

# University of Calcutta

## Surendranath College

### Assignment : Environmental Science

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The sound is a kind of energy. The sound that is emitted when the vibrations of the sound source are regular, uninterrupted and periodic are called **melodic sounds or musical sound**. On the other hand, if the vibrations of the sound producing source are irregular and isolated and not periodic, then the sound emitted is called a **melodious sound or noise**. The melodious sound causes noise pollution. Noise pollutants produce annoyances in humans.

### ■ Definition of Noise Pollution:

Noise pollution is the excessive sound of human endurance that interferes with the normal functioning of human physiology and adversely affects the body and mind.

In other words, noise pollution can be caused by excessive, sharp, unwanted, hoarse and uncomfortable sounds beyond human tolerance.



### ☆ Types of Noise Pollution

Following are the three types of pollution:

1. **Transport Noise**
2. **Neighbourhood Noise**
3. **Industrial Noise.**

### 1. Transport Noise:

It mainly consists of traffic noise which has increased in recent years with the increase in the number of vehicles. The increase in noise pollution leads to deafening of older people, headache, hypertension, etc.

### **2. Neighbourhood Noise:**

The noise from gadgets, household utensils etc. Some of the main sources are musical instruments, transistors, loudspeakers etc.

### **3. Industrial Noise:**

It is the high-intensity sound which is caused by heavy industrial machines. According to many researches industrial noise pollution damages the hearing ability to around 20%.

### **»» Measurement of intensity of sound:**

We measure sound intensity (also referred to as sound power or sound pressure) in units called decibels. Decibels (dB) are named in honor of Alexander Graham Bell, the inventor of both the telephone and the audiometer. An audiometer is a device that measures how well a person can hear certain sounds. A modern version of it is still used today to diagnose hearing loss.

Decibels are different from other familiar scales of measurement. While many standard measuring devices, such as rulers, are linear, the decibel scale is logarithmic. This kind of scale better represents how changes in sound intensity actually feel to our ears. To understand this, think of a building that is 80 feet tall. If we build up another 10 feet, the building will be 12.5 percent taller, which would seem just slightly taller to us; this is a linear measurement. Using the logarithmic

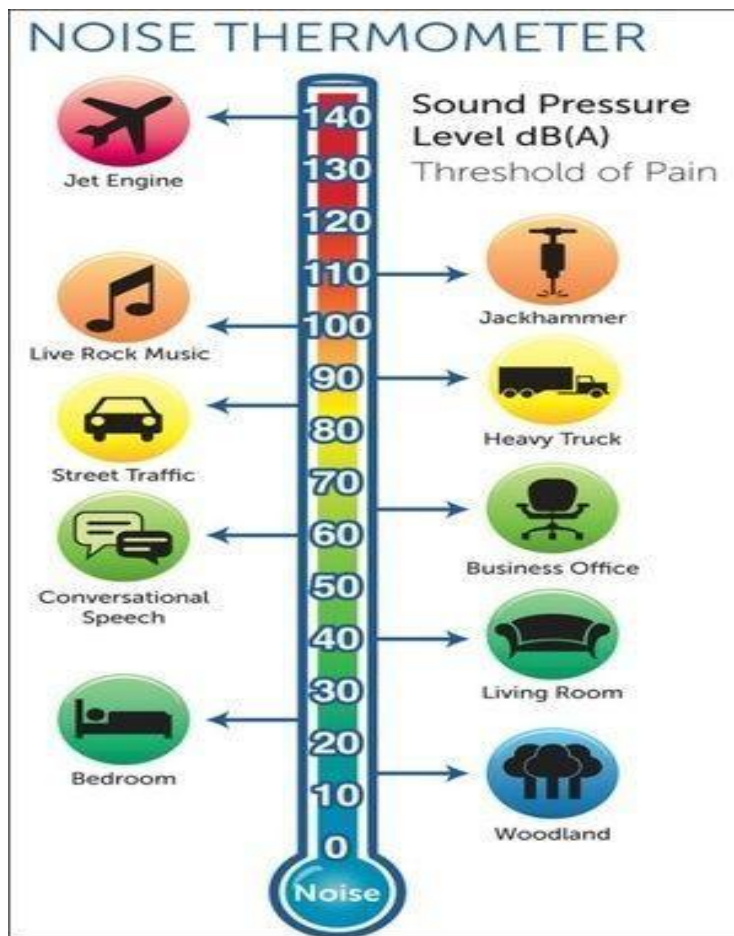
decibel scale, if a sound is 80 decibels, and we add another 10 decibels, the sound will be ten times more intense, and will seem about twice as loud to our ears.

