - including endemic species - or, conversely, the intrusion of invasive species that threaten crops and other animals.

Global warming therefore impacts biodiversity. It is the balance of biodiversity that is modified and threatened. According to the IPCC, a 1.5°C (34.7°F) average rise might put 20-30% of species at risk of extinction. If the planet warms by more than 2°C, most ecosystems will struggle.

2. On oceans

Because of global warming, permafrost and ice are melting massively at the poles, increasing the sea level at a rate never known before. In a century, the increase reached 18 cm (including 6 cm in the last 20 years). The worst case scenario is a rise of up to 1m by 2100.

The acidification of the oceans is also of great concern. In fact, the large amount of CO2 captured by the oceans makes them more acidic, arousing serious questions about the adaptability of seashells or coral reefs.

3. On humans

Human beings are not spared by these upheavals. Climate change is affecting the global economy. It is already shaking up social, health and geopolitical balances in many parts of the world. The scarcity of resources like food and energy gives rise to new conflicts.

Rising sea levels and floods are causing population migration. Small island states are in the front line. The estimated number of climate refugees by 2050 is 250 million people.

 **Effects of Global Warming in India**

 Elevated carbon dioxide emissions from industries, factories, vehicles etc. have contributed to the greenhouse effect, causing warmer weather that lasted long after the atmospheric shroud of dust and aerosols had cleared [7]. Further climatic changes 20 million years ago, long after India had crashed into the Laurasian landmass, were severe enough to cause the extinction of many endemic Indian forms. The formation of the Himalayas resulted in blockage of frigid Central Asian air, preventing it from reaching India; this made its climate significantly warmer and more tropical in character than it would otherwise have been [9]. Several effects of global warming, including steady sea level rise, increased cyclonic activity, and changes in ambient temperature and precipitation patterns, have affected or are projected to affect India. Ongoing sea level rises have submerged several low-lying islands in the Sundarbans, displacing thousands of people. Temperature rises on the Tibetan Plateau, which are causing Himalayan glaciers to retreat [4]. The present rate of global warming could mean that many plants and animals currently living at lower elevations or at lower latitudes will progressively migrate to higher elevations and latitudes. Hence, in the long term, it may be expected that some of our currently important agricultural species will no longer be able to grow at their present lower latitudinal and lower elevation limits if the global temperate warms.

 Temperature

 Evert year rapidly increase the temperature from the global warming and climate change. As the result natural calamities like Tsunami, Soil erosion, Ice glaciers melting in Himalayas and other things.

Global warming prevention

1. Renewable energies

The first way to prevent climate change is to move away from fossil fuels. What are the alternatives? Renewable energies like solar, wind, biomass and geothermal.

2. Energy & water efficiency

Producing clean energy is essential, but reducing our consumption of energy and water by using more efficient devices (e.g. LED light bulbs, innovative shower systems) is less costly and equally important.

3. Sustainable transportation

Promoting public transportation, carpooling, but also electric and hydrogen mobility, can definitely help reduce CO2 emissions and thus fight global warming.

4. Sustainable infrastructure

In order to reduce the CO2 emissions from buildings - caused by heating, air conditioning, hot water or lighting - it is necessary both to build new low energy buildings, and to renovate the existing constructions.

5. Sustainable agriculture & forest management

Encouraging better use of natural resources, stopping massive deforestation as well as making agriculture greener and more efficient should also be a priority.

6. Responsible consumption & recycling

Adopting responsible consumption habits is crucial, be it regarding food (particularly meat), clothing, cosmetics or cleaning products. Last but not least, recycling is an absolute necessity for dealing with waste.

**E-waste or electronic waste**

It refers to all types of electronic equipment and gadgets, such as cameras, cell phones, light bulbs, laptops, printers and microwaves as well as accessories which end up being dumped on land or water. If you have electronic items which have stopped working and are as good as waste matters, it is a good idea to opt for e-waste recycling. Read on and know about the main advantages of this type of recycling.

Advantages of E-Waste Recycling

It can save natural resources

Most of the natural resources happen to be non renewable in nature. With e waste recycling, the valuable components can easily be separated and allowed to recover. This allows the production of new items with the use of the same components. This allows reducing pollution, save the resources and also save energy.

It can minimize pollution

E wastes have a lot of toxic chemicals which are harmful for the health of human beings, as well as the environment. Those around electronic wastes are always at risk of suffering from some serious ailments and health disorders, due to breathing of toxic chemicals in these materials. Once e-wastes are allowed to remain on the land in an unprocessed form, they can contaminate ground resources. By recycling e waste matters, you can reduce the amount of pollution in soil, water and air.

It can lower landfill space

By opting for electronic waste recycling Adelaide, you can lower the amount of space required for landfills which are the areas that are needed to cover waste materials. By reducing space needed for landfill purposes, you can ensure that these areas can be used for housing or agricultural purposes.

It can create employment

With recycling, more and more employment opportunities can be created. With more e waste recycling facilities being set up and the existing agencies hiring more employees for the reprocessing, you will be able to save nature and support the economy.

It can prevent long-term damage

Exposure to nickel, cadmium, lithium, mercury, glass and various other components contained within electronic materials can cause long-term damage to health and the environment. There can also be cancerous developments in some cases, which is not uncommon. Other than humans, domesticated animals and pets may also suffer from cancers and other conditions. This can affect livestock and meat products, and affect the health of grown-ups as well as kids. With recycling, you can prevent all such issues and safeguard health and ecosystem.

IMPACTS OF E-WASTES

 Electronic wastes can cause widespread environmental damage due to the use of toxic materials in the manufacture of electronic goods (Mehra, 2004). Hazardous materials such as lead, mercury and hexavalent chromium in one form or the other are present in such wastes primarily consisting of Cathode ray tubes (CRTs), Printed board assemblies, Capacitors, Mercury switches and relays, Batteries, Liquid crystal displays (LCDs), Cartridges from photocopying machines, Selenium drums (photocopier) and Electrolytes. Although it is hardly known, e-waste contains toxic substances such as Lead and Cadmium in circuit boards; lead oxide and Cadmium in monitor Cathode Ray Tubes (CRTs); Mercury in switches and flat screen monitors; Cadmium in computer batteries; polychlorinated biphenyls (PCBs) in older capacitors and transformers; and brominated flame retardants on printed circuit boards, plastic casings, cables and polyvinyl chloride (PVC) cable insulation that releases highly toxic dioxins and furans when burned to retrieve Copper from the wires. All electronic equipment contain printed circuit boards are hazardous because of their content of lead (in solder), brominated flame retardants (typically 5-10 % by weight) and antimony oxide, which is also present as a flame retardant (typically 1-2% by weight

Pollution

Pollution, we probably hear of this term every other day at school, college, and offices. We also come across the term in newspapers, online journals, and media in general. So what is it and why is it deemed harmful? Pollution occurs when pollutants contaminate the natural surroundings; bringing about changes that affect our normal lifestyles adversely.

Pollutants are the key elements or components of pollution which are generally waste materials of different forms. Pollution disturbs our ecosystem and the balance in the environment. With modernization and development in our lives, pollution has reached its peak; giving rise to global warming and human illness.

Different Forms of Pollution

Major Types of Pollution Affecting Our Planet

1. Air Pollution-Burning of Fuel,Chimney Smoke

2. Water Pollution--Industrial Waste,Groundwater Pollution,Oil Spills,Eutrophication

3. Soil Pollution

4. Noise Pollution

5. Radioactive Pollution

6. Thermal/Heat Pollution

7. Light Pollution

Serious Effects of Pollution on Our Humans and Environment

1. Environment Degradation

2. Human Health

3. Global Warming

4. Ozone Layer Depletion

5. Infertile Land

Bottom Line

Different Forms of Pollution

Pollution occurs in different forms; air, water, soil, radioactive, noise, heat/ thermal, and light.

Every form of pollution has two sources of occurrence; the point and the non-point sources. The point sources are easy to identify, monitor, and control, whereas the non-point sources are hard to control.

To understand this occurrence better, let us now discuss the different types of pollution and their effects on mankind and the environment in general.

Major Types of Pollution Affecting Our Planet

Following is a list of the different types of Pollution that evidently destroy us and our earth.

1. Air Pollution-air-pollution-smoke-toxic-ash

While there are many types of pollution, Air Pollution is probably the most prominent and dangerous form of it. Pollution may occur due to many reasons. Here’s a brief list.

Burning of Fuel

Excessive burning of fuel which is a necessity of our daily lives for cooking, driving, and other industrial activities; releases a huge amount of chemical substances in the air every day. Over time, these substances pollute the air.

Chimney Smoke

Another common cause of air pollution may be attributed to the smoke from chimneys, factories, vehicles, or the burning of wood. These activities, individually and collectively release sulfur dioxide into the air thereby making it toxic.

The effects of air pollution are evident too. The release of sulfur dioxide and other hazardous gases into the air causes global warming and acid rain; which in turn lead to increased temperatures, erratic rains, and droughts worldwide.

These effects don’t just debilitate the lives of humans, but they also end up making it tough for the animals to survive.

As humans, we breathe in every polluted particle from the air which results in the potential chances of asthma and lung cancer. Either way, unless we address this issue, it may take a bigger and worse shape.

2. Water Pollution-groundwater-pollution-dirty-water

Water Pollution has taken a toll on all the surviving species of the earth. Almost 60% of the species live in water bodies and when the water is polluted, it severely impacts their lives and hinders their health in general. But what are the specific causes of water pollution? Let’s take a closer look.

Industrial Waste

Water pollution may occur due to multiple factors. One of the biggest instances may be industrial water pollution where the industrial wastes are dumped into the rivers and other water bodies thereby causing an imbalance in the water. Over time, it leads to severe contamination thereby resulting in the death of aquatic species.

Groundwater Pollution

Water pollution may also be caused when insecticides and pesticides like DDT are sprayed on plants. While this may not seem much, over time, this simple activity pollutes the groundwater system which most of us use. If left unchecked for long, the same groundwater will turn out to be hazardous, leading to a range of health issues in the long run.

Note that in addition to the spraying of pesticides, groundwater may also be polluted from the toxic chemical spills occurring from industrial operations.

Oil Spills

Oil spills in the oceans too have caused irreparable damage to the water bodies. Oil spills are usually caused due to accidents from large ships, tankers, or any other form of an oil pipeline.

Eutrophication

Eutrophication is another big source of water pollution, it occurs due to daily activities like washing clothes, utensils near lakes, ponds, or rivers; this forces detergents to go into the water which blocks sunlight from penetrating, thus reducing oxygen and making it inhabitable.

Water pollution not only harms the aquatic beings but it also contaminates the entire food chain by severely affecting humans dependent on these. Water-borne diseases like cholera, diarrhoea have also increased in all places.

3. Soil Pollution-garbage-trash-landfill-site-environmental-concern

Soil pollution occurs due to the incorporation of unwanted chemicals in the soil due to human activities. The use of insecticides and pesticides absorbs the nitrogen compounds from the soil making it unfit for plants to derive nutrition .

The release of industrial waste, mining, and deforestation also exploits the soil. Since plants can’t grow properly, they can’t hold the soil which in turn leads to soil erosion.

4. Noise Pollution=woman-holding-ears-noise-pollution

Noise pollution is caused when noise which is an unpleasant sound affects our ears and leads to psychological problems like stress, hypertension, hearing impairment, etc. It is caused by machines in industries, loud music, noise from traffic, noise from construction activities, and so on.

As with the other forms of pollution, noise pollution is extremely dangerous and can lead to multiple fatalities in both humans and animals.

In humans, it affects our overall well-being, sleep, and total hours of rest. It may also adversely impact the development of kids and create an imbalance in the blood pressure and heart rate of elderly individuals.

5. Radioactive Pollution-radioactive-pollution-nuclear-pollutant

Radioactive pollution is highly dangerous when it occurs. It can occur due to nuclear plant malfunctions, improper nuclear waste disposal, accidents, etc. It causes cancer, infertility, blindness, defects at the time of birth; it can sterilize soil and affect air and water.

6. Thermal/Heat Pollution-industrial-pollution-industry-pollutant

Thermal/heat pollution is due to the excess heat in the environment creating unwanted changes over long time periods; due to the huge number of industrial plants, deforestation, urban sprawl, and air pollution. It increases the earth’s temperature, causing drastic climatic changes and extinction of wildlife.

Thermal pollution can result in an increase in temperature and can prove to be disastrous for humans and wildlife. The increase in temperature can make wildlife populations vulnerable and they may never be able to recover.

7. Light Pollution-light-pollution-nightlife-city

Light pollution occurs due to prominent excess illumination of an area. It is largely visible in big cities, on advertising boards and billboards, in sports or entertainment events at the night.

In residential areas, the lives of the inhabitants are greatly affected by this. It also affects astronomical observations and activities by making the stars almost invisible.

**Serious Effects of Pollution on Our Humans and Environment**

1. Environment Degradation

The environment is the first casualty for the increase in pollution weather in air or water. The increase in the amount of CO2 in the atmosphere leads to smog which can restrict sunlight from reaching the earth.

This very scenario affects the process of photosynthesis in plants, thereby hindering their growth. Gases like Sulfur dioxide and nitrogen oxide can also cause acid rain. Again, water pollution in terms of the oil spill may lead to the death of several wildlife species.

2. Human Health

The decrease in the quality of air leads to several respiratory problems including asthma or lung cancer. Chest pain, congestion, throat inflammation, cardiovascular disease, respiratory disease are some of the diseases that can be caused by air pollution.

Water pollution occurs due to contamination of water and may pose skin related problems including skin irritations and rashes. Similarly, noise pollution leads to hearing loss, stress, and sleep disturbance.

It is worth noting that while the results of pollution tend to vary, it has one specific impact: degrading the quality of human life. Pollution has an adverse impact on humans in general and regardless of its extent, all of us have encountered its ill-effects at some point of time or the other.

3. Global Warming

The emission of greenhouse gases particularly CO2 is leading to global warming. Every other day new industries are being set up, new vehicles come on roads and trees are cut to make way for new homes.

All of them, in a direct or indirect way, lead to an increase in CO2 in the environment. The increase in CO2 leads to the melting of polar ice caps which increases the sea level and pose danger for the people living near coastal areas.

It is worth noting that Global Warming is almost entirely caused by humans and unless we check our pollution levels, it can completely destroy the world as we know it.

While Global Warming is already a reality, when it becomes even more pronounced over the next few years, we will possibly encounter the worst. There’ll be fluctuations in temperature, a significant and persistent temperature rise, forest fires, and so much more.

4. Ozone Layer Depletion

The ozone layer is the thin shield high up in the sky that stops ultraviolet rays from reaching the earth. As a result of human activities, chemicals, such as chlorofluorocarbons (CFCs), are released into the atmosphere thereby contributing to the depletion of the ozone layer.

5. Infertile Land

Due to the constant use of insecticides and pesticides, the soil may become infertile. Plants may not be able to grow properly. Various forms of chemicals produced from industrial waste are released into the flowing water which also affects the quality of the soil.

Bottom Line

Pollution not only affects humans by destroying their respiratory, cardiovascular, and neurological systems; it also affects the nature, plants, fruits, vegetables, rivers, ponds, forests, animals, etc, on which they are highly dependent on survival. It is crucial to control pollution as nature, wildlife and human life are precious gifts to mankind**.**

**Regional level environmental problems**

**Waste Management: Management of Solid and Liquid**

The waste may be defined as material for which no use or reuse is intended. The wastes generated from the natural Processes and anthropogenic activities which pollute the environment and make the earth an unhealthy planet, is termed as environmental wastes, depending upon the physical states of wastes, these are of three types:

(1) Solid waste,

(2) Liquid waste

(3) Gaseous waste.

The accumulation of wastes in different forms causes serious environmental hazards. So it’s high time for the present society to take appropriate steps for the management of waste, possibly through its recycling. The management of waste is another way of conservation of resources.

1. Management of Solid Waste:

Solid wastes include solid portions of the discarded material such as glass bottles, crockeries, plastic containers, metals and radioactive wastes. The solid wastes may be biodegradable or non-biodegradable. The biodegradable solid wastes are agricultural wastes, food wastes, paper, food processing by products, manure, yard wastes etc. The non-biodegradable wastes include plastics, metals, synthetic materials, polythene, radioactive wastes etc.

The solid waste management involves disposal of solid waste to land (or ocean) or recovering and reproducing useful substances from the waste through recycling.

The entire methodology of solid waste management is based on:

(A) Collection of Waste,

(B) Disposal,

(C) Resource recovery.

(A) Collection of Waste:

The solid wastes are usually collected by a covered truck.

(B) Disposal of Waste:

After the collection of wastes, the wastes are disposed of by any one of the methods described below

(i) Dumping:

It is a process of controlled and final disposal of waste at land fill sties which must be done using state of the art methods, {base sealing, treatment of percolated water, landfill gas disposal/utilisation etc.)

ii) Sanitary land fill:

It is a method of disposing of the waste without creating nuisances or hazards to public health by using the principles of engineering. In the process, the waste is confined to smallest practical volume by covering it with a layer of earth, at the conclusion of each day’s operation.

(iii) Incineration:

It is a method of converting the volume of waste to ashes by burning. This method is adopted when the cost of land filling is very high.

(iv) Pyrolysis:

It is a method of burning waste in absence of oxygen or air. The process reduces volume of the waste and produces stable end products.

(v) Composting:

This process involves preparation of refuse and degrading the organic matter in waste in to bio-fertilizer by aerobic micro-organisms. After about 3 to 4 weeks of the operation, the composting product becomes ready for curing, blending with additives, bagging and marketing.

(vi) Biogas technology:

The organic matter present in solid waste is decomposed by putrefactive bacteria in absence of air (anaerobic condition) to biogases in a biogas digestor. The approximate composition of biogas is 60% methane (CH4) and 40% C02 For better yield of biogas, the organic solid waste may be mixed with poultry waste, grass, leaves, straw, kitchen waste etc.

(C) Resource recovery (Recycling):

By the process of recycling a number of useful products can be obtained from the solid wastes.

Some important products obtainable from solid wastes are described below:

1. Electricity can be generated from incinerated plastics.

2. Synthetic oil can be produced from plastic wastes.

3. Waste papers and cardboards from sugar cane bagasse can be used for the preparation of unbreakable dolls, packing cardboards etc.

4. Metals can be recycled from the industrial scrap.

5. Ethyl alcohol can be produced from agricultural wastes.

6. Heavy metals can be extracted by bioleaching technology.

7. Waste glasses can be used for the preparation of new glass bottle.

8. Bricks and concretes can be prepared by using ash generated by power plants, slit from water works and red mud from aluminium industry.

Some Industrial Wastes & Their Subsequent Uses

**2**. Management of Liquid Wastes:

Liquid wastes are the liquid part of the waste material. Liquid waste includes effluents of industries, fertiliser and pesticide solutions from agricultural fields, leachate from landfills, urban runoff of untreated waste water and garbage, mining wastes etc. The liquid waste may contain nontoxic inorganic substances or toxic organic substances.

Some important liquid waste management methods are described below:

1. Sewage treatment:

The process of sewage treatment involves the following methodology:

(a) Dilution:

In this method, the sewage is subjected to perfect dilution so that the dissolved oxygen in natural water decomposes the organic wastes completely, thereby reducing the turbidity. The reduction of turbidity favours easier penetration of sun light and natural ecosystem is restored.

(b) Mechanical treatments:

The sewage is allowed to pass through different screens, filters, grit chambers, sedimentation basins etc. At first the sewage is filtered to remove suspended Particles. Then the sewage is subjected to grinding followed by some chemical treatment.

By this operation, the minute solid Particles present within the sewage get coagulated and settle at the bottom. The precipitates are separated either by filtration or by gravity settling. The sediments obtained above are then put in sludge digester where it is digested in absence of air to release biogas.

(c) Biological treatments:

In this method, the sewage is passed through trickling filters where aerobic bacteria degrade the sewages as it seeps through large vat beds filled with crossed stones covered with bacterial growth. Alternatively, the sewage is pumped into a large tank, mixed with bacteria rich sludge and agitated heavily in presence of sufficient amount of oxygen for several hours which causes bacterial degradation of organic waste.

The waste is then pumped into sedimentation tank where the suspended solids settle as sludge. The entire solution is filtered to separate sludge and effluent. The sludge is taken in an anaerobic digester and broken down. After suitable treatment, the sludge can be used as fetiliser. The effluent may be chlorinated to kill the pathogenic microbes and discharged in to water -bodies.

(d) Chemical treatments:

The sewage obtained after mechanical or biological treatments is subjected to specific chemical treatment followed by some physical operation:

(i) Precipitation:

The sewage may be treated with calcium oxide to precipitate up to 90% of phosphates and suspended particles. The precipitate separates and settles at the bottom.

(ii) Adsorption:

The effluent is treated with activated charcoal which adsorbs colour, odour and dissolved organic compounds.

(iii) Osmosis:

The dissolved organic and inorganic substances can also be separated by the process of osmosis.

(iv) Chemical oxidation:

The effluent may be subjected to oxidation in presence of ozone or hydrogen peroxide to remove dissolved organic compounds.

(v) Removal of ammonia:

After the first operation, the waste water is introduced into a metal tower from which it trickles down over a series of plastic baffles plates and air is forced upwards which removes ammonia gas.

2. Removal of ammonia:

The treatment of industrial effluents in ‘Effluent Treatment involves chemical or primary treatment (by methods of neutralization, sedimentation, coagulation, precipitation etc.) followed by biological or secondary treatment (by activated sludge and trickling filter method) and tertiary treatment (by methods of ion exchange, reverse osmosis, chemical oxidation).

3. Effluent water can be used to grow algae and aquatic plants to produce biomass for biogas plants.

4. The effluents containing heavy metals like cadmium, mercury, lead etc. can be purified by growing water hyacinth plants.

5. The sewage with organic nutrients is stored in specially constructed shallow ponds called as oxidising or stabilizing pond. In the pond, green algae and bacteria grow in presence of sun light, consuming organic nutrients. This water contains enough nitrogen, phosphorous and potassium and is highly helpful for the growth of plants.

**Mining and Quarrying**

Mining and quarrying extract a wide range of useful materials from the ground such as coal, metals, and stone. These substances are used widely in building and manufacturing industry, while precious stones have long been used for adornment and decoration. Mining and quarrying involve investigating potential sites of extraction, then getting the required material out of the ground, and finally processing with heat or chemicals to get out the metal or other substance of interest. All these operations may use large amounts of water.

Mining and quarrying can be very destructive to the environment. They have a direct impact on the countryside by leaving pits and heaps of waste material. The extraction processes can also contaminate air and water with sulphur dioxide and other pollutants, putting wildlife and local populations at risk. More careful use of natural resources, including recycling, and also restoration efforts after mining and quarrying can help limit these environmental impacts.

Historical Background and Scientific Foundations

People have always extracted useful materials from the ground. The Stone, Bronze, and Iron Ages were underpinned by knowledge of how to obtain these materials. Archaeological studies have shown evidence for copper mining in Africa around 6,000 years ago and, a little later, in ancient Egypt and North America. Meanwhile, the Romans developed many mining techniques to make the process more efficient. Today practically every manufactured item contains material that has been mined or quarried.

Mining involves taking an economically useful material from the ground. Substances that are mined include ores, coal, evaporates, and precious stones and metals. Quarrying is the cutting or digging of stone, and related materials, from an excavation site or pit and it usually leaves behind a large hole in the ground. An ore is a deposit containing an economically viable amount of a mineral, which itself is a crystalline inorganic compound, usually containing a metal. It is the metal that is of value. The main groups of minerals that are mined are oxides, sulphides, and silicates. Economically, the most significant metals are aluminium, manganese, copper, chromium, and nickel.

The evaporates are materials that are deposited in the ground from evaporation of chemical solutions. They include rock salt, used for culinary purposes and in water softening, and gypsum, which is used to make plasterboard. Substances like diamond, precious metals, and stones are always in great demand for decorative purposes, including jewelry. Meanwhile, gravel, clay, sand, and limestone are quarried in vast quantities for use in building materials like concrete, cement, and glass. Crushed stone from quarries is used in large amounts to build roads. A mile of a motorway could require nearly a quarter of a million tons of crushed stone. Sulfur deposits are mined mainly to make sulfuric acid, which is a mainstay of the chemical industry.

Mining and quarrying involve three distinct stages. First there is exploration and assessment to see whether a resource is worth exploiting. This might involve a certain amount of drilling into the ground. Then the substance is extracted by whatever technique is most appropriate to its location. This is often dictated by the depth of the resource under the surface. Open pit and shallow strip mining are commonly used to extract resources up to 600 ft (180 m) below ground. The mining process removes the source and the rock and soil, known as overburden, on top of it. The overburden is stacked up into a so-called spoil heap close by. Deeper resources will be extracted by underground mining that can go to about 8,000 ft (2,440 m). Beyond this, temperatures increase to a level that makes mining impracticable. Rock removed to create tunnels for mining is generally added to the spoil heap. Finally, the ore or other resource must be processed to extract the metal or material of interest. This usually involves some kind of heat or chemical treatment. For example, smelting is a common form of processing and involves roasting an ore to release the metal it contains.

**Sand mining**

Sand mining is the extraction of sand, mainly through an open pit but sometimes mined from beaches and inland dunes or dredged from ocean and river beds. Sand is often used in manufacturing, for example as an abrasive or in concrete. It is also used on icy and snowy roads usually mixed with salt, to lower the melting point temperature, on the road surface. Sand can replace eroded coastline.[1] Some uses require higher purity than others; for example sand used in concrete must be free of seashell fragments. Sand mining contributes to the construction of buildings and development. However, the negative effects of sand mining include the permanent loss of sand in areas, as well as major habitat destruction.

Sand mining presents opportunities to extract rutile, ilmenite and zircon, which contain the industrially useful elements titanium and zirconium. These minerals typically are found in ordinary sand deposits and are separated by water elutriation.

Sand mining is a direct cause of erosion, and impacts the local wildlife.[2] Various animals depend on sandy beaches for nesting clutches, and mining has led to the near extinction of gharials (a species of crocodile) in India. Disturbance of underwater and coastal sand causes turbidity in the water, which is harmful for organisms like coral that need sunlight. It can also destroy fisheries, financially harming their operators.

Removal of physical coastal barriers, such as dunes, sometimes leads to flooding of beachside communities, and the destruction of picturesque beaches causes tourism to dissipate. Sand mining is regulated by law in many places, but is often done illegally.[3] Globally, it is a $70 billion industry, with sand selling at up to $90 per cubic yard.[4]

**Impacts and Issues**

Quarrying and mining operations also involve the generation of other environmental and amenity impacts, which include:

•Noise.

•Dust.

•Atmospheric emissions from combustion engines.

•surface and groundwater pollution caused by, e.g. fuel and chemical spillages.

•Vibration from, e.g. blasting.

•Visual and aesthetic impacts.

•Landform changes.

•Destruction of natural habitats and historical artefacts.

Mining and quarrying have often been criticized for their social and environmental impact. Far fewer lives are claimed by the industry in modern times, thanks to improved technology and safety measures. However, mining was a difficult and dangerous job. Valuable materials like gold and diamonds have often helped finance corrupt regimes, crime, and terrorism while inhuman labour conditions have often been employed in their extraction.

The environmental impacts of mining and quarrying are several. While the extractions are underway, **the landscape is visibly disfigured and habitat loss can be extensive.** The mining operations themselves and the accompanying spoil heaps cause a drastic change in the location with direct destruction of habitat and blocking or burying nearby bodies of water. Mining can often **affect local hydrology, causing changes in the water flow as well as quality.**

STRIP MINING: A method for removing coal from seams located near Earth’s surface becomes polluted. Mining companies now acknowledge that they need to invest in restoring land they have exploited. This involves levelling spoil heaps, filling in holes and re-grassing the area. However, it can take many years for vegetation to become re-established at a former mine site. There are also many abandoned mines where environmental impact is ongoing.

**Emissions from mining and quarrying can contaminate both air and water.** The U.S. Environmental Protection Agency (EPA) lists as many as **100 different air pollutants issuing** from the nation’s mining industry, including dust particles and sulphur dioxide, which can create acid precipitation. Meanwhile, the Mineral Policy Centre in Washington, D.C., says that 12,000 mi (19,312 km) of rivers and streams in the United States are polluted by abandoned and current mining operations. The problem is that a great deal of water is used in extraction of ores, especially those containing only low concentrations of metals, and this leaches heavy metals and sulphur from the rocks so that it enters the water supply. Ore processing can sometimes be more polluting than the extraction itself. For example, smelting often releases sulphur dioxide into the atmosphere to create acid precipitation, including acid rain.

**Fires** occurring in underground mines are another environmental impact. These can be difficult to extinguish and may actually burn for many years. There are hundreds of such mine fires around the world, in China, the United States, Russia, and India, for example, they emit a substantial amount of methane and carbon dioxide into the atmosphere, thereby adding to the greenhouse effect.

The polluting nature of mining and quarrying is underlined by work carried out by the Blacksmith Institute, which is focused on solving pollution problems in the developing world. Each year they publish a list of the world’s most polluted sites. In 2007, six of the top ten most polluted sites were mines or smelter facilities.

Mining and quarrying are, by their very nature, destructive to the environment. As the global population grows and many countries improve their standards of living, demand for industrial materials is sure to grow. This creates increasing pressure on existing mineral resources, which are finite. Prospectors will go further field in search of new supplies. There have even been discussions about trying to exploit the pristine environment of Antarctica. However, there is a growing awareness that mineral resources are indeed finite and that they should be conserved. Efforts to recycle metals and other materials could help prevent the depletion of resources.

**Biodiversity hotspot/ecological hotspot**



**The term ‘hot spot’ was introduced by N. Myers in 1988 for those geographical regions particularly rich in ‘endemic’, ‘rare’ and ‘threatened’ species found in relatively small areas but facing significant threats to habitat loss.**

**Presently, there are 36 areas across the globe that qualify as hotspots. They represent 2.4% of the Earth’s land surface but support more than half of the world’s plant species as endemics — and nearly 43% of bird, mammal, reptile and amphibian species as endemics.**

**The 36 ecological hotspots are home to 2 billion people and provide crucial ecosystems services for human life and livelihood.**

**For any area to qualify as a biodiversity hotspot, the following two criteria’s must be met:**

**The area must contain at least 1,500 species of endemic vascular plants.**

**The area must have lost at least 70 per cent of its primary native vegetation.**

A biodiversity hotspot is a biogeographic region that is both a significant reservoir of biodiversity and is threatened with destruction.

The term biodiversity hotspot specifically refers to 25 biologically rich areas around the world that have lost at least 70 percent of their original habitat. The remaining natural habitat in these biodiversity hotspots amounts to just 1.4 percent of the land surface of the planet, yet supports nearly 60 percent of the world's plant, bird, mammal, reptile, and amphibian species.

Biodiversity Hotspots Across the World

The eight hottest hot spots in terms of the above factors are:

Madagascar

Philippines

Sundaland [South East Asia]

Brazil’s Atlantic Forest

Caribbean

Indo-Burma

The Western Ghats and Sri Lanka

Eastern Arc and Coastal Forests of Tanzania/Kenya

There are 4 biodiversity hot spots present in India. They are:

The Eastern Himalayas [Arunachal Pradesh, Bhutan, Eastern Nepal]

Indo-Burma and [Purvanchal Hills, Arakan Yoma, Eastern Bangladesh]

The Western Ghats and Sri Lanka

Sundalands: Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines).

EXTINCTIONS AND A LOOK INTO THE FUTURE

Interestingly, the organisms that we know today represent only a very small portion of all the living creatures that have inhabited the planet since life began. All the species living today represent only 5% of all the species that have roamed the Earth during its history! This is a reminder that extinction is a constant force shaping Earth’s biodiversity.

However, many scientists would agree that, today, we are facing a rate of species extinction that is faster than has ever been seen before. Plant and animal species in biodiversity hotspots are currently suffering devastating losses. In fact, by definition, a biodiversity hotspot must have lost at least 70% of its habitat [9]. Biodiversity hotspots now cover only 1.4% of the land on Earth, when they originally covered 12% of the land [10]. Factors, such as pollution, exploitation of land, invasive species, deforestation, and climate change are the leading causes of habitat loss and destruction [11]. The fact that these factors are widespread creates challenges for the species that manage to survive; and with an ever-changing climate and unpredictable circumstances, species that cannot resist the changing environment or move to a more suitable habitat will likely become extinct [4].

When we think about the future of biodiversity on Earth, we need to consider the role we play in climate change. Some scientists predict that up to 54% of species are at risk of extinction due to climate change. The consequences of climate change are extremely widespread, threatening even places untouched by humans [12]. In order to protect our planet, we can start by making small changes in our daily lives. Taking action by recycling, picking up trash, being conservative with our water consumption, and limiting pollution by walking, biking, or taking public transportation are ways that we can help the environment. We can also come up with our own ideas, as we educate ourselves on biodiversity by reading about different places and living things.

Natural disasters

A natural disaster is a major adverse event resulting from natural processes of the Earth; examples are floods, hurricanes, tornadoes, volcanic eruptions, earthquakes, tsunamis, storms, and other geologic processes. A natural disaster can cause loss of life or damage property, and typically leaves some economic damage in its wake, the severity of which depends on the affected population's resilience (ability to recover) and also on the infrastructure available.

An adverse event will not rise to the level of a disaster if it occurs in an area without vulnerable population. In a vulnerable area, however, such as Nepal during the 2015 earthquake, an earthquake can have disastrous consequences and leave lasting damage, which can require years to repair.

Geological disasters

 Avalanches and landslides

A landslide is described as an outward and downward slope movement of an abundance of slope-forming materials including rock, soil, artificial, or even a combination of these things.

During World War I, an estimated 40,000 to 80,000 soldiers died as a result of avalanches during the mountain campaign in the Alps at the Austrian-Italian front. Many of the avalanches were caused by artillery fire.

Earthquakes :

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. At the Earth's surface, earthquakes manifest themselves by vibration, shaking, and sometimes displacement of the ground. Earthquakes are caused by slippage within geological faults. The underground point of origin of the earthquake is called the seismic focus. The point directly above the focus on the surface is called the epicentre. Earthquakes by themselves rarely kill people or wildlife. It is usually the secondary events that they trigger such as building collapse, fires, tsunamis (seismic sea waves) and volcanoes. Many of these could possibly be avoided by better construction, safety systems, early warning and planning.

Volcanic eruptions

Volcanoes can cause widespread destruction and consequent disaster in several ways. The effects include the volcanic eruption itself that may cause harm following the explosion of the volcano or falling rocks. Secondly, lava may be produced during the eruption of a volcano, and so as it leaves the volcano the lava destroys many buildings, plants and animals due to its extreme heat. Thirdly, volcanic ash, generally meaning the cooled ash, may form a cloud, and settle thickly in nearby locations. When mixed with water this forms a concrete-like material. In sufficient quantities, ash may cause roofs to collapse under its weight but even small quantities will harm humans if inhaled. Since the ash has the consistency of ground glass, it causes abrasion damage to moving parts such as engines. The main killer of humans in the immediate surroundings of a volcanic eruption is the pyroclastic flows, which consist of a cloud of hot volcanic ash which builds up in the air above the volcano and rushes down the slopes when the eruption no longer supports the lifting of the gases. It is believed that Pompeii was destroyed by a pyroclastic flow. A lahar is a volcanic mudflow or landslide. The 1953 Tangiwai disaster was caused by a lahar, as was the 1985 Armeco tragedy in which the town of Armeco was buried and an estimated 23,000 people were killed.

Volcanoes rated at 8 (the highest level) on the Volcanic Explosivity Index are known as super volcanoes. According to the Toba catastrophe theory, 75,000 to 80,000 years ago a supervolcanic eruption at what is now Lake Toba in Sumatra reduced the human population to 10,000 or even 1,000 breeding pairs, creating a bottleneck in human evolution,[8] and killed three-quarters of all plant life in the northern hemisphere. However, there is considerable debate regarding the veracity of this theory. The main danger from a super volcano is the immense cloud of ash, which has a disastrous global effect on climate and temperature for many years.

Hydrological disasters

The Limpopo River during the 2000 Mozambique flood

A violent, sudden and destructive change either in the quality of Earth's water or in the distribution or movement of water on land below the surface or in the atmosphere.

Floods

A flood is an overflow of water that 'submerges' land.[9] The EU Floods Directive defines a flood as a temporary covering the land with water which is usually not covered by water.[10] In the sense of 'flowing water', the word may also be applied to the inflow of the tides. Flooding may result from the volume of water within a body of water, such as a river or lake, which overflows, causing some of the water to escape its usual boundaries.[11] While the size of a lake or other body of water will vary with seasonal changes in precipitation and snow melt, it is not a significant flood unless the water covers land used by man, like a village, city or other inhabited area, roads, expanses of farmland, etc.

Tsunami

A tsunami (plural: tsunamis or tsunami; from Japanese: 津波, lit. "harbour wave"; English pronunciation: /tsuːˈnɑːmi/), also known as a seismic sea wave or as a tidal wave, is a series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake. Tsunamis can be caused by undersea earthquakes such as the 2004 Boxing Day tsunami, or by landslides such as the one in 1958 at Lituya Bay, Alaska, or by volcanic eruptions such as the ancient eruption of Santorini. On March 11, 2011, a tsunami occurred near Fukushima, Japan and spread through the Pacific Ocean.

Limbic eruptions

A limbic eruption occurs when a gas, usually CO2, suddenly erupts from deep lake water, posing the threat of suffocating wildlife, livestock and humans. Such an eruption may also cause tsunamis in the lake as the rising gas displaces water. Scientists believe landslides, volcanic activity, or explosions can trigger such an eruption. To date, only two limbic eruptions have been observed and recorded. In 1984, in Cameroon, a limbic eruption in Lake Monoun caused the deaths of 37 nearby residents, and at nearby Lake Nyos in 1986 a much larger eruption killed between 1,700 and 1,800 people by asphyxiation.

Meteorological disasters

Cyclonic storms

Cyclone, tropical cyclone, hurricane, and typhoon are different names for the same phenomenon, which is a cyclonic storm system that forms over the oceans. The determining factor on which term is used is based on where they originate. In the Atlantic and Northeast Pacific, the term "hurricane" is used; in the Northwest Pacific it is referred to as a "typhoon" and "cyclones" occur in the South Pacific and Indian Ocean.

The deadliest hurricane ever was the 1970 Bhola cyclone; the deadliest Atlantic hurricane was the Great Hurricane of 1780 which devastated Martinique, St. Eustatius and Barbados. Another notable hurricane is Hurricane Katrina, which devastated the Gulf Coast of the United States in 2005.

Blizzards

Blizzards are severe winter storms characterized by heavy snow and strong winds. When high winds stir up snow that has already fallen, it is known as a ground blizzard. Blizzards can impact local economic activities, especially in regions where snowfall is rare. The Great Blizzard of 1888 affected the United States, when many tons of wheat crops were destroyed, and in Asia, 2008 Afghanistan blizzard and the 1972 Iran blizzard were also significant events. The 1993 Superstorm originated in the Gulf of Mexico and traveled north, causing damage in 26 states as well as Canada and leading to more than 300 deaths.[12]

Hailstorms

Hailstorms are precipitation in the form of ice, with the ice not melting before it hits the ground. Hailstones usually measure between 0.2-inch (5 millimetres) and 6 inches (15 centimetres) in diameter. A particularly damaging hailstorm hit Munich, Germany, on July 12, 1984, causing about $2 billion in insurance claims.

Ice storms

An ice storm is a type of winter storm characterized by freezing rain. The U.S. National Weather Service defines an ice storm as a storm which results in the accumulation of at least 0.25-inch (6.4 mm) of ice on exposed surfaces.

Cold waves

A cold wave (known in some regions as a cold snap or cold spell) is a weather phenomenon that is distinguished by a cooling of the air. Specifically, as used by the U.S. National Weather Service, a cold wave is a rapid fall in temperature within a 24-hour period requiring substantially increased protection to agriculture, industry, commerce, and social activities. The precise criterion for a cold wave is determined by the rate at which the temperature falls, and the minimum to which it falls. This minimum temperature is dependent on the geographical region and time of year.

Heat waves

A heat wave is a period of unusually and excessively hot weather. The worst heat wave in recent history was the European Heat Wave of 2003. A summer heat wave in Victoria, Australia, created conditions which fuelled the massive bushfires in 2009. Melbourne experienced three days in a row of temperatures exceeding 40 °C (104 °F) with some regional areas sweltering through much higher temperatures. The bushfires, collectively known as "Black Saturday", were partly the act of arsonists. The 2010 Northern Hemisphere summer resulted in severe heat waves, which killed over 2,000 people. It resulted in hundreds of wildfires which caused widespread air pollution, and burned thousands of square miles of forest.

Droughts

Drought is the unusual dryness of soil caused by levels of rainfall significantly below average over a prolonged period. Hot dry winds, shortage of water, high temperatures and consequent evaporation of moisture from the ground can also contribute to conditions of drought. Droughts result in crop failure and shortages of water.

Well-known historical droughts include the 1997–2009 Millennium Drought in Australia led to a water supply crisis across much of the country. As a result, many desalination plants were built for the first time (see list). In 2011, the State of Texas lived under a drought emergency declaration for the entire calendar year and severe economic losses.[13] The drought caused the Bastrop fires.

Thunderstorms

Severe storms, dust clouds, and volcanic eruptions can generate lightning. Apart from the damage typically associated with storms, such as winds, hail, and flooding, the lightning itself can damage buildings, ignite fires and kill by direct contact. Especially deadly lightning incidents include a 2007 strike in Ushari Dara, a remote mountain village in northwestern Pakistan, that killed 30 people,[14] the crash of LANSA Flight 508 which killed 91 people, and a fuel explosion in Dronka, Egypt caused by lightning in 1994 which killed 469.[15] Most lightning deaths occur in the poor countries of America and Asia, where lightning is common and adobe mud brick housing provides little protection.[16]

Tornadoes

A tornado is a violent and dangerous rotating column of air that is in contact with both the surface of the Earth and a cumulonimbus cloud, or the base of a cumulus cloud in rare cases. It is also referred to as a twister or a cyclone,[17] although the word cyclone is used in meteorology in a wider sense, to refer to any closed low pressure circulation. Tornadoes come in many shapes and sizes, but are typically in the form of a visible condensation funnel, whose narrow end touches the Earth and is often encircled by a cloud of debris and dust. Most tornadoes have wind speeds less than 110 miles per hour (177 km/h), are approximately 250 feet (80 m) across, and travel a few miles (several kilometers) before dissipating. The most extreme tornadoes can attain wind speeds of more than 300 mph (480 km/h), stretch more than two miles (3 km) across, and stay on the ground for dozens of miles (perhaps more than 100 km).[18][19][20]

Wildfires

Wildfires are large fires which often start in wild land areas. Common causes include lightning and drought but wildfires may also be started by human negligence or arson. They can spread to populated areas and can thus be a threat to humans and property, as well as wildlife. Notable cases of wildfires were the 1871 Peshtigo Fire in the United States, which killed at least 1700 people, and the 2009 Victorian bushfires in Australia.

Disaster Management in India

A disaster is a very serious disturbance in the functioning of a community and society as a fall-out widespread human, material, or environmental losses that exceed the ability of the affected population to cope with its own resources.

To manage this disaster is the discipline by which man has to make continuous efforts to reduce the harm caused by disasters. India is a disaster-prone country. In fact, there is no such country which is safe from disasters. There are two types of disasters, natural disasters, and man-made disasters.

Natural disasters are the disasters caused due to natural reasons which are beyond the control of humans including floods, hurricanes, earthquakes and volcano eruptions that have immediate impacts on human lives.

Disaster management :

National disaster management authority (NDMA) is the apex body that is mandated to lay down the policies and guidelines for disaster management to ensure timely and effective response towards disasters. A separate fund called “national disaster management fund” (NDMF) is also there for exclusive mitigation.

Functions performed by the NDMA are

Administration,Policies formation for disaster management,

Mitigation of disasters, Approval of the plans laid down,

Formation of funds for the purpose of mitigation of disasters,

Running various programs and imparting guidelines.

Effects of Disasters

There are both direct and indirect impacts of the disaster which have been deadly destructive and damaging effects on human life. There is a loss of life as well as livestock.

Disaster management can broadly be divided into three parts, before, during and after the disaster.

Pre-disaster Management:

It is related to the rescue even before the disaster strikes. The main motive of this is to lessen the impact and curb the loss of human life and other species. The Pre-Disaster Management includes development of information technology, assessment of disaster, and issuance of warning to the people through radio and media etc. in case a disaster strikes, transportation of the people to a safe place, mobilization of resources for necessary action.

Management during disasters:

The accomplishment of this phase is contingent to the level of preparation of the pre disaster management phase. This depends on the swift action and the coordination of the victims during the time of the calamity and safely transporting them to safety shelters. In this phase; food, clothing, shelter and health facilities are provided to the aggrieved people.

Post Disaster management:

Reconstruction, redevelopment of the affected areas is conducted. The affected people are given rehabilitation, employment and compensation to help them get back to their feet.

Institutions in India:

National disaster management authority (NDMA): National Disaster Management Authority is an agency of the Ministry of Home Affairs whose main purpose is to coordinate response to natural and man-made disasters. The organisation was established through the disaster management act introduced by the government of india in 2005. The agency is accountable for framing policies, laying down guidelines and coordinating with the State Disaster Management Authorities (SDMAs) to ensure a holistic and dispersed approach to disaster management.

National Remote Sensing Centre:

National Remote Sensing Centre (NRSC) is one of the centres of the Indian Space Research Organisation (ISRO). NRSC manages data from aerial and satellite sources.

Indian Council of Medical Research (ICMR):

The Indian Council of Medical Research (ICMR), the top body in India for the formulation, organization and endorsement of biomedical research. It is one of the oldest and largest medical research bodies in the world. The ICMR is funded by the Government of India through the Department of Health Research, Ministry of Health and Family Welfare.

Central Water Commission (CWS):

The Commission is allotted with the responsibilities of initiating, coordinating and furthering in consultation for the State governments especially during the times when a calamity strikes. It is therefore, entrusted with the coordination of schemes for control, conservation and utilization of water resources throughout the country, for purpose of flood control, irrigation, navigation, and drinking water supply and water power development.

Prevention and Control of the Natural Disaster

The natural disaster is inevitable, even if we have measures to predict or forecast the disaster we can’t stop them from happening. The best which can be done is to avoid the practices which are hazardous for the environment which is leading to environmental degradation while preparing plans for our disaster management. Once a disaster has occurred it leads to massive destruction and loss of life. In case of the disaster like earthquakes, floods, etc. Where a number of humans are displaced and post-disaster there are a number of causalities. This is the time when the actual emergency comes into effect by giving first aid to the injured ones, providing the rescue operations and relief operations to the victims.

The most vulnerable sections in these disasters are the poor. Hence it is necessary to mobilize them towards preparedness. The quick and timely response is the essence of providing immediate relief and rescue operations to save human lives and mitigate miseries as soon as possible. The response mechanism envisages that on receiving signals of a disaster happening or likely to happen, all activities related to the mitigation process are activated without loss of time.

Disaster management is a collective and coordinated effort. A number of activities need to be performed in the event of a disaster. This involves the coordination, command, and full control, rapid assessment of damage, restoration of power, telecommunication and surface transport, the deployment of search and rescue teams, medicals and para-medical teams, water for drinking and food material, setting up of temporary shelters, sanitation, and hygiene identification and earmarking of resources, last but not the least, maintenance of law and order is equally important.Each and every person must take an active part in disaster management to reduce the risk of human life. The proper disaster management team can take charge as soon as possible when the disaster strikes.

**Conserve Natural Resources**

**Conservation of natural resources needs to be viewed with the conservation and utilization of natural resources.** Natural Resources are materials or substances occurring in nature which can be exploited for economic gain. Examples of natural resources are air, water, wood, oil, wind energy, iron and coal. There are two types of natural resources, renewable and non-renewable resources. Renewable resources are ones that can be replenished or reproduced easily. Some of them, like sunlight, air, wind, etc., are continuously available and their quantity is not affected by human consumption. Non-renewable resources are formed over very long geological periods. Minerals and fossil fuels are included in this category. Since their rate of formation is extremely slow, they cannot be replenished once they get deployed.

Natural resources are very important for our survival on earth. But due to global warming and our carelessness, natural resources are depleting day by day. At this rate of depletion, soon there will be no natural resources for our life and future generations. So here are some ways by which we can save natural resources.

1. Follow the 3 R’s

It is time to apply the three R’s of the environment that is reduce, reuse, recycle. We should reduce the amount of waste generated by us. We can do this by buying products that have less packaging as more than 30% of our waste is packaging materials. We can also look for things that are packed in materials that don’t require a lot of energy or resources to produce. Instead of buying things that we are not going to use often, we can borrow them for someone else. There are tremendous ways by which we can reduce the amount of waste generated by us, we can use computers instead of papers, we can start a compost bin, etc. Next is reuse. Instead of throwing things away, we can try to find ways to use them again! We can bring cloth sacks to the store with us instead of taking home new paper or plastic bags. Coffee cans, shoe boxes and other types of containers that we throw away can be used to store things or can become fun arts and crafts projects. We can write on both sides of paper or store food in a reusable plastic container. We can also recycle things to save the environment. Many of the things we use every day, like paper bags, soda cans, and milk cartons, are made out of materials that can be recycled. Things like paper and plastic grocery bags, and plastic and aluminum cans and bottles can often be brought to the grocery store for recycling. If we practice this method, then there will be less waste to pollute our land, air and water.

2. Save Water

Without water nothing can live. It is the source of all life on earth. Water covers 70% of our planet, but only 3% of it is clean and suitable for human consumption and we are polluting this 3% also by dumping hazardous waste into water bodies. Therefore the need to save this natural resource is urgent. We can save water in a thousand ways. We can turn off the tap when we are not using it, we can change our laundry patterns like doing laundry only when there are lots of clothes and on buying a new washing machine, we should make sure it has at least a five-star water efficiency rating and four-star energy rating. Front-loading washing machines are usually the most water efficient, using up to 50% less water. We can change the flush of toilet to a dual-flush toilet. We can take shorter showers and we can utilize gray water or waste water from bath and washing machines on gardening. We can also collect and harvest rainwater. So, conserve water to conserve life.

3. Save electricity

We need electricity at every moment and in every walk of life. So we should use it properly and thus save energy. At home, we should be very careful regarding the electric apparatus used by us. Fans, lights, air-conditioners, refrigerators, water heaters should be used properly. Television sets should not be on when we do not need them. We should use lights and bulbs that consume less power.

4. Save fuel

Fuel is a natural resource that produces useful energy when it undergoes a chemical or nuclear reaction. Coal, wood, oil, petrol or gas provides energy when burned so we consider them as fuel. To save fuel is very essential for our future because we are running out of it and at this rate of its consumption, soon there will be no petrol left for our cars. We can save fuel in many ways. We can visit the petrol pump only if our car has little or no fuel. We can turn off our car in slow traffic or at traffic signals. We can minimize the use of brakes. We can drive at a steady speed or use electric-powered cars. We can use public transport or take a walk instead of driving.

5 plastic

Plastic are very harmful for the environment. It takes 1000 years to decompose into smaller pieces, which seep down into the soil and release chemicals, which eventually reach the water supply, thus polluting the water bodies. It also kills animals in the water as they eat plastic bags. The manufacturing of plastic bags is harmful to the environment because non-renewable resources are used (petroleum and natural gas). This manufacturing process itself uses toxic chemicals, pollutes the atmosphere and consumes energy. The transportation of the billions of plastic bags produced annually means further energy consumption, largely in the form of more petroleum. Stores give out unlimited amounts of plastic bags for FREE even when the customer doesn’t really need one. So as we see its cost in terms of energy and manpower is greater than the value of the material produced. So we should try to curb the use of plastic. We should use biodegradable bags made from fabrics. We should donate old newspapers and magazines to small scale institutes that cut these old papers into paper bags and packets.

6. Go Green

One cannot decline the devastating results which deforestation has brought to mankind. Increasing population causes an increase in demand of land, water and other resources, which compelled man to make several chunks of green land barren for construction of houses and setting industries. Besides, it has also disturbed the water cycle. Planting trees can at least restore the balance. It can become a huge step in not only conserving natural resources, but also planting them.

7. Use renewable resources

Since some of the resources are in limited amount like coal, natural gas, etc, we must make use of renewable resources for power generation and other energy requirements. Also the requirement of energy is inevitable, man has to find substitute for these resources which should be eco-friendly and efficient in nature. One of the great option is hydro-power and solar power. Energy can be even harnessed through moving winds using windmills in suitable areas. There is nuclear power which is proved to be highly efficient. Power can be generated from these sources and these are the best ways for natural resources conservation like fossil fuels.

8. Biodiversity

Biodiversity is our natural heritage and particularly important for creating sustainability because of the specialized roles each species plays in maintaining ecological balance. Communities can promote healthy wildlife by supporting integrative approaches for managing, protecting, and enhancing wildlife populations and habitats appropriate to their area.

9. Judicious use

The first and foremost need of the hour is to use the remaining resources judiciously whether it is abundant or limited in amount. We should try to use ways to protect the non-renewable resource as much as we can. We must not forget that our future generation also possess the right to have these resources. We must assure that there is no wastage from our end.

10. Awareness

Undoubtedly awareness among masses regarding pollution has increased and some have started taking measure to save resource in all possible way from their end. But still there is a huge part of population who is still not aware of the causes. Even if they know, they don’t know the preventive measures. So they need to get educated about the eco-friendly methods through programs, advertisements, or some other way.

DENR

The Department of Environment and Natural Resources (DENR) is responsible for the formulation and implementation of policies, guidelines, and rules related to environmental management, as well as the management and conservation of the country's natural resources.

**The following agencies are attached to the DENR:**

Environmental Management Bureau

Mines and Geo-Sciences Bureau

National Mapping and Resources Information Authority

National Water Resources Board

Palawan Council for Sustainable Development

Laguna Lake Development Authority

Natural Resources Development Corp.

Pasig River Rehabilitation Commission

Philippine Reclamation Authority

Philippine Forest Corporation

Philippine Mining Development Corporation