NOISE POLLUTION

Sound, a normal feature of our life, is the means of communication and entertainment in most animals, including human beings. It is also a very effective alarm system. A low sound is pleasant whereas a loud sound is unpleasant and is commonly referred to as 'noise'. Noise can be defined as an unpleasant and unwanted sound.

Whether a given sound is as pleasant as music or as unpleasant as noise depends on its loudness, duration, rhythm and the mood of the person. But loudness is definitely the most significant criterion which converts sound into noise. Exposure to loud noise is indeed annoying and harmful too.

Noise is a physical form of pollution and is not directly harmful to the life supporting systems namely air, soil and water. Its effects are more directly on the receiver i.e. man. Noise pollution is the result of modern industrialized urban life and congestion due to over population. Noise is unwanted sound. Sound is a form of energy which is emitted by a vibrating body and on reaching the ear causes the sensation of hearing through nerves. Sounds produced by all vibrating bodies are not audible.

Even though noise pollution is not fatal to human life, yet its importance cannot be overlooked because repeated exposure to noise reduces the sleeping hours and productivity or efficiency of a human being. It affects the peace of mind and invades the privacy of a human being. The importance of noise pollution as environmental problem is being recognised as the ill effects of noise on human health and environment are becoming evident with each passing day.

NOISE UNITS

The frequency limits of audibility are from 20 HZ to 20,000 HZ. A noise problem generally consists of three inter-related elements- the source, the receiver and the transmission path. This

transmission path is usually the atmosphere through which the sound is propagated, but can include the structural materials of any building containing the receiver. Decibel represents the intensity and is defined as one tenth of a bel where one bel represents a difference in level between two intensities I,, I_0 where one is ten times greater than the other.

Sources of Noise Pollution:

Major sources of noise pollution are:

(i) Industrial Sources:

Progress in technology (industrialization) has resulted in creating noise pollution. Textile mills, printing presses, engineering establishments and metal works etc. contribute heavily towards noise pollution. In industrial cities like Kolkata, Ludhiana, Kanpur etc., often the industrial zones are not separated from the residential zones of the city especially in the case of small scale industries.

These operate from workshops located on the ground floors of the residential areas and cause annoyance, discomfort and irritation to the residents exposed to the noise that is inevitably produced. The situation is much better in modern planned cities like Chandigarh where the industrial area is kept away from the residential areas and both are separated from each other by a sufficiently wide green belt.

(ii) Transport Vehicles:

Automobile revolution in urban centers has proved to be a big source of noise pollution. Increasing traffic has given rise to traffic jams in congested areas where the repeated hooting of horns by impatient drivers pierce the ears of all road users.

Noise from airplanes constitutes an increasing serious problem in big cities like Delhi & Mumbai. Airport situated in the vicinity of population centres and the air planes pass over

residential areas. Heavy trucks, buses trains, jet-planes, motor-cycles, scooters, mopeds, jeeps— the list of vehicles is endless but the outcome is same — noise pollution.

(iii) Household:

The household is an industry in itself and is a source of many indoor noises such as the banging of doors, noise of playing children, crying of infants, moving of furniture, loud conversation of the inhabitants etc. Besides these are the entertainment equipment in the house, namely the radio, record-players and television sets. Domestic gadgets like the mixer-grinders, pressure cookers, desert coolers, air- conditioners, exhaust fans, vacuum cleaners, sewing and washing machines are all indoor sources of noise pollution.

(iv) Public Address System:

In India people need only the slightest of an excuse for using loud speakers. The reason may be a religious function, birth, death, marriage, elections, demonstration, or just commercial advertising. Public system, therefore, contributes in its own way towards noise pollution.

(v) Agricultural Machines:

Tractors, thrashers, harvesters, tube wells, powered tillers etc. have all made agriculture highly mechanical but at the same time highly noisy. Noise level 90 dB to 98 dB due to running of farm machines have been recorded in the state of Punjab.

(vi) Defence Equipment:

A lot of noise pollution is added to the atmosphere by artillery, tanks, launching of rockets, explosions, exercising of military airplanes and shooting practices. Screams of jet engines and sonic booms have a deafening impact on the ears and in extreme cases have been known to shatter the window panes and old dilapidated buildings.

(vii) Miscellaneous Sources:

The automobile repair shops, construction-works, blasting, bulldozing, stone crushing etc. are other sources of noise pollution.

Effects of Noise:

Noise is generally harmful and a serious health hazard. It has far-reaching consequences and has many physical, physiological as well as psychological effects on human beings.