Decibel (dB), unit for expressing the ratio between two physical quantities, usually amounts of acoustic or electric power, or for measuring the relative loudness of sounds. One decibel (0.1 bel) equals 10 times the common logarithm of the power ratio. Expressed as a formula, the intensity of a sound in decibels is  $10 \log_{10} (S_1/S_2)$ , where  $S_1$  and  $S_2$  are the intensity of the two sounds; i.e., doubling the intensity of a sound means an increase of a little more than 3 dB.

**Measurements of intensity of sound in decibel are mention here,**

<b>Source of Sound</b>	<b>Decibel</b>
The weakest audible sound	0
Whisper sound at distance 4 foot	20
Silent streets of the city	40
Normal conversation at a distance of 12 foot	60
Noisy roads in Kolkata	80
Loudspeaker, noisy railway station	90
Horn of vehicles at a distance of 23 foot	100
Instrument	120
The sound of lightning	120

Jet plane	140
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### »» Cause and Source of Noise Pollution:

Apart from natural causes such as thunder and lightning, most noise pollution is caused by various man-made actions. The main causes or source of noise pollution are as follows :

#### 1) Noise Pollution by Vehicles :

One of the main causes of noise pollution is vehicles. The uncomfortable noise of buses, lorries, motor vehicles, trim, temples etc. and the intensity of various types of electric horns have also made human life miserable. Moreover, noise pollution is increasing in hospitals, schools and other quite busy places.

## **2)Noise Pollution in Railways :**

Noise pollution occurs when trains move from one place to another and when passengers are picked up at the rail station. People who live near the station are affected by this noise pollution. The sound of train's whistle can be heard from a few miles away.

## **3)Noise Pollution by Air Transport :**

Airplane, helicopters make loud noises when flying in the sky and when transporting from one place to another. Noise pollution is also caused by the noise of jet aircraft and supersonic aviation.

## **4)Noise Pollution through Various Industrial Machinery :**

The noise of the machine is considered as one of the causes of noise pollution in various factories. The noise of the machine causes noise pollution among the people living in the factory area including the factory workers. Notable among these factories are engineering machinery manufacturing factories, textile looms, newspaper presses, key punching machines, car repair factories etc..

## **5)Mechanical Contamination :**

Noise from Fidel powered generators, vacuum cleaners, washing threshing machines, rice mills causes noise pollution in local people.

## **6)Pollution from neighbours and shops :**

When people living in an area play loud TV at home, play the radio or listen to music on tape recorder or use a loudspeaker, local residents or neighbours are exposed to noise pollution.

