**Chapter-12**

**Noise and microbial pollution**

The most common definition of **Noise** is "unwanted sound." A sound might be unwanted because it is:

* Loud
* Unpleasant or annoying
* Intrusive or distracting

The word "noise" descends from the Latin word "nausea," meaning seasickness. It is also defined as “wrong sound, in the wrong place at the wrong time.” **Noise pollution** refers to sounds in the environment that are caused by humans and that threaten the health or welfare of human or animal inhabitants.

**Measures of noise:**

Intensity of noise is measured in decibel units (dB). The scale of decibel unit is logarithmic and not mathematical. The scale starts from 0 dB, which is the threshold of hearing. It represents the faintest sound that we can hear. Every increase of 10dB represents a ten-fold increase. Increase from 0 to 10 dB means sound louder by 10 times; whereas an increase to 20 dB means 100 time louder than 0dB. Likewise, 30dB means 1000 times more than 0dB and this way scale moves logarithmically. The intensity of noise level varies greatly with the distance from sources. As the distance from the sources increases, noise levels decrease. For example, normal traffic movement on a road has a noise level of around 45-50dB and for a person standing on the roadside the noise level is around 40-45dB, whereas for a person sitting in the car on the road, the level is around 70 dB. At an exposure to 45-50 dB noise levels, a person can not sleep. The pain starts in the ear at around 120dB. Not only is the distance from the source but period of exposure is also important. Noise (decibel) is generally measured with filters that emphasize sound in certain frequencies. The filter *A* is most frequently and the noise is represented as dBA. The filter C is used to measure low-frequency sounds like bass in an amplified music.

**Noise Levels of Routine activities**

|  |  |
| --- | --- |
| Source | Decibel (dB) |
| Threshold of hearing | 0 |
| Normal breathing and rustling of leaves | 17 |
| Audible | 20-30 |
| Normal conversation | 60 |
| Barking of dogs | 65 |
| Crackers | 130-135 |
| Jet aircraft | 150 |
| Rocket take off | 200 |
| Heart beat | 12 |
| Normal talking | 40 |
| Normal traffic | 40-45 |
| Truck / bus | 80 |
| Heavy traffic | 80-85 |
| Shouting | 100 |
| Sub-way train / train | 100 |
| Horns / pressure horns | 120 |
| Jet takeoff | 120 |
| Jet plane takeoff | 150 |
| Launching of space rocket | 160-190 |

**Major Sources of Noise**

* Army practices like firing, explosions, tanks etc.
* Crackers
* Domestic gadgets like mixer grinder, desert coolers, exhaust fans, pressure cooker etc.
* Loud speakers, public address system and music systems
* Transport vehicles like buses, trucks, rail, airplanes etc.
* Industrial activities, construction activity like mixer, road rollers, bulldozers, drilling machines etc.
* Commercial establishments
* Agricultural operations including mechanical devices like pumps, harvesters, and tractors.
* Community functions like Jaagrans, kirtans, music shows, etc.
* Increased population, urbanization and industrialization coupled with increase in number of motor vehicles including cars, buses, trucks, motor cycles, rails, airplanes, etc.

**Effects of noise pollution**

Noise causes physiological and psychological effects on humans. The effects of noise pollution can be categorized into two types:

1. Auditory effects:

* Auditory fatigue occurs when sound is above 90dB. It causes reduction in the efficiency of hearing.
* Deafness (permanent loss of hearing ability) occurs when noise is above 150dB.

1. Non-auditory effects:

* Emotional disturbances
* Anxiety and stress
* Headache, eye strain, stomach disorders and high blood pressure by increasing cholesterol level.
* Decreased heart output

**Permissible Limits**

As per the Ministry of environment and Forests, Government of India *(EPA Notification G.S.R. 1063(E), dt. 26th Dec., 1989)* ambient permissible standards has been set for the noise levels in different establishments during day as well as night times. These have been set under the *Environment (Protection) Act 1986* and are as under:

|  |  |  |
| --- | --- | --- |
| **Areas** | **dB (A)**  **Day time**  **6.00AM to 9.00 PM** | **dB(A)**  **Night time**  **9.00 PM to 6.00AM** |
| Industrial area | 75 | 70 |
| Commercial zone | 65 | 55 |
| Residential area | 55 | 45 |
| Silence zone (Hospitals, educational institutes, and courts) | 50 | 40 |

**How to Protect Oneself From Noise**

Noise pollution is not like other forms of pollutions. We can avoid it by reducing the source or moving away from the source. The best approach is to protect from noise and reduce the noise sources. In this way we can remove noise pollution. Some of the measures in this direction are :

• Wearing of earplugs at noisy places

• Keep the homes free from noise by having heavy curtains on windows, acoustical tiles on the walls and ceilings

• Purchase of less-noisy generator sets, pumps, vacuum cleaners and air conditions, blowers etc.

• Use of music systems at lowest possible noise / sound levels

• If possible, use the earphones to avoid noise disturbance to others

• Avoid using pressure horns and other such equipments on the automobiles

• Automobiles should be kept in good conditions and repaired so as to reduce noise levels.

