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## ENVIRONMENTAL IMPACTS ON NOISE POLLUTION IN HUMAN AND MARINE LIVES

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### ABSTRACT

*The term “noise” may be defined as an unwanted sound at a wrong time and wrong place. Although noise is undesirable, it could be meaningful or meaningless. A meaningful noise is generally meant for inviting attention or expecting a consequence response such as the cry of a baby or a screaming of a person or help. On the contrary, a given sound is wanted or unwanted may depend upon the person involved, the loudness, the rhythm, and the length of time for which one is exposed to it. Sound intensity is measured in the terms of decibels (db), that is the tenth part of the longest unit bel. One db is the faintest sound that a human year can hear.*

*Environmental noise in land may be classified as Industrial Noise, Transport Noise and Neighbourhood Noise. The effect of noise pollution especially on marine life is highly prominent.*

**Key words:** Noise Pollution, Decibel,

## **1. INTRODUCTION**

Pollution is the introduction of contaminants into the natural environment which causes the adverse changes. Pollution that affects human life and other living life in many ways like a form of chemical substances through industries and factories or energy such as noise, heat or light. The prolonged and loud sound is usually considered as noise which tends to noise pollution which is mostly caused due to industries, vehicles, airplanes etc. Therefore such a noise of found to cause some kind of physical, physiological or psychological harm or stress to human beings, therefore it is considered as pollutant. Noise is a by-product of human activity and the background noise levels have been found to be increasing year by year for the last few decades. Excessive noise can result in loss of hearing, increase in accidents and decrease of productivity. Hence it is essential to take suitable precautions to reduce noise pollution particularly in urban and industrial areas.

Sound has several physical properties among which frequency and intensity are most relevant for the present discussion.

## **2. THE DECIBEL SCALE**

Sound frequency is the rate at which compression waves arrive at or pass a fixed point. "Pitch" is the human perception of sound frequency. Sound intensity is the acoustical power i.e., the energy delivered by sound per unit area. "Loudness" is the human perception of the sound intensity. Hertz (Hz) or cycles per second are a measure of sound frequency. Human beings can hear only sound ranging from 20 Hz to 20,000 Hz. The range of frequencies of human speech is 200 to 3000 Hz, which is best for human hearings. Thus, we can hear only sounds of certain frequencies and even among them. Sounds too high in frequency (above 20,000 Hz) are called *ultrasound* and that which is too low in frequency (below 20 Hz) is called *infrasound*.

The response of ear to sound is proportional to the logarithm of its intensity or pressure. The loudness of two sounds is judged subjectively by the ear of the ratio of their intensities or pressures. The loudness is expressed in terms of a unit called "decibel" ("deci" comes from the Latin word for ten, and a "bel" is the "logarithm of a ratio" of any two acoustical or electronic intensities. In terms of sound, a "decibel" (db) is ten times the logarithm of the ratio of two sound intensities, one being the intensity of any sound of interest and the other being a reference sound.

**Table 2.1.1 The Decibel Scale**

<b>Sound Source</b>	<b>Decibel, dB</b>
Launching of space rocket	170
Jet plane at take off	150
Threshold of pain	140
Pneumatic riveter	130
Running motor cycle	118
Jet fly over at 150 m	115
Rock band	111
Jet fly over at about 300 m	103
Farm tractor	98
Motor cycle at 25 ft	90
Heavy city traffic	85
Alarm Clock	80
Average City traffic	70
Normal conversation	60
Business office or light city traffic	50
Living room	45
Library	35
Broadcasting studio or A quiet room at night	20
Rustling of leaves	10
Threshold of hearing	0

**Table 2.1.2 Psychological and Physical Effects at Different Decibel Level**

<b>Decibel Level</b>	<b>Effects</b>
<b>135 dB</b>	Painful
<b>110 dB</b>	Discomfort
<b>88 dB</b>	Hearing impairment on prolonged exposure
<b>80 dB</b>	Annoying
<b>65 dB</b>	Intrusive

### 3. CAUSES AND EFFECTS OF NOISE IN LAND

Noise pollution affects both health and behavior. Unwanted sound (we say as, noise) can damage psychological and physiological health. Noise pollutions may tend to cause hearing loss, high stress level, hypertension, disturbances in sleep, and other harmful effects.

#### 3.1 Physiological Effects

The acute effects caused by noise depend upon the frequency and pressure. The levels of about 150 dB (high), immediate permanent hearing impairment may be caused. At sound levels in the range of 120 – 150 dB, effects on respiratory system, dizziness, disorientation, loss of physical control, other physiological changes resulting from stress, nausea and vomiting may be caused. Even sound of the

order of 70 dB can have measurable physiological effects, although they may not result in any immediate impairment.

Nerve fibers leaving the inner ear carry impulses elicited by sirens, trumpets, etc to the medulla of the brain stem, where they meet other fibers going to other parts of the brain. Nerve pathways permits both ears to communicate with numerous parts of both sides of the brain, including the centres of consciousness and the control centres that regulate breathing, blood pressure and other bodily functions below the level of consciousness.

Loud sounds can cause an increased secretion of many hormones of the pituitary gland e.g., adrenocorticotrophic hormone (ACTH). ACTH in turn simulates the adrenal gland, which secretes several other hormones. Through a variety of influences, these hormones in turn trigger various effects such as (i) enhancement of the sensitivity of the body to adrenalin, (ii) increase in blood sugar levels (iii) suppression of immune systems and (iv) decreasing the efficiency of liver to detoxify blood.