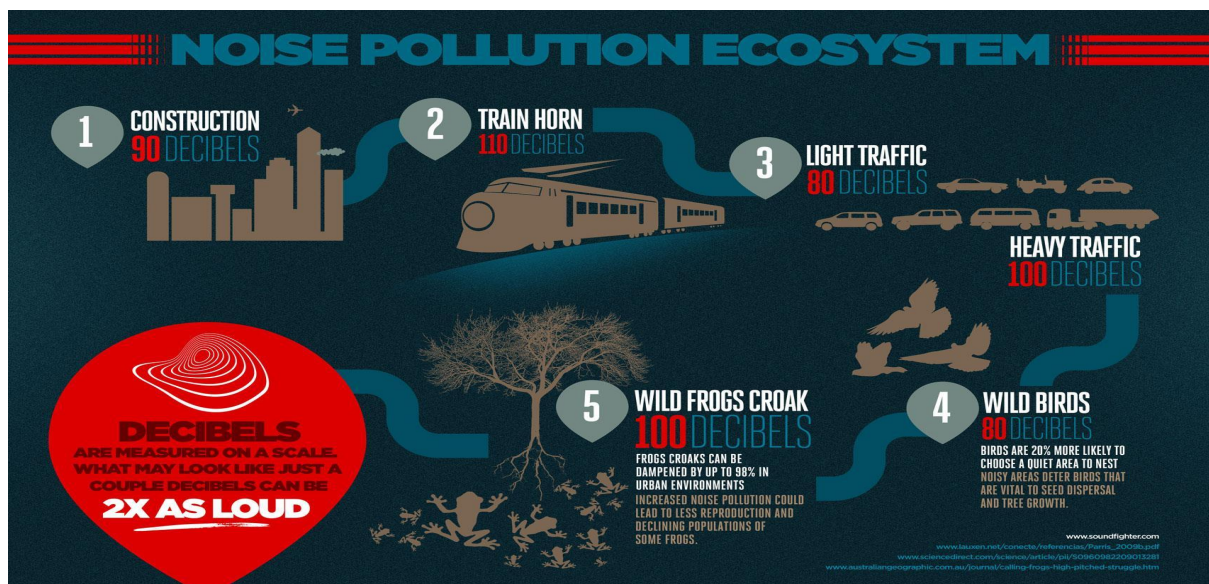


## 7) Contamination through conversation :

Noise pollution is caused by loud conversations of people in different offices, stock markets or in a meeting procession or gathering in school-college or restaurant.

## 8) Pollution for social reasons :

Noise pollution is caused by the sound of nic or fireworks when a mix is played or a firecracker is burned on the occasion of a festival or wedding, Rabindra Jayanti, Nazrul Jayanti or any other cultural event.



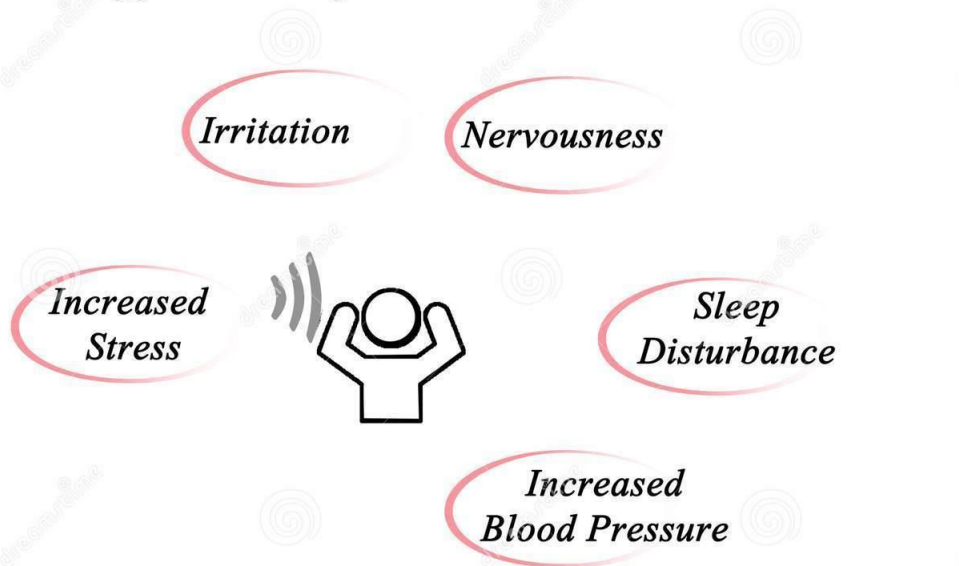


## Source of different types of noise pollution

### »» Effects of Noise Pollution :-

● **On Human:** Noise pollution has a significant impact on human health or human life. Excessive noise causes annoyance in people. Noise pollution often causes temporary or permanent physical or mental illness in the human body.

### *Effects of Noise Pollution*



The effects of noise pollution on humans are divided into two categories:

#### A) Temporary effects of noise pollution:

1. For some reason high levels of noise causes temporary damage to the eardrum. This results in temporary loss of human hearing. Partial deafness occurs when the long time is within 90 decibel sounds.

2. Prolonged exposure to 125 decibel sounds causes pairs in the ear.
3. Many times the sound of jet aircraft, the sound of nic etc. interferes with hearing. This is called masking.

