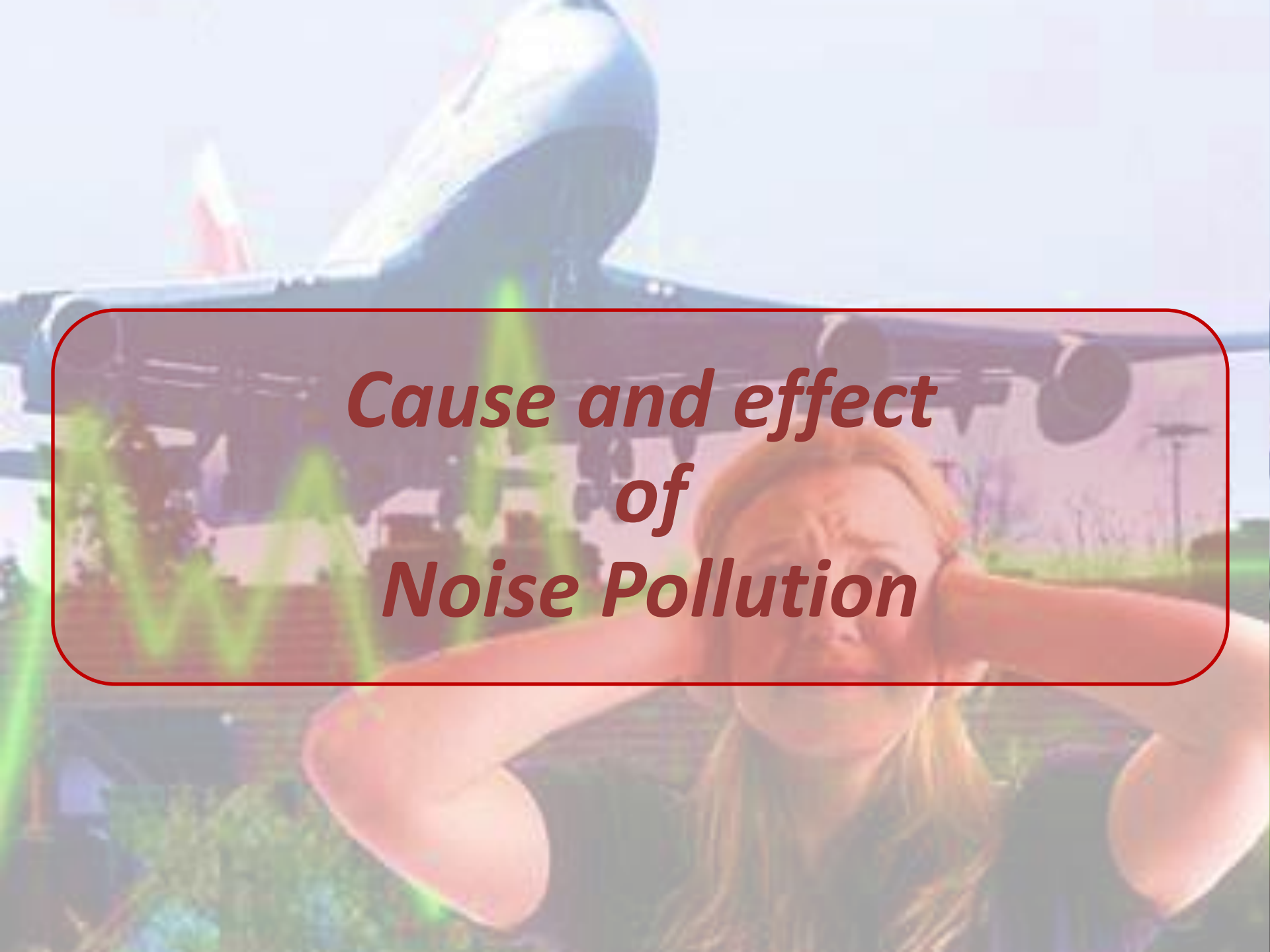