**Laws Governing Noise Pollution**

Besides controlling the noise at the source and protecting one from the noise, the Union Government has made some rules and regulations for controlling the noise pollution. Even in the Indian Penal Code noise pollution has been included as a nuisance under IPC sections 268 and 290. Now the noise pollution is been dealt under the Air Pollution in the Air Pollution Control Act and *The Environment (Protection) Amendment Rules 2003*. The government of India has enacted *The Noise Pollution (Regulation and Control) Rules 2000* which have even been amended in 2002. According to these rules, then use of loud-speakers and public address systems has been prohibited and these can be used only with the prior permission of competent authority. Further, no such systems can be used between 10.00 PM to 6.00Am except in the close doors. Ambient noise standard were notified in 1989. Even the standards have been set for the noise level of the crackers (as per the notification number G.S.R. 682(E), dated 5th October) in 1999, vehicular noise standards in 1990 and again in 2003. Likewise, there have been standards for the use of petrol or kerosene generators.

**Noise limits implemented from January1, 2003 in India are:**

|  |  |
| --- | --- |
| **Type of vehicle** | **Permissible limit (dB)** |
| Two wheelers |  |
| Up to 80CC | 75 |
| 80CC-175CC | 77 |
| Above 175CC | 80 |
| Three wheelers |  |
| Up to 175CC | 77 |
| Above 175CC | 80 |
| Passenger car | 75 |
| Passenger vehicles |  |
| Up to 4 Ton | 77 |
| 4-12 Ton | 80 |
| Above 12 Ton | 82 |

**SECTORAL NOISE LIMITS**

|  |  |  |
| --- | --- | --- |
| **Area** | **Limits dB** | |
|  | **Day time** | **Night time** |
| Industrial | 75 | 70 |
| Commercial | 65 | 55 |
| Residential | 55 | 45 |
| Silence zone | 50 | 40 |

**NOISE LEVEL STANDARDS FOR RESIDENTIAL AREAS**

|  |  |
| --- | --- |
| **Location** | **Noise level (dB)** |
| Rural | 25-35 |
| Sub-urban | 30-40 |
| Urban | 40-45 |
| City | 45-50 |

**PERMISSIBLE LIMITS FOR HOUSEHOLD GOODS**

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| --- | --- |
| **Appliance** | **Standard limit (dB)** |
| Refrigerator | 46 |
| Air cooler | 60 |
| Air conditioner 1-1.5 Ton | 68 |
| Mixer, vibrator, crane etc. | 75 |
| Diesel generator | 85 to 90 |

**Microbial pollution:**

Microbial pollution is caused by microbes. Microbes are defined as any microscopic organism including protozoa, bacteria and viruses. Most microbes are beneficial to human health and society. Microbes are member of the primary tropic level in the food chain. They are helpful in biochemical cycling of primary nutrients such as carbon, nitrogen, phosphorus and sulphur.

**ANIMAL HOSTS OF MICROBES AND HUMAN DISEASES**

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| --- | --- |
| **Animal host** | **Human disease** |
| Birds and Chicken | Salmonellosis gastroenteritis |
| Bird flu |
| Cats | Taxoplasmosis |
| Tularemia |
| Cattle | Cryptosporidiosis |
| Giardiasis |
| Gastroenteritis |
| Horse | Brucellosis |
| Salmonellosis |
| Gastroenteritis |
| Swine | Glanders |
| Giardiasis |
| Gastroenteritis |

**Microbes as air pollutants**

|  |  |
| --- | --- |
| **Disease** | **Casual agents** |
| Chickenpox (Varicella) | *Herpes Zoster virus* |
| Common cold | *Arbo virus, Rhino virus, Echo virus* |
| Diphtheria | *Corynebacterium diptheriae* |
| Influenza (flu) | *Orthomyxo virus* |
| Measles | *Rubella virus* |
| Mumps (enlargement of parotid and salivary glands) | *Paramyxo virus* |
| Pneumonia | *Diplococcus pneumoniae* |
| Tuberculosis | *Mycobacterium tuberculosis* |
| Whooping cough (Pertussis) | *Bordetella pertussis* |

**Microbes as water pollutant**

|  |  |
| --- | --- |
| **Disease and symptoms** | **Causal agent** |
| **Amoebic dysentery** | *Entamoeba histolytica* |
| **Ascariasis** | *Ascaris lumbricoides (round worm)* |
| **Cholera** | *Vibrio cholera* |
| **Diarrhoea or loose motions** | *Adenovirus, Enterovirus* |
| **Dysentery, arthritis** | *Shigella* |
| **Enteric fever** | *Salmonella cholerasuis* |
| **Enterobiasis** | *Enterobius (Oxyuris) vermicularis* |
| **Gardiasis** | *Giardia intestinalis* |
| **Gastroenteritis** | *Escherichia coli* |
| **Jaundice or hepatitis** | *Hepatitis A,B.C Viruses* |
| **Salmonellosis, gastroenteritis** | *Salmonella enteridis* |
| **Taeniasis** | *Taenia solium (tape worm)* |
| **Tuberculosis** | *Mycobacterium tuberculosis* |
| **Typhoid** | *Salmonella typhi* |