## **B)The long term effects of noise pollution:**

### **1. Effects on hearing aids :**

It has been observed that deafness occurs when living life within 100 decibel sounds for a long time. This is because the cochlea is a snail-shaped organ inside your inner ear that allows you to hear. The cochlea can respond to a certain range of frequencies, or pitches of sound. The cochlea responds best to frequencies in the range of human speech. It doesn't respond as well to frequencies that are much higher or lower. When sounds containing frequencies are too high or too low for us to hear as in ultrasonic and infrasonic sounds—our cochlea doesn't respond at all. Moreover, 160 decibel can tear up the eardrum. As a result, people become permanently deaf.

### **2. Effects on heart :**

Prolonged monstrous noise affects the human heart. This increases or decreases the heart rate. Many times the level of calcium and glucose in the blood decreases or the level of white blood cells (WBC) in the blood increases. Noise pollution often increases arterial blood pressure.

### **3. Effects on respiration :**

Noise pollution changes the rate of breathing in many people. The effects of loud noises also increase the depth of respiration and rapid breathing and exhalation.

### **4. Effects on the brain :**

The monstrous sound affects the human nervous system, such as the brain and spinal cord. Many times memory loss,

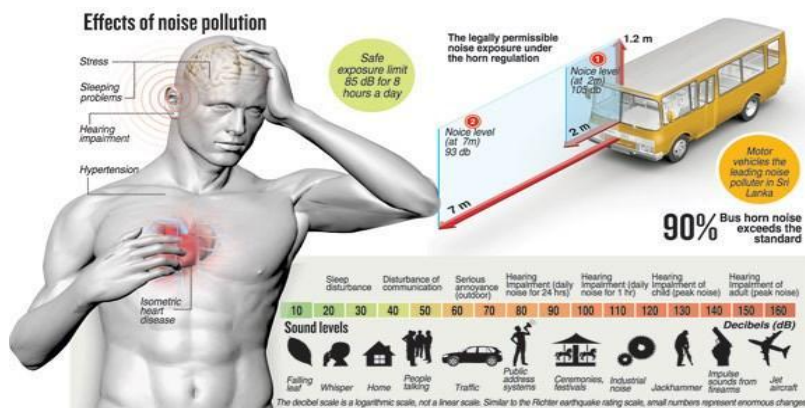
mental exhaustion. As a result of loud noises, various kinds of excitement are created in the body. Moreover, nausea and convulsions occur in some people. The concentration of different tasks is lost. Many times insomnia also starts. Noise pollution also impairs the functioning of the autonomic nervous system in the body. Some people have difficulty walking.

### **5. Effects on eyes :**

Noise pollution can lead to visual impairment in many people. The ability to recognize light or different colours is lost. In many cases, as a result of noise pollution, the lenses of the eye do not expand properly.

### **6. Effects on child development:**

Children appear to be more sensitive to noise pollution related disease and dysfunctions are known to affect children, for hearing impairment to psychological and physical effects. Also, children who regularly use music players at high volumes are at risk of developing hearing dysfunctions. IN 2001, it was estimated that 12.5% of American children between the ages of 6 to 19 years had impaired hearing in one or both ears.