The major chronic effect of noise is the so-called noise-induced hearing loss. A person exposed to high noise level goes deaf more quickly than the one who is exposed to a relatively noise-free environment during his day to day activities. This effect depends upon and increases with the pressure, frequency and the time to exposure. Studies on a group of youngsters listening to rock music generated at over 92 dB throughout the 500 to 8000 Hz range and sustained over about an hour showed a “threshold shift” of 40 dB in about 10% of the listeners, and 20 to 30% “threshold elevation” in the others. Most of this “threshold shift” is usually temporary but repeated exposure can make it permanent.

### **3.2 Psychological And Other Effects**

Although there is little specific evidence regarding the onset of mental or nervous illness cause by noise, some reports are available to indicate temporary effects such as deterioration in concentration and even mental disorientation at high noise levels.

Loud continuous noise reduces the working efficiency, interferes with communication, and increases frequency of errors which may, at times, cause accidents. Noise reduces the mental capability. Noise has psychological effects to humans ranging from mild distress to complete unhinging.

Noise interferes with deep sleep and interrupts sleep. Because sleep is important to emotional stability, noise may contribute to distress and emotional disturbances. Noise also aggravates may existing psychological conditions and mental illness.

Noise has some behavioral effects on birds and animals also.

## **4. EFFECTS OF NOISE POLLUTION ON PHYSICAL HEALTH**

The most harmful effect of noise which is more excessive is physical damage to the ear and the temporary or permanent hearing loss often called a temporary threshold shift (TTS). People suffering from this condition are unable to detect weak sounds. However hearing ability is usually recovered within a month to exposure. For example, in Mumbai people living in close vicinity of Ganesh mandals that play blaring music for ten days of the Ganesh festival are usually knows to suffer from this

phenomenon. There will be no recovery in case of loss of hearing ability on permanent threshold shift.

Below a sound level of 80 dB hearing loss does not occur at all. However temporary effects are noticed at sound levels between 80 and 130 dB. About 50% of the people will experience permanent hearing loss to some degree if it is more than 150 dB. A level of sound of 150 dB or more than that can physically affect the human eardrum.

The hearing loss degree depends on the duration as well as the intensity of the noise. For example, 1 hour of exposure to a 100 dB sound level can produce a TTS that may last for about one day. In most industries and factories, people working with noisy machinery are subjected to high sound levels for over a period of 10 years may cause 15 dB of NIPTS. In addition to hearing losses excessive sound levels can cause harmful effects on the circulatory systems by raising blood pressures and altering pulse rates.

### 5. EFFECTS OF NOISE POLLUTION ON MENTAL HEALTH

Noise can lead to emotional or psychological effects such as mental stress, anxiety and irritability. Mental fatigue and lack of concentration are the significant health effects of noise. For examples, the schools or colleges situated nearby in busy areas such as market, bus stand or busy area of the city, the students suffer a lot from noise pollution. They can mentally disturb with various kinds of noise pollution and leads to lack of concentration in his studies.

If the people working in industries or factories which deals with noisy machineries, it may affect the normal auditory communication, this may arise the increases in the rate of accidents. Also it lead to lowered worker efficiency and productivity.

### 6. PERMITTED NOISE LEVEL

Table 6.1.1 Ambient Noise Levels dB

Zone	Day-time	Night-time
Silent Zone	50	40
Residential Zone	55	45
Commercial Zone	65	55
Industrial Zone	70	70

Table 6.1.2 given the standard safe time limit for one being exposure to various noise levels Beyond this *safe* time continuing exposure over a period of a year will lead to hearing loss.

**Table 6.1.2**

<b>Duration</b>	<b>dba</b>
8 Hours	90
4 Hours	93
2 Hours	96
1 Hour	99
30 Minutes	102
15 Minutes	105
7 Minutes	108
4 Minutes	111
2 Minutes	114
1 Minute	117
30 Seconds	120
Instantaneous rupture of membrane	150

## 7. NOISE POLLUTION IN MARINE LIFE

Sensitivity of various marine species to ocean pollution may vary. Marine cetaceans like dolphins and whales, the sound is the primary sense, which is used to navigate and find foods. Soft shelled species like prawns, fishes etc are much more sensitive in nature. That is the main reason why the ocean is called as the “silent world”.

Sounds of various noise pollution includes everything from the ship noise to the lower frequency sonar sounds used extensively in detection of submarine or even the noise from seismic air noise from oil and gas exploration or even commercially shipping traffic and coastal jet ski traffic.

Studies have showed that while these sounds may have no impact on human, in marine life, they can be detrimental. Population of cetacean (whales and dolphins) has declined in areas prone to such noise pollution from ships.

Marine Pollution (MARPOL) proposed annexes IX for the regulation of pollution by noise from the Ships.

## 8. CONCLUSION

The methods of noise source reduction is regular and through maintenance of operating machinery. Noise levels at construction sites can be controlled using proper construction sites can be controlled using proper construction planning and scheduling techniques. Air noise compressors may be away from the site boundary at construction sites in order to reduce the noise pollution. Schools and colleges will be constructed in the place where there are no disturbance due to noise in order to students can concentrate on their studies. Most of the vehicular noise comes from the movement of the vehicle tires on poorly maintained vehicles can add to the noise levels. Traffic volume and speed also have significant effects on the overall sound. For example, doubling the speed increases the sound levels by about 9 dB and doubling the traffic volume increases sound levels by about 3 dB. A smooth flow of traffic also causes less noise than does a stop-and-go traffic pattern. Proper highway planning and design are essential for controlling traffic noise. Establishing lower speed limits for

highways that pass through residential areas, limiting traffic volume and providing alternative routes for truck traffic are effective noise control measures.

Use of earplugs and earmuffs can protect individuals effectively from excessive noise levels. Specially designated earmuffs can reduce the sound level reaching the eardrum as much as 40 db.

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