(i) Physical Effects:

The physical manifestation of noise pollution is the effect on hearing ability. Repeated exposure to noise may result in temporary or permanent shifting of the hearing threshold of a person depending upon the level and duration of exposure. The immediate and acute effect of noise pollution is impairment of hearing (i.e. total deafness.)

Human ears have sensory cells for hearing. If these cells are subjected to repeated sounds of high intensity before they have an opportunity to recover fully, they can become permanently damaged leading to impairment of hearing. Besides the sensory cells, the delicate tympanic membrane or the ear drum can also be permanently damaged by a sudden loud noise such as an explosion.

(ii) Physiological Effects:

The physiological manifestations of noise pollution are several as mentioned below:

(a) Headache by dilating blood vessels of the brain.

(b) Increase in the rate of heart-beat.

(c) Narrowing of arteries.

(d) Fluctuations in the arterial blood pressure by increasing the level of cholesterol in the blood.

(e) Decrease in heart output.

(f) Pain in the heart.

(g) Digestive spasms through anxiety and dilation of the pupil of the eye, thereby causing eye-strain.

(h) Impairment of night vision.

(i) Decrease in the rate of colour perception.

(j) Lowering of concentration and affect on memory,

(k) Muscular strain and nervous breakdown.

(l) Psychological Effect

The psychological manifestations of noise pollution are:

(a) Depression and fatigue which considerably reduces the efficiency of a person.

(b) Insomnia as a result of lack of undisturbed and refreshing sleep

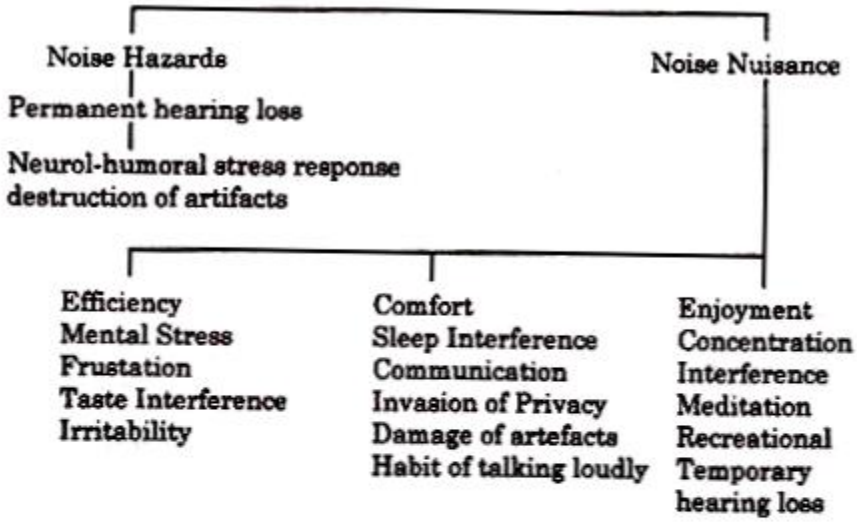
(c) Straining of senses and annoyance as a result of slow but persistent noise from motorcycles, alarm clocks, call bells, telephone rings etc.

(d) Affecting of psychomotor performance of a person by a sudden loud sound

(e) Emotional disturbance

For a talkative person, the most important effect of noise pollution would invariably be that noise interferes with our conservation. So, noise is annoying and the annoyance depends on many factors not merely the intensity of the sound but also repetition, because even a sound of small intensity (e.g. dripping tap or clicking of clock) may become annoying, simply by repetition.

Some of the well- known effects of noise on human beings and the relation of noise pollution level and its harmful effects are shown in Table



Noise Pollution Level and its Harmful Effects:

Level (in db)	**Effects**
up to 30	No disturbance
30—60	Stress, tension, psychological (illness, heart attact) effects especially at upper range.
60—90	Damage to health, psychological and vegetative (disturbance in stomach-gall function, pains in muscles, high blood pressure, disturbance in sleeping)
90—120	Damages to health and ontological (ear diseases) effects

Above 120	Painful effects in long run.

Effects of Noise Pollution on Human Beings

Decreases the efficiency of a man-Regarding the impact of noise on human efficiency there are number of experiments which shows that human efficiency increases with noise reduction.

Lack of concentration-For better quality of work there should be concentration , Noise causes lack ofconcentration. In big cities , mostly all the offices are on main road. The noise of traffic or theloud speakers of different types of horns divert the attention of the people working in offices.