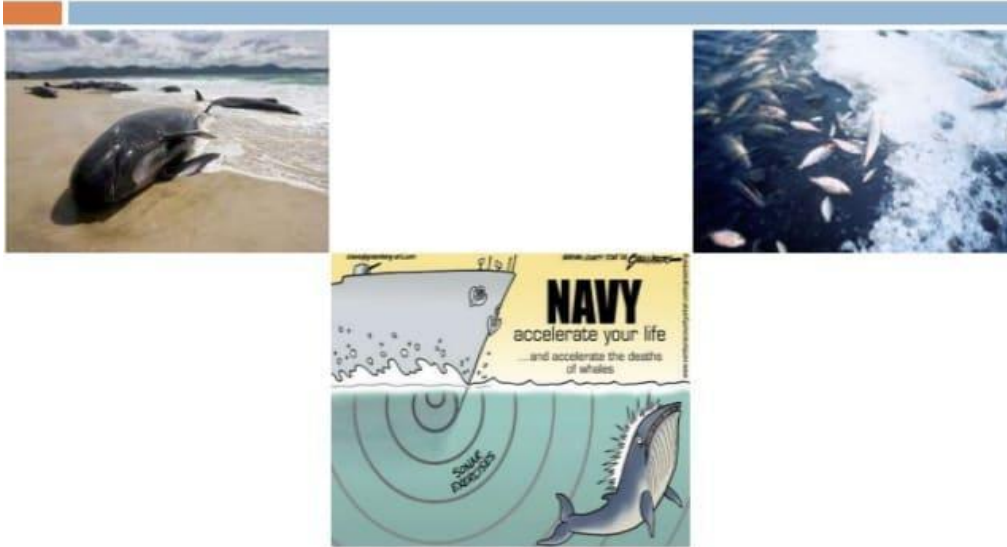


## Some effects of noise pollution on human

### ● Effects on wild animals and birds:

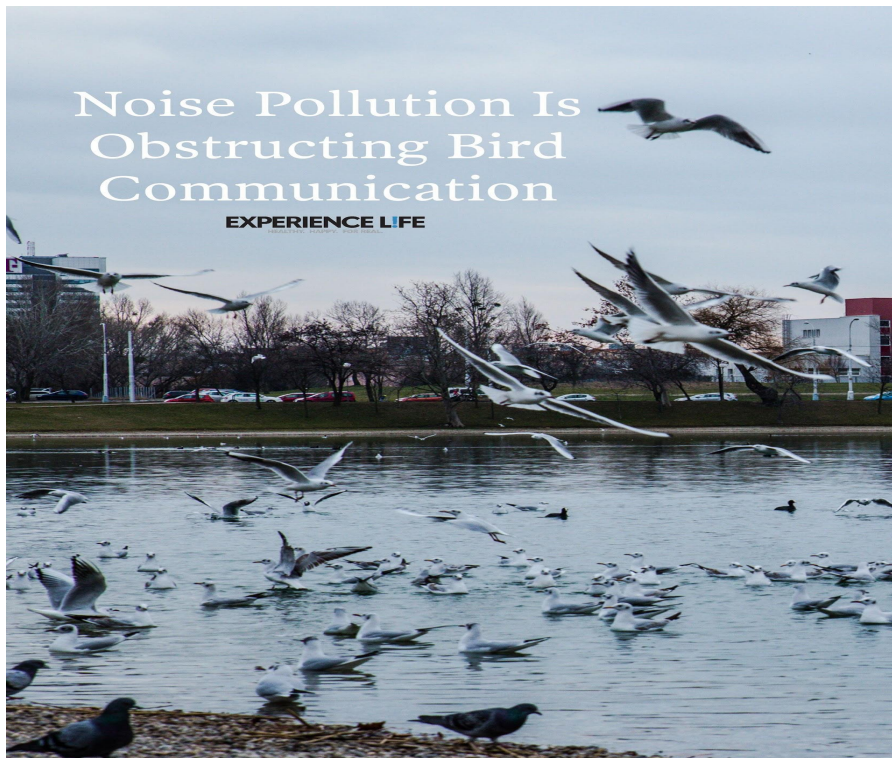
Wild animals are much more vulnerable to noise pollution than humans. Excessive noise in the wild environment, wildlife can not identify prey or predator. As a result, they either fail to hunt or are killed by predators. Excessive noise pollution in the wild environment means they cannot communicate with each other through sound. Especially if during the breeding season they fail to breed because they cannot hear the call of the mate.

## More effects on animals:-



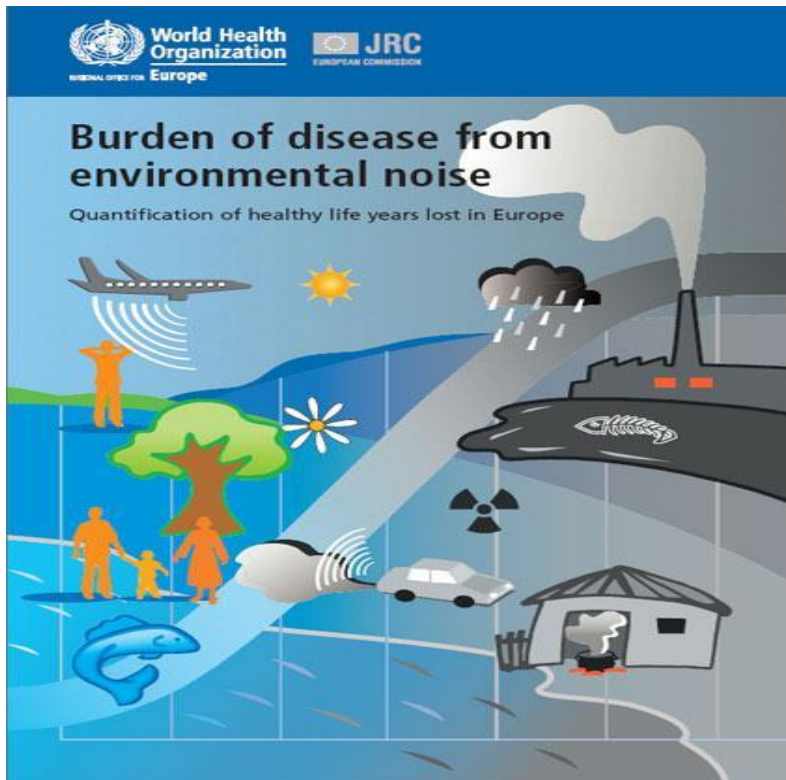
In general, wild animals have higher hearing than humans. Domesticated dogs, cats or birds become aggressive or frightened by noise pollution. As a result of noise pollution, birds cannot participate in reproduction. Migratory birds, especially during the breeding season, used to come from the winter to the lakes of India. But now due to noise pollution they come to our country in many small numbers.





### ●Effects on Environments :

New offspring of animals and birds do not come into the world due to inability to take part in reproduction due to noise pollution. As a result, the number of birds is declining. Many animals and birds are becoming extinct due to lack of reproduction. That is shy. The balance of the ecology of the environment is disturbed and effects fall on the people as well.



### »» Probable Control of Noise Pollution :

Noise pollution can be controlled or prevented in the following ways, e.g. **A) Control noise pollution in technical ways, B) Control noise pollution in legal ways, C) Control noise pollution in environmental ways, D) Noise pollution control through public education.**

#### **A) Control noise pollution in technical ways:**

1) Controlling or preventing noise pollution making technical improvements in the old-fashioned high noise pollution of various factories or industries.

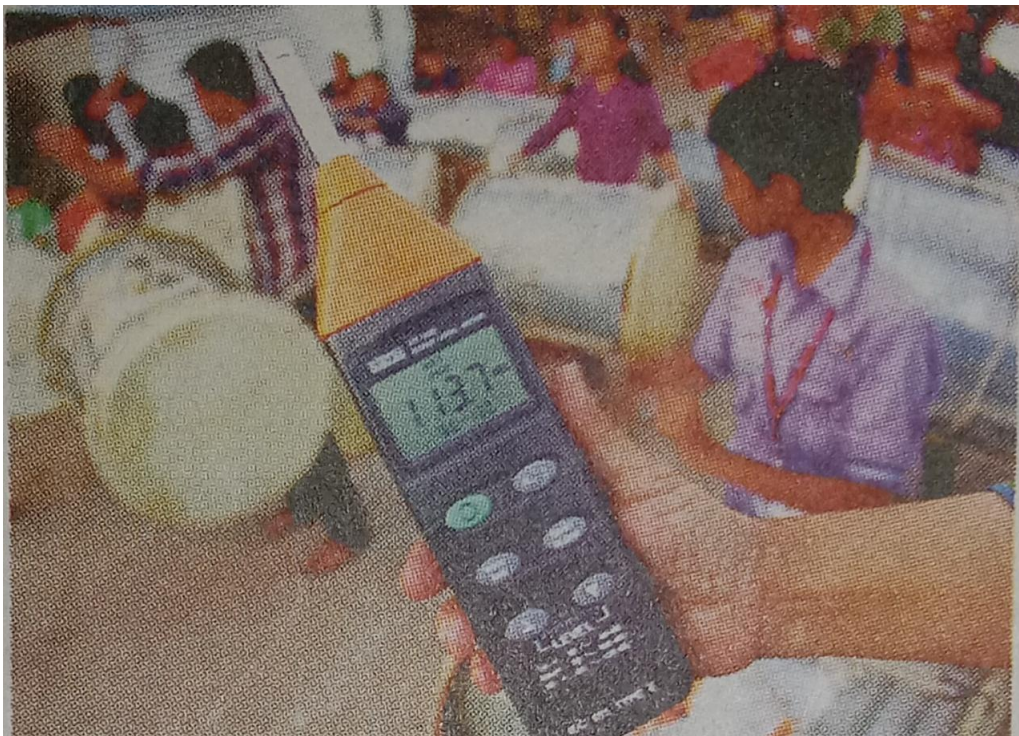
2) In many cases, noise pollution is controlled by the use of noise control coverage on equipment that produces unwanted noise.

3) Arrange for the use of sound resistant ear plugs, canal cups and ear muffs for humans working in various industries elsewhere when noise effects exceed 40 decibel.

4) Noise Pollution control or noise resistant zones need to be created in industries that produce loud noise.

5) Silencers should be installed to prevent loud honking of car horns.

6) Avoid prolonged use of earphones, especially at elevated sound levels.



**Noise monitor detector**

### **B)Control noise pollution in legal way:**

Anti-noise pollution laws have been enacted in many countries around the world. In India, too, noise generation within 100 meters of hospitals, courts and industrial

establishments is prohibited by law . There are also some restrictions on noise pollution control for other places, the Calcutta High Court issued these guidelines. Not only that, the Motor Vehicles Act also specifies the level of use of horns when driving in residential areas.

### **C) Control noise pollution in environmental ways:**

1) Plants can absorb sounds. Therefore, noise pollution can be prevented by planting trees on both sides of the road in urban areas. Experiments have shown that plants like tamarind, banyan, ashoka , neem, coconut, fir etc. absorb more noise.

2) Many homes in urban areas today are covered with soundproofing walls and roofs. This prevents some of the noise pollution.

### **D)Noise pollution control through public education:**

1)Noise pollution is somewhat controlled when people are made aware of the evils of noise pollution through propaganda with the help of various media.

2)Noise pollution is controlled when the mic is played below 65 decibels at various social events.

3) Noise pollution is controlled by educating people to stop burning fireworks, crackers.

4) Noise pollution can be controlled to some extent by not using unnecessary horns on scooters, motor cycles, motor vehicles etc.





»» **Indian Standards for er ambient noise levels :-**

This is determined by the Environment (Protection) Act of the MOEF or the Ministry of Environment and Forest,



<b>Areas</b>	<b>Levelsof Noise Pollution, Leq dB</b>	
	<b>During the day (6.00-21.00 IST)</b>	<b>At night (21.00-6.00 IST)</b>
<b>1) Silent zone (within 100 meters of the hospital and educational place, court)</b>	<b>50</b>	<b>45</b>
<b>2) Residential zone</b>	<b>55</b>	<b>45</b>
<b>3) Commercial zone</b>	<b>65</b>	<b>55</b>
<b>4) Industrial</b>	<b>75</b>	<b>65</b>

### **■Conclusion :-**

The sound is mechanical energy from a vibrating source. The unpleasant and unwanted Sound is called noise. The main sources of noise pollution are various modes of transportation, industrial operations, construction activities and celebrations, and electric home appliances. It exists mostly in densely populated areas like cities and industrial complexes, railway stations, bus stations, air ports, television, radio, and even kitchen gadgets generate noise. Sound levels are measured in units called decibels. Conservation produces sound at about 40 decibels and so on. The limit that humans can accept is about 110 decibels without pain and damage.



»» **Noise causes the following effects:**

- Interferes with man's communication.
- Hearing damage.
- Physiological and psychological changes.

»» **The noise pollution can be controlled by the following:**

- Reduction in sources of noise.
- Proper oiling will reduce the noise from the machinery.
- Planting more trees which have broad leaves.