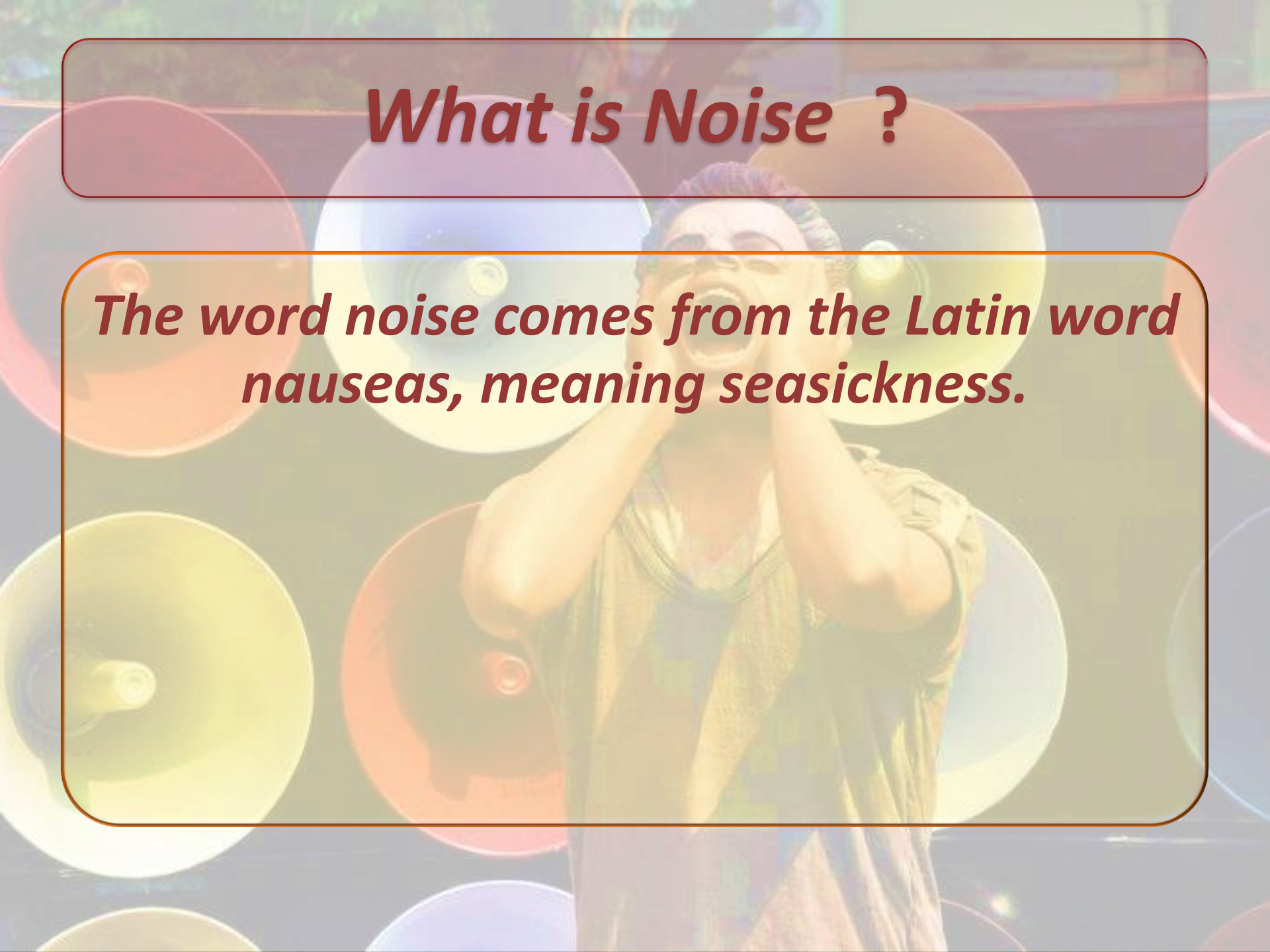


Cause and effect of Noise Pollution

What is Noise ?

The word noise comes from the Latin word nauseas, meaning seasickness.



What is Noise ?

Sound that is unwanted or that disrupts the activity or balance of human or animal life is called as noise. When there is lot of noise in the environment, it is termed as noise pollution.

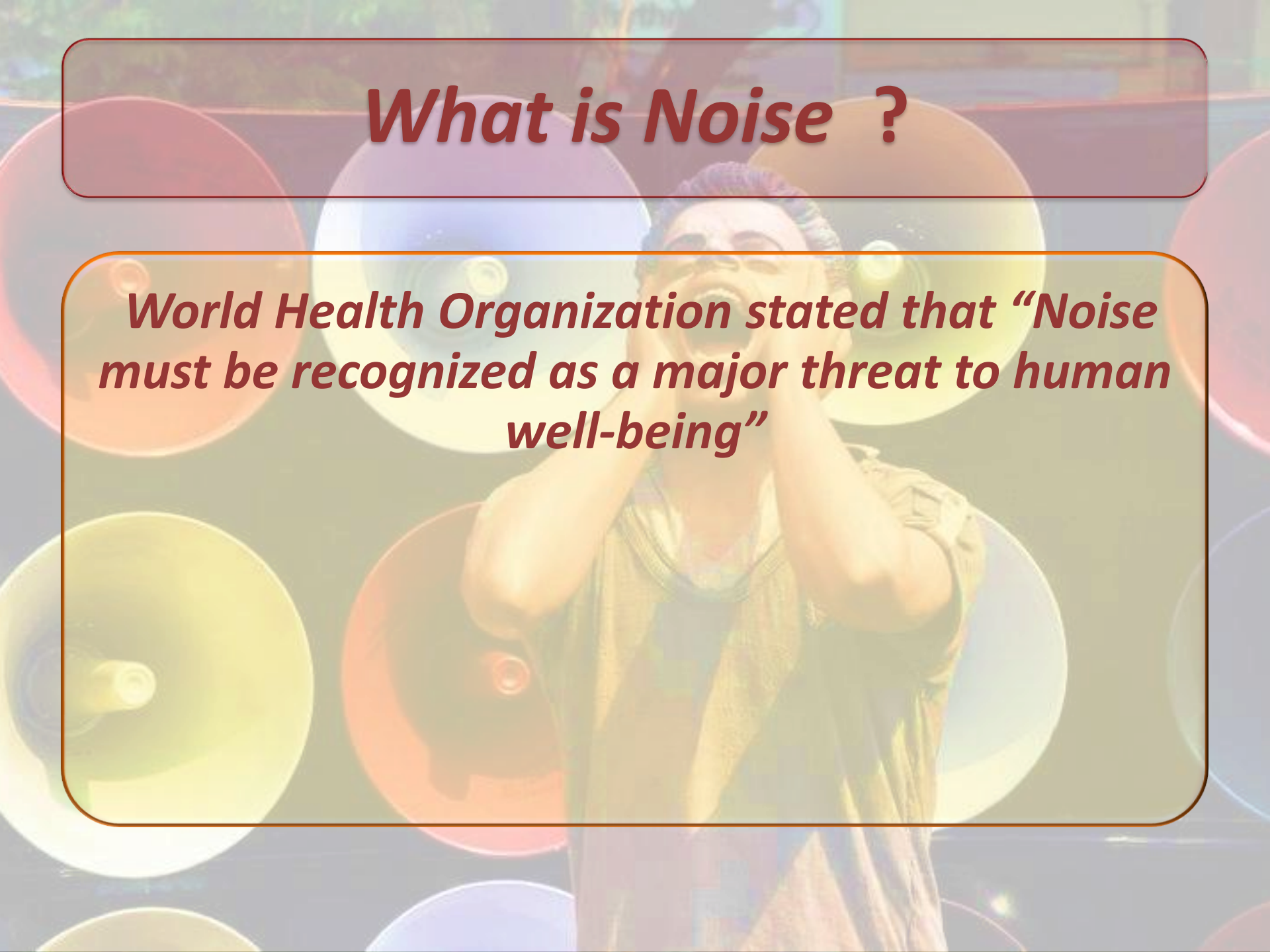
What is Noise ?

Sound becomes undesirable when it disturbs the normal activities such as working, sleeping, and during conversations.

It is an underrated environmental problem because of the fact that we can't see, smell, or taste it.

What is Noise ?

World Health Organization stated that "Noise must be recognized as a major threat to human well-being"



Sources of Noise Pollution

> Transportation systems are the main source of noise pollution in urban areas.

> Construction of buildings, highways, and streets cause a lot of noise, due to the usage of air compressors, bulldozers, loaders, dump trucks, and pavement breakers.

Sources of Noise Pollution

> Industrial noise also adds to the already unfavorable state of noise pollution.

> Loud speakers, plumbing, boilers, generators, air conditioners, fans, and vacuum cleaners add to the existing noise pollution.

Effect Of Noise Pollution On Humans

1. Chronic exposure to noise may cause noise-induced hearing loss. Older males exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity than their non-exposed peers.

Effect Of Noise Pollution On Humans

2. Unwanted noise can damage physiological and psychological health. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects.

Effect Of Noise Pollution On Humans

3. High noise levels can contribute to cardiovascular effects and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress and vasoconstriction leading to the increased blood pressure noted above as well as to increased incidence of coronary artery disease..

WDCS

They can't afford to wait for evolution

Effect On Animals & Aquatic Life

1. Noise can have a detrimental effect on animals, increasing the risk of death by changing the delicate balance in predator or prey detection and avoidance, and interfering the use of the sounds in communication especially in relation to reproduction and in navigation . .

Effect On Animals & Aquatic Life

2. An impact of noise on animal life is the reduction of usable habitat that noisy areas may cause, which in the case of endangered species may be part of the path to extinction. Noise pollution has caused the death of certain species of whales that beached themselves after being exposed to the loud sound of military sonar .

Effect On Animals & Aquatic Life

3. Some other effects on wildlife & aquatic animals are:

> Hormone Imbalance

> Chronic Stress

> Panic & Escape Behavior

> Abandonment of Offspring

> Injury

> Increase in Loudness of Inter species communication .

Noise Measurement

Levels and the Decibel

The sound pressure of the faintest sound that a normal healthy individual can hear is about 0.00002 Pa. The sound pressure produced by a Saturn rocket at liftoff is greater than 200 Pa. Even in scientific notation this is an "astronomical" range of numbers.

To cope with this problem, a scale based on the logarithm of the ratios of the measured quantities is used. Measurements on this scale are called levels. The unit for these types of measurement scales is the **bel**, which was named after Alexander Graham Bell:

$$L' = \log \frac{Q}{Q_0}$$

where L' = level, bels
Q = measured quantity
Q_0 = reference quantity
log = logarithm in base 10

A bel turns out to be a rather large unit, so for convenience it is divided into 10 subunits called **decibels** (dB). Levels in decibels are computed as follows:

$$L = 10 \log \frac{Q}{Q_0}$$

The decibel does not represent any physical unit. It merely indicates that a logarithmic transformation has been performed.

Noise Measurement

Sound Power Level. If the reference quantity (Q_0) is specified, then the decibel takes on physical significance. For noise measurements, the reference power level has been established as 10^{-12} W. Thus, sound power level may be expressed as

$$L_w = 10 \log \frac{W}{10^{-12}}$$

Sound Intensity Level. For noise measurements, the reference sound intensity is $10^{-12}\ \mathrm{W \cdot m^{-2}}$. Thus the sound intensity level is given as

$$L_I = 10 \log \frac{I}{10^{-12}}$$

$$L = 10 \log \frac{x}{Q_0}$$

The decibel does not represent any physical unit. It merely indicates that a logarithmic transformation has been performed.

Noise Measurement

Sound Pressure Level. Because sound-measuring instruments measure the p_{rms}, the sound pressure level is computed as follows:

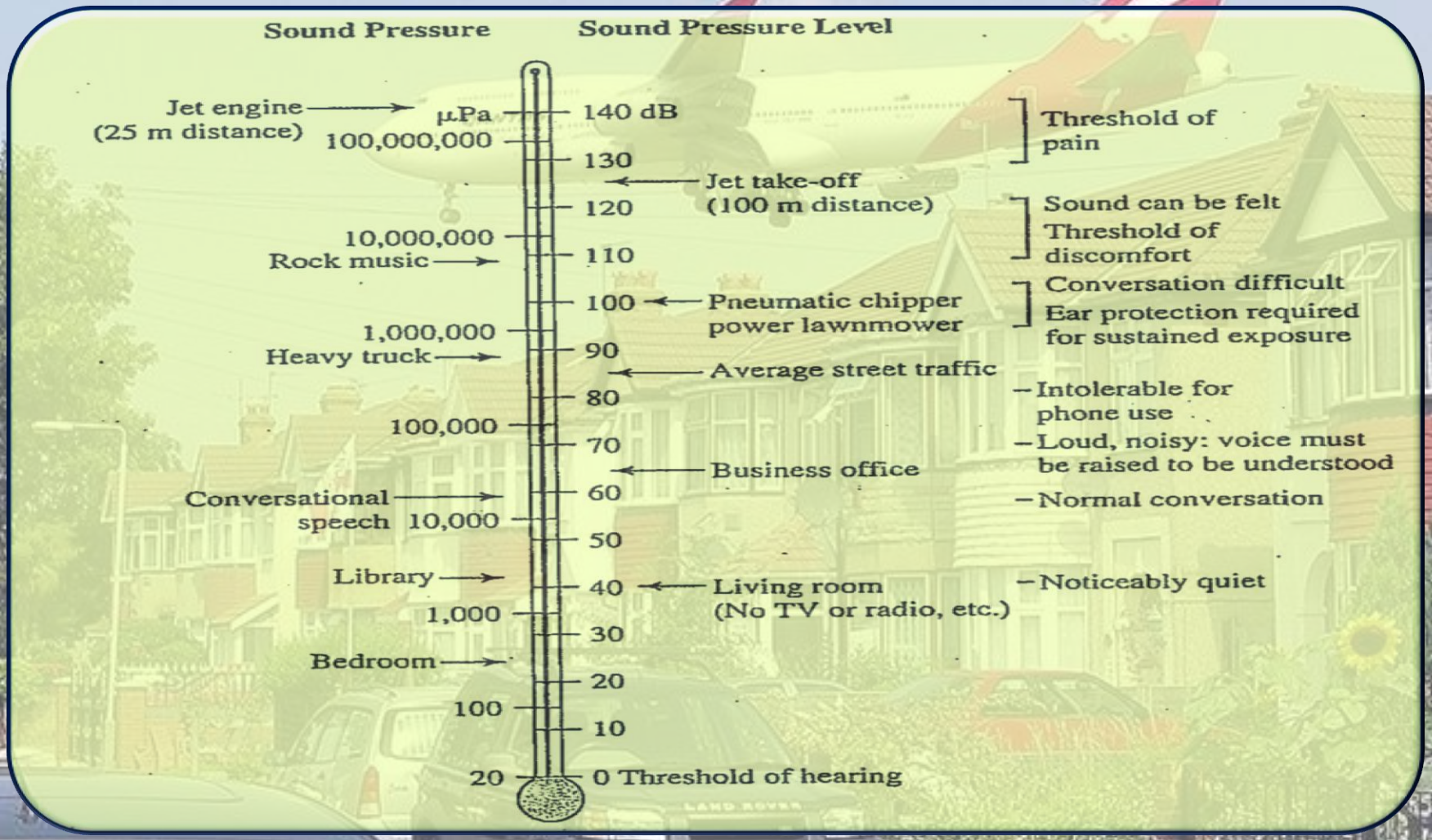
$$L_p = 10 \log \frac{(p_{rms})^2}{(p_{rms})_0^2}$$

which, after extracting the squaring term, is given as

$$L_p = 20 \log \frac{(p_{rms})}{(p_{rms})_0}$$

The reference pressure has been established as 20 μPa (micropascals).

Noise Measurement



Noise Measurement

Equivalent noise level quantifies the noise environment as a single value of sound level for a desired duration. This relates directly to the effects of noise pollution on human beings.

$$L_{eq} = 10log[(\frac{1}{T})\int(p_{a/p_{ref}})\text{^}2 \quad dt\,]$$

Noise Control Strategy

> Planting bushes and trees in and around sound generating sources is an effective solution for noise pollution.

> Regular servicing and tuning of automobiles can effectively reduce the noise pollution.

> Buildings can be designed with suitable noise absorbing material for the walls, windows, