**COURSE N 07**

**Noise Pollution**

**1. Definition of Noise Pollution**

**Noise pollution** refers to the **presence** of **unwanted** or **excessive** **sound** that **disrupts** the normal **acoustic** environment and can have adverse effects on human health, wildlife, and the ecosystem.

**Difference between Noise and Sound:**
Sound is a term that describes vibrations that travel through air or another medium and can be heard when they **reach** a **person's** or **animal's** **ear**. It is a **fundamental** part of communication and can be enjoyable or informative.

**Noise**, however, is typically defined as an unwanted or unpleasant sound that can disturb, or even harm individuals and the environment.

**While sound can be beneficial, noise generally has negative implications for comfort and health.**

**2- Noise Levels and Thresholds (magnitude or intensity)**

**Decibel Scale (dB):**
**The decibel (dB) scale measures the intensity of sound**, **with each increase of 10** dB representing a **tenfold** DECENNIAL increase in sound intensity.

**The scale** **ranges** from 0 dB (the faintest (lowest)sound the **human** **ear** can detect) to over **140 dB** (which can cause **immediate** harm to hearing).

**Prolonged exposure** to **sounds** **above** 85 dB can cause hearing damage, and everyday sources like traffic and construction often exceed this level, making them significant contributors to noise pollution.

**Thresholds:**

* Discomfort Threshold: Around 70 dB, sounds become uncomfortable for many individuals.
* Hearing Damage Threshold: Prolonged exposure to sound levels above 85 dB can result in hearing loss over time.
* Acceptable Levels for Different Environments:
	+ Workplace: Generally regulated to stay below 85 dB for extended exposure, though limits can vary based on regulations.
	+ Residential Areas: Ideally kept below 55 dB during the day and 45 dB at night to minimize disturbance and maintain comfort for residents.

**2. Types of Noise**

* Continuous Noise: Sources like running engines (industrial machines).
* Intermittent Noise: E.g., traffic, construction sites with pauses, and alarms.
* Impulsive Noise: Sudden noises like explosions, fireworks, and gunshots.
* Low-Frequency Noise: Often felt (FEEL) more than heard, originating from industrial sources or heavy machinery.

 **Sources of Noise Pollution**

**1. Human-Induced Sources (cause, generate)**

* Transportation Noise:
	+ **Road Traffic**: Noise from cars, motorcycles, buses, and trucks.
	+ **Airplanes**: noise near **airports** and during **flight** paths(**Takeoff and Landing:** )
	+ **Railways**: Vibrations and noise caused by trains.
	+ **Marine Vessels**: Port activity and impact on nearby areas and marine life.
* **Industrial Noise**: Heavy machinery, processing plants, and construction sites.
* **Community and Recreational Noise**: Music festivals, public events, street noise, and household noise.

**2. Natural Sources**

* Weather and Geological Events: Sounds from **storms**, **earthquakes**, and **volcanoes**.
* Wildlife and Ecosystems: Animal calls, especially near forests or bodies of water.

**2. Noise Monitoring Tools and Techniques**

* Sound Level Meters: Portable devices for measuring sound intensity in dB.
* Dosimeters: Wearable devices to monitor noise exposure over time, common in occupational health.
* Noise Mapping Technologies: Tools like GIS for creating noise maps of cities or regions.
* Software for Noise Prediction: E.g., CadnaA, SoundPLAN for analyzing and predicting noise levels in urban planning.

 **Health and Environmental Impacts of Noise Pollution**

1. Effects on Human Health

* Physical Impacts:
	+ Hearing Loss: Causes and prevention.
	+ Cardiovascular Diseases: Elevated risk of hypertension, heart attacks, and other cardiovascular issues.
* Psychological Impacts:
	+ Stress: Chronic exposure to noise increases stress levels and related health effects.
	+ Sleep Disturbance: Disrupted sleep cycles, affecting overall well-being.
	+ Cognitive Impacts: Reduced concentration, learning difficulties, and productivity losses.
* **Social Impacts**: Interference with communication, reduced quality of life, and potential for **social conflict** in noisy communities.

2. Impacts on Wildlife and Ecosystems

* Behavioral Changes: Animals adapting or avoiding noisy areas, disrupting natural behaviors.
* Communication and Breeding: Disruption of natural calls, mating signals, and predator warnings.
* Biodiversity: Changes in habitat use and population dynamics due to chronic noise exposure.

**TUTORIAL WORK N 07**

**Question 01**

**Match the word with its definition:**

1. **Sound**
2. **Noise Pollution**
3. **Decibel (dB)**
4. **Threshold**
5. **Continuous Noise**
6. **Intermittent Noise**
7. **Impulsive Noise**
8. **Low-Frequency Noise**
9. **Dosimeter**
10. **Noise Mapping Technologies**

**Definitions:**

**a) A device used to measure sound exposure over time, often worn by individuals in noisy environments.
b) A measurement scale used to quantify the intensity of sound, with each 10 dB increase representing a tenfold increase in sound intensity.
c) A term for unwanted or disruptive sound that affects health, wildlife, and ecosystems.
d) A source of noise that occurs without interruption, such as the constant hum of industrial machines.
e) A type of noise that appears in bursts or periodic intervals, like traffic noise or construction site sounds.
f) A type of noise that comes in sudden, sharp bursts, such as explosions or fireworks.
g) Low-pitched sounds that are often felt rather than heard, commonly produced by machinery or large engines.
h) The point or level at which something starts, such as the minimum sound level at which hearing damage may occur.
i) The vibrations that travel through air or another medium and can be heard by the human ear or animal ears.
j) A technological tool, often used in urban planning, that creates visual maps showing the distribution of noise levels in different areas.**

**2. Multiple Choice Questions (MCQs):**

* **What is the primary difference between sound and noise?
a) Sound is always harmful, while noise is not.
b) Sound can be beneficial, while noise is unwanted.
c) Sound cannot be heard, but noise can.
d) Sound and noise are the same.**
* **At what decibel level does prolonged exposure begin to cause hearing damage?
a) 55 dB
b) 70 dB
c) 85 dB
d) 100 dB
*Answer: c)***
* **Which of the following is an example of impulsive noise?
a) Running engine
b) Traffic noise
c) Explosions
d) Airplane takeoff
*Answer: c)***

**3- True or False Questions:**

* **Noise pollution is caused only by human activities.
*Answer: False* (Natural sources like wildlife and weather also contribute.)**
* **A noise level above 140 dB can cause immediate hearing damage.
*Answer: True***

**3. Short Answer Questions:**

* **Explain what the discomfort threshold for noise is and at which decibel level it occurs.
*Answer: The discomfort threshold is the level at which sounds become uncomfortable for many individuals, typically around 70 dB.***
* **Name three sources of human-induced noise pollution.
*Answer: Road traffic, airplanes, and industrial noise.***

**5. Matching Questions:
Match the noise type with its example:**

* **Continuous Noise – a) Explosions**
* **Intermittent Noise – b) Running engine**
* **Impulsive Noise – c) Traffic noise**
* **Low-Frequency Noise – d) Heavy machinery
*Answer: Continuous Noise: b, Intermittent Noise: c, Impulsive Noise: a, Low-Frequency Noise: d***