Fatigue:Because of Noise Pollution, people cannot concentrate on their work. Thus they have to give their more time for completing the work and they feel tiring.

Abortion is caused-There should be cool and calm atmosphere during the pregnancy. Unpleasantsounds make a lady of irritative nature. Sudden Noise causes abortion in females.

Causes Blood Pressure-Noise Pollution causes certain diseases in human. It attacks on the person's peace of mind. The noises are recognized as major contributing factors in accelerating the already existing tensions of modern living. These tensions result in certain disease like blood pressure or mental illness etc.

Temporary of permanent Deafness-The effect of noise on audition is well recognized. Mechanics ,locomotive drivers, telephone operators etc. All have their hearing impairment as a result of noise at the place of work. Physicians & psychologists are of the view that continued exposure to noise level above. 80 to 100 db is unsafe, Loud noise causes temporary or permanent deafness.

Effects of Noise Pollution on Animals

- Noise pollution damage the nervous system of animal.
- Animal looses the control of its mind and becomes dangerous

Impacts of Noise:

a. Annoyance:

It creates annoyance to the receptors due to sound level fluctuations. The aperiodic sound due to its irregular occurrences causes displeasure to hearing and causes annoyance.

b. Physiological Effects:

The physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol are affected.

c. Loss of Hearing:

Long exposure to high sound levels cause loss of hearing. This is mostly unnoticed, but has an adverse impact on hearing function.

d. Human Performance:

The working performance of workers/human will be affected as they'll be losing their concentration.

e. Nervous System:

It causes pain, ringing in the ears, feeling of tiredness, thereby effecting the functioning of human system.

f. Sleeplessness:

It affects the sleeping there by inducing the people to become restless and loose concentration and presence of mind during their activities

g. Damage to Material:

The buildings and materials may get damaged by exposure to infrasonic / ultrasonic waves and even get collapsed.

Control of Noise Pollution:

a. Reducing the Noise Levels from Domestic Sectors:

The domestic noise coming from radio, tape recorders, television sets, mixers, washing machines, cooking operations can be minimized by their selective and judicious operation. By usage of carpets or any absorbing material, the noise generated from felling of items in house can be minimized.

b. Maintenance of Automobiles:

Regular servicing and tuning of vehicles will reduce the noise levels. Fixing of silencers to automobiles, two wheelers etc., will reduce the noise levels.

c. Control over Vibrations:

The vibrations of materials may be controlled using proper foundations, rubber padding etc. to reduce the noise levels caused by vibrations.

d. Low Voice Speaking:

Speaking at low voices enough for communication reduces the excess noise levels.

e. Maintenance of machines:

Proper lubrication and maintenance of machines, vehicles etc. will reduce noise levels. For example, it is a common experience that, many parts of a vehicle will become loose while on a rugged path of journey. If these loose parts are not properly fitted, they will generate noise and cause annoyance to the driver/passenger. Similarly is the case of machines. Proper handling and regular maintenance is essential not only for noise control but also to improve the life of machine.

RADIOACTIVE POLLUTION(RAP)

The radioactive pollution is defined as the physical pollution of air, water and the other radioactive materials. The ability of certain materials to emit the proton, gamma rays and electrons by their nuclei is known as the radioactivity. The protons are known as the alpha particle and the electrons are also known as the beta particle. Those materials are known as the radioactive elements. The environmental radiations can be from different sources and can be natural or manmade.

The natural radiations are also known as the background radiations. In this the cosmic rays are involved and reach the surface of earth from space. It includes the radioactive elements like radium, uranium, thorium, radon, potassium and carbon. These occur in the rock, soil and water. The man made radiations include the mining and refining of plutonium and thorium. This production and explosion of nuclear weapons include the nuclear fuels, power plants and radioactive isotopes.

The first atom bomb was exploded in the Japan in the year 1945. It affected the Hiroshima and Nagasaki cities. It adversely affected the flora, fauna and humans of that area. In spite of these destructions the nuclear race is still going on between different nations. The nuclear arms are tested with the production of nuclear weapons.

The radioactive elements are produced in the environment and affect other materials also. It includes the strontium, radium and iodine. The gases and particles are produced by the radioactive materials. They are carried by the wind and the rain brings down the radioactive particles to the ground which is referred as nuclear fallout. The soil transfers these radioactive substances to the plants and ultimately they reach the human body and cause many side effects. The iodine may affect the white blood cells, bone marrow, spleen, lymph, skin cancer, sterility, eye and damage to the lung. The strontium has the ability to aggregate in the bones and form a bone cancer and leads to tissue degeneration.

The radioactive materials are passed through the land to water and cause an adverse effect on the aquatic animals. They reach to human through the food chain. The nuclear power generates a lot of energy which is used to run turbines and produces electricity. The fuel and the coolant produce a large amount of pollution in the environment. The atomic reactors are also rich in the radioactive materials. There biggest problem is in their disposal and if they are not properly disposed they can harm the living organisms. If they escape they can cause a hell lot of

destruction. The gases escape as a vapor and cause pollution on the land and water. The use of radioactive isotopes is multipurpose. They are of a great scientific value and they may be present in the waste water. From these water resources they reach to the human body via food chain. The people who work in power plants have more chances of the exposure to harmful radiations. The human beings also receive the radiation and radiotherapy from the x rays.

Radiation is the process by which radiant energy is transferred from one place to another in the form of electro-magnetic waves.

he various types of radiation differ from one another by their frequency or wavelength. Higher the frequency or lower the wavelength of a radiation, higher will be its energy. Again, higher the energy of the radiation, it will cause higher damage to the living organisms.

Non-ionising Radiation:

These are the radiations which induce the ionisation of atoms and molecules. An atom is ionised when energy supplied to it separates one or more of its electrons. Ionisation of a molecule produces two fragments. The radiation pollution is mainly caused by non-ionising radiation.

Alpha (α), beta (β), and gamma (γ) radiations are mainly responsible for radiation pollution. Alpha radiation contains energetic -alpha particles. Each alpha particle carries two units of positive charges and interacts strongly with living tissues.

Beta, radiation is made up of energetics electrons. Each beta particle carries one unit of negative charge and interacts strongly with matter. Gamma radiations are made up of high energy photons. Photons bring about strong electro-magnetic interaction with matter.

Sources of Radiation Pollution:

Radiation sources are mainly natural but partly manmade.

The natural sources of radiation may be:

1. Radioactive minerals;

2. Cosmic rays;

3. Radio nuclides.

1. Radioactive Minerals:

The minerals containing Uranium- 235 (U^{235}), Uranium-238 (U^{238}), Thorium-232 (Th^{232}), Plutonium- 239 (Pu^{239}) etc. are capable of emitting energetic radiations causing pollution.

2. Cosmic Rays:

The cosmic rays containing highly energetic particles reach the surface of the earth causing pollution. The intensity of cosmic rays depends on latitudes and altitude of the place. The intensity is maximum at the poles and minimum at the equator.

3 .Radio nuclides:

The unstable radio-nuclides in the atmosphere can be splitted up into smaller parts emitting energetic radiation. The smaller radio-nuclides enter into the body of organism along with air during respiration.

The various sources of manmade radiation pollutions may be:

1. Nuclear power plants;

2. Radio-active wastes;

3. Nuclear explosions; and

4. Radio-isotopes.

1. Nuclear Power Plants:

Nuclear power plants emit radiation to a very smaller extent except accidental leaks (Chernobyl accident of undivided USSR).

2. Radio-active Wastes:

The nuclear power plants produce a lot of nuclear radio-active wastes. The disposal of these wastes has become a global problem. Some countries producing large quantity of nuclear wastes dump them in ocean near other countries.

3. Nuclear Explosion:

During nuclear explosion, a large number of radio-nuclides are generated in the atmosphere. The radio nuclides settle down with rain contaminating the soil and water bodies. Finally, these enter into food chain causing serious problem to the living organisms.

4. Radio-isotopes:

Radio-isotopes are also prepared artificially either by nuclear fusion or by nuclear fission. If these radio-isotopes are not properly handled, these emit radiations causing pollution.

5. Television Set:

Television sets produce radiations which can also cause cancer.

Effect of Radiation Pollution:

When radiation passes through different living organisms the following disorder takes place:

1. Radiation splits the molecules of the tissues into ions and free radicals and causes mutation by breaking DMA (Deoxy ribonucleic acid) molecules in the nucleus.

2. Radiation in bone marrow may cause leukemia.

3. Radiation may cause skin burns which may lead to skin cancer.

4. Radiation at pelvic regions of pregnant ladies, cause damage to the foetus.

Control of Radiation Pollution:

Radiation pollution can be controlled in the following ways:

1. Care should be taken to check manmade radiation pollution at source.

2. Nuclear reactor should be perfectly maintained to avoid accidental leakage.

3. Nuclear tests should be banned.

4. Radioactive materials should be properly labeled and handled.