

ENVIRONMENTAL AND HEALTH IMPACTS DUE TO TOXIC AND NON TOXIC POLLUTANTS AND WASTAGES FROM MINING AND INDUSTRIAL RELEASE

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ABSTRACT

The progress of a nation is mainly calculated by advancement in industries. Country will become physically powerful when it is industrially superior. Agriculture has its own significance because it provides the basic amenities of life, but it cannot take alone nation ahead. Even to revise and advance in agriculture, industrialization is also necessary. The modern devices utilized by farmers are produced by industries. Industries play a vital to national income; producing products like medicines, processed foods, and outfits which are produced in industries, are used in our everyday life. Goods which are produced by industries and ISO goods are been exported to many industries in India, and thus progressively captures global market. To carry out survival in the world every country desires to be noticed an esteemed product for what it manufactures, increases the global market. Major problem which has to be looked behind is the pollution caused by industrialization, impacts an environment and health issues.

As per Environment (Protection) Act, 1986, environment includes all physical and biological surroundings of an organism along with their interactions. Environment is thus defined as “the summing of this i.e total amount of water present, air, land and their inter-relationships and also with the human beings, other living organisms and materials.”

COMPONENTS OF ENVIRONMENT

Primarily, there are three components of environment. They are:

Abiotic or Non-living Component Biotic, biotic or living Component Energy Component.

The abiotic components is subdivided into three categories

- a) **Lithosphere or Solid Earth**
- b) **Hydrosphere or Water Component**
- c) **Atmosphere or Gaseous Envelope**

The abiotic or non-living component includes medium i.e soil, water, air and bodies of other organisms in case of parasites and climate i.e temperature, light, wind, rainfall, snow, humidity etc. The biotic component of environment consists of flora and fauna including man as the important factor. Abiotic and biotic components constitute together the Biome environment. The energy component includes the solar energy, geochemical energy, thermal energy, electrical energy, hydroelectrical energy, nuclear, atomic energy and all other form of energy which plays an important role to maintain the real life of organisms. In all the components of environment is a complex, self generating cycle which goes on. Moreover, there exists equilibrium among all the components of environment which creates balance in nature. But due to some human activities the equilibrium in nature is disturbed, causing the environmental pollution (Naik, 2005).

The four principle components of environment are Lithosphere, Hydrosphere, Biosphere and Atmosphere. Lithosphere is the earth's outer layer. It includes the top part of the mantle and all of the crust. It is approximately 100 km thick. The hydrosphere is the zone on earth in which water present in various forms. The biosphere includes the thin layer below, on and above the earth's surface where, life exist. The atmosphere is combination of gases, mainly hydrogen and oxygen, is found above earth's surface. The atmosphere extends for about hundreds of kilometers until its density reaches the outer space (Langford, 2013).

TYPES OF ENVIRONMENT

The environment can be divided into two categories; they are

- a) **Natural Environment**
- b) **Man-made or Anthropogenic Environment**

Natural environment operates through self regulating mechanism i.e. any change in natural ecosystem brought about natural process which is counter balanced by changes in other component of environment. This mechanism is known as homeostatic environment. Thus, there exists a reciprocal relationship among various components of environment. These components are water, air, noise, soil, forest, wild life, flora and fauna etc.

In man - made environment, man is the most important environmental agent, when it is combined with modern technologies and are capable of modifying the environment according to his needs. Man made environment includes technology transportation, housing etc. So, it is concluded that environment consists of an amalgamation of different systems like physical, chemical, biological, social and cultural i.e 4 -elements an any change in the environment caused by natural process or man-made process can effects the living organism adversely or beneficially (Naik, 2005).

FACTORS DAMAGING ENVIRONMENT:

The four important ecological factors which are affecting the environment are as follows: 1. Topographic or Physiographic Factors, which consists of altitude, direction of mountain chains, plateaus, plains, lakes, rivers, sea level and valleys etc.

2. Climate Factors or Aerial Factors, which include atmosphere, light, temperature and humidity etc.

3. Edaphic Factors, which comprise lithosphere or soil.

4. Biotic Factors, which include all types of interactions between different forms of life, for example men, animals, plants, and micro-organisms etc. (Naik, 2005).

Environmental Pollution

For normal and healthy living is required by all living beings, including humans, livestock, plants, micro-organisms and wildlife. The favourable unpolluted environment has a specific composition. When this composition gets changed by addition of harmful substances, the environment is called polluted environment and the substances polluting it are called pollutants. Environmental pollution can, therefore, be defined as any undesirable change in the physical, chemical or biological characteristics of any component of the environment (air, water, soil), which can cause harmful effects on various forms of life or property (Velan, 2011).

Pollution-Pollution is defined as deviation from natural composition of a part of environment, which results in adverse effects on life. Pollution is usually caused by the addition of environment waste products to human activity. When these waste products are not efficiently assimilated, decomposed or otherwise removed from natural, biological and physical processes of the biosphere, which give adverse effects result in the pollutants, are accumulated or converted to toxic substances.

Different Types of pollutants in Environment

Primary pollutants are defined as substances emitted directly from an identifiable source. Secondary pollutants are substances derived from primary pollutants by chemical reactions. Pollutants need not be material substances. Noise and even electromagnetic waves can be pollutants. In today Scenario man is a polluting environment. There is no scope for nature decompose to any manmade material and return their elements to cycle of nature. Such substances will remain, will cause harmful or adverse effects unless they are somehow dispersed or diluted from nature.

With the increase in population, creates the problem of balanced and clean environment. In industrialised countries mainly in larger cities there is problem of disposal sewage, industrial wastes has become severe,

which pollutes the air, water and soil (Kaushik&Kaushik, 2010). Some of the major types of pollutions are Air pollution; Land pollution; Sound pollution; Dust pollution; Radiation pollution; Thermal pollution; Light pollution etc. (Bheem, 2012)

Environmental pollution can therefore, be defined as any undesirable change in the physical, chemical or biological characteristics of any component of environment (i.e. air, water and soil) which causes harmful effects on various forms of life or property.

IMPACTS OF INDUSTRIAL POLLUTION ON ENVIRONMENT

Environmental pollution can be defined as any unwanted change in the physical, chemical or biological characteristics of any component of the environment (i.e air, water and soil), which causes dangerous effects on various forms of life or property. Most rigorous pain in industrialization is environmental pollution that is affecting our land, water and air. Poisonous gases are released from industrial emissions and vehicles exhaust have contaminated our atmosphere. Release of greenhouse effect into the atmosphere has created global warming. chlorofluorocarbon is been accountable for depletion of protective ozone layer in the stratosphere, which makes our earth more prone to harmful ultra violet radiations. Nitrous oxide and sulphur released from power plants and industries causing acid rain in many regions of our earth. Most of rivers in our world have suffered huge losses due to water pollution. Larger rivers which are adjacent to major industrial is converted into open sewers. Even though groundwater is containnated due to unlawful drilling of industrial waste water. Contamination of the land with toxic heavy metals is rendering it fruitless. Heavy metals and pesticides usage through food chain has become alarming cause for human health. Human behavior and technological advances have not only caused regional impacts but also resulted in global environmental instability. Technological advancement coupled with improved life style has resulted in production and emission of uninvited substances into the environment causing global environmental problems such as acid rain, depletion ozone layer , global warming and climate change (Kaushik & Kaushik, 2010).

IMPACTS OF INDUSTRIAL POLLUTION ON HEALTH

Health is defined as state of complete physical, mental and social well-being and not affected by any diseases or infirmity (WHO, 1948). Health is a state of being free from any disease; Health is a state of perfect harmony between all the organs and systems of the body. The first definition of health has a basic fault in it – it tries to define a primary state through a secondary state. Health is a primary state. It cannot be fully defined through a secondary phenomenon.

Health is an indefinable word. Most of the people who consider themselves healthy are not. And many people who are suffering from some known disease may be relatively healthy. Health is a concept which does not merely relate to the absence of disease, healthy working of organs, or having good thoughts. Health is a holistic

concept. It relates to a person as a whole. Not just the person you see, but also the person you feel (Bhatia, 2009).

Various aspects concerning protection and promotion of healthy human environment includes water, air, food, shelter and working areas of public health aspects. For promotion of public health, various information inputs from a variety of fields like ecology, microbiology, pathology, entomology, epidemiology, human physiology and engineering are also required. Public health basically deals with water supply, sewerage and sewage disposal, drainage system, refuse sanitation, ventilation, air conditioning, and air pollution abatement and preventing outbreak of diseases like malaria, dengue, encephalitis etc. The engineers of public health department apply engineering principles for sanitation of environment.

Municipal water supplied should be free from impurities, should meet drinking water quality standards prescribed by agencies like Bureau of Indian Standards (BIS), World Health Organization (WHO) or Indian Council of Medical Research (ICMR). In ancient times ground water which is derived from wells or springs moves through porous strata of sediments of the soil, it was largely filtered and pure. When surface waters were used, these were made to stay in impounding reservoirs so that all impurities settled down. Then, filtration through beds of sand and gravel followed by flocculation using alum. This process was known as coagulation. However, the filtered and coagulated water is still not free from microbes which are responsible for spreading various diseases like cholera, typhoid, dysentery etc. Therefore, disinfection of water becomes a very important step in public water supply systems. (Kaushik&Kaushik, 2010).

IMPACTS OF INDUSTRIAL SOLID WASTE

Solid waste consists of large number of materials including factory waste, packaging material, organic wastes, acids, alkalis and metals etc. During some industrial processing large quantities of hazardous and toxic materials are also produced. Main sources of industrial wastes are chemical industries, metal and mineral processing industries. Radioactive wastes are generated by nuclear power plants. Thermal power plants produce fly ash in large quantities. Solid wastes from other types of industries include scrap metal, rubber, plastic, paper, glass, wood, oils, paints, asphalt, tars, dyes, scrap leather, ceramics, abrasives, slag, heavy metals, asbestos and batteries. In some of the developed countries environmental laws and safety laws are becoming more severe due to which disposal of hazardous wastes has become a problem. Cost of disposal wastes is increasing. Therefore, these wastes are being exported to developing countries which do not even have sufficient knowledge or technique for their disposal.

IMPACTS OF WATER POLLUTION

Water pollution defined as change in physical, chemical or biological characteristics of water making it unsuitable for designated use in its natural state. Water is an essential commodity for our survival. We need water for drinking, cooking, bathing, washing, irrigation, and for industrial operations. Most of the water for such uses comes from rivers, lakes or groundwater sources. Water has the property to dissolve many substances in it; therefore, it can easily get polluted. Pollution of water can be caused by point sources or non-point sources. Point sources are specific sites near water which directly discharge effluents into them. Major point sources of water pollution are industries, power plants, underground coal mines, offshore oil wells etc. The discharge from non-point sources is not at any particular site, rather, these sources are scattered, which individually or collectively pollute water. Surface run-off water from agricultural fields, overflowing of small drains, rain water sweeping roads and fields, atmospheric deposition etc., are the non-point sources of water pollution. Ground water is about 0.6% of the total water available on our earth which is about 30 times more than surface water (streams, lakes and estuaries). Ground water seems to be less prone to pollution as the soil layer through which water passes helps to retain various contaminants due to its cation exchange capacity. However, there less a number of potential sources of ground water pollution. Industries such as textile, chemical, tanneries, deep well injection, mining etc., are mainly responsible for ground water pollution, which is irreversible. Industrial effluents, Industrial wastes containing toxic chemicals, acids, alkalies, metallic salts, phenols, cyanides, ammonia, radioactive substances, etc., are sources of surface water pollution. They also cause thermal (heat) pollution of water. Ground water pollution with arsenic, fluoride and nitrate are posing serious health hazards. (Kaushik&Kaushik, 2010).

IMPACTS OF WATER POLLUTION

Toxic substances polluting water are ultimately effect human health. Some heavy metals like lead, mercury and cadmium cause various types of diseases. Mercury dumped into water is transformed into water soluble methyl mercury by bacterial action. Methyl mercury accumulates in fish. In 1953, people in Japan suffered from numbness of body parts, vision and hearing problems and abnormal mental behavior. This disease is called as Minamata disease occurred due to consumption of methyl mercury contaminated fish caught from Minamata Bay in Japan. The disease claimed nearly 50 lives and permanently paralyzed over 700 persons. Pollution caused by heavy metal cadmium causes the disease called Itai-itai in the people of Japan. The disease was caused by cadmium contaminated rice. The rice fields were irrigated with effluents of zinc smelters and drainage water from mines causes diseases in bones, liver, kidney, lungs, pancreas and thyroid are affected. Lead is released in water through water pipes it is used in plumbing. Poisoning lead effects kidneys, reproductive system, liver, brain and central nervous system. It also causes anemia and mental retardation in children. Nitrate ions present in the water is harmful to human health. From nitrogen fertilizers, nitrate ions seep into water bodies from where they may bioaccumulate in the bodies of the consumers. In stomach nitrate

is reduced to nitrite which is responsible for blue baby syndrome and stomach cancer. Young children less than 1 year when ingest excessive nitrate, nitrite is formed in their stomach by microbes is not acidic to the extent to inhibit the microbes. Nitrite reacts with hemoglobin which is converted into non-functional oxidized form. It causes diarrhea and vomiting child becomes slate blue, giving the baby blue baby syndrome or methaemoglobinaemia. Nitrate in the stomach of adult humans partly converts into nitrite. Nitrite interacts with secondary amines to produce N-nitrosamine which in experimental animals have been shown to cause stomach cancer. In human beings, however, evidences do not show association of nitrate with cancer. Fluoride pollution causes defects in teeth and bones, a disease called fluorosis. Pesticides reach through drinking water in humans which causes various health problems. Organophosphorus and carbamate pesticides are more toxic. Organochlorine pesticides accumulate in the body effects various organs especially the central nervous system. These pesticides stimulate liver enzymes which results in rapid metabolism of drugs in the person who is on medication. Thus, effectiveness of medicines will be reduced. (Kaushik&Kaushik, 2010).

Robb (1994) discusses the Environmental Consequences of Closure Coal Mine. Over 30,000 People lost their due to social consequences and run down of mine buildings, the abandonment of spoil heaps and leakage of mine waters from the unused pits as environmental consequences. The Study reveals with evidences that how Mining has altered natural underground hydrological conditions. Author suggested possible solution to tackle the problem of acidic, metal-laden waters. These treatments include raising the alkalinity by liming and allowing the settlement of metal precipitate in lagoons or ponds. This method requires much land for the lagoons.

Woodley and Moore (1967) discusses about the pollution resulting from both surface and underground mining in India. Study prescribes some measures to tackle pollution. These are surface mine excavations, clarification of wash water in settling ponds, reuse of wash water, soil coverage of acid-producing refuse-disposal sites, and soil coverage of roads containing acid- producing material.

IMPACTS AIR POLLUTION

Air pollution has adverse effects on living organisms and materials. Air pollutants affect plants by entering through stomata (leaf pores through which gases diffuse), destroy chlorophyll and affect photosynthesis. During the day time the stomata are wide open to facilitate photosynthesis. Air pollutants during day time affect plants by entering the leaf through these stomata more than night. Pollutants also erode waxy coating of the leaves called cuticle. Cuticle prevents excessive water loss and damage from diseases, pests, drought and frost. Damage to leaf structure causes necrosis (dead areas of leaf), chlorosis (loss or reduction of chlorophyll causing yellowing of leaf) or epinasty (downward curling of leaf), and abscission (dropping of leaves). Particulates deposited on leaves can form encrustations and plug the stomata and also reduce the availability of sunlight. The damage can result in death of the plant. Sulphur dioxide causes bleaching of leaves, chlorosis and necrosis of leaves. Nitrogen dioxide results in increase abscission and suppressed growth. Ozone causes flecks on leaf

surface, premature aging, necrosis and bleaching. Peroxyacetyl nitrate causes silverying of lower surface of leaf which damage the young and more sensitive leaves of suppressed growth. Fluorides cause necrosis of leaf-tip while ethylene results in epinasty, leaf abscission and dropping of flowers. Air pollutants mixing up with rain can cause high acidity (lower pH) in fresh water lakes. This affects aquatic life especially fish. Some of the fresh water lakes have experienced death of all fishes. Industrial air Pollutes materials, because of their corrosiveness, particulates can cause damage to exposed surfaces. Presence of sulphur dioxide and wetness can accelerate corrosion of metallic surfaces due to formation of sulfuric acid. Metal parts of buildings, vehicles, bridges, wires and metallic railway tracks are also affected. Sulfuric acid also damages buildings and causes disfigurement of statues made up of marble and limestone. Sulfuric acid formed in the atmospheric, Sulphur dioxide and water vapours damages the leather binding of books. The pages of the books become brittle. Sulphur dioxide can affect fabric, leather, paint and paper. Ozone in the atmosphere can cause cracking of rubber. Nylon stockings are weakened and ultimately damaged. Tyres of various vehicles are also damaged. These days chemicals are added to prevent damage to rubber tyre by ozone. Oxides of nitrogen and ozone can also cause fading of cotton and rayon fibres (Kaushik&Kaushik, 2010).

IMPACTS AIR POLLUTION

Air pollution has adverse effects on living organisms and materials. Human respiratory system has a number of mechanisms for protection from air pollution. Bigger particles ($> 10 \mu\text{m}$) can be trapped in the hairs and sticky mucus in the lining of the nose. Smaller particles can reach trachea bronchial system and there get trapped in mucus. They are sent back to throat by beating of hair like cilia from where they can be removed by spitting or swallowing. Years of exposure to air pollutants adversely effects these natural defences and can result in lung cancer, asthma, chronic bronchitis and emphysema (damage to air sacs leading to loss of lung elasticity and acute shortness of breath). **Suspended particulates can cause damage to tissues in lungs causes diseases like asthma, bronchitis and cancer especially when they bring with them cancer causing or toxic pollutants attached on their surface.** Sulphur dioxide causes constriction of respiratory passage and causes bronchitis like conditions. The suspended particulates, can form acid sulphate particles, which can go deep into the lungs and affect them severely. Oxides of nitrogen especially irritate the lungs which causes chronic bronchitis and emphysema. Carbon monoxide reaches lungs combines with hemoglobin of blood to form carboxy hemoglobin. Carbon monoxide has affinity of hemoglobin i.e 210 times more than oxygen. Haemoglobin thus unable to transport oxygen to various parts of the body. This causes suffocation. Long exposure to Carbon monoxide may cause dizziness, unconsciousness and even death. Many other air pollutants like benzene (from unleaded petrol), formaldehyde and particulates like polychlorinated biphenyls (PCBs), toxic metals and dioxins (from burning of polythene) can cause mutations, reproductive problems or even cancer. Many other hazardous materials like asbestos, beryllium, mercury, arsenic and radioactive substances cause lung diseases and/or affect other vital organs like kidney, liver, spleen, brain may also cause cancer (Kaushik & Kaushik, 2010).

CONCLUSION

People living near the industrial dump yard area are highly affected with diseases like TB, Gastric, and Joint pain etc. But it is a fact that people who are living there are also exposed to pollution causes the chronic diseases which is referred earlier which makes seriously ill. Environment means surroundings, ongoing ash dumping activity has blanketed the peripheral area with small dust particles that disturbs and makes people sick which lead an unpleasant life. Dumping as well as the transporting activity pollutes the atmosphere making the residents more vulnerable to respiratory problems. The residents of the area come into direct contact of the waste drainage water making them exposed to infectious diseases especially skin disorder. They also effect environmental problems such as land degradation, water contamination etc. The Steel plant being very close to the survival area emits carbon dioxide, sulphur dioxide and nitrous oxides which is harmful for health and causes respiratory problems and environmental problems such as air pollution.

Therefore effective environmental management programmes and activities must be implemented in these polluted areas, plantation of trees , adaptation of proper waste management, emphasize on combination of intensive labour technique and capital intensive technique, afforestation, usage of pollution control equipments such as (ESP) Electro-Static Precipitators, bag houses and ventury scrubbers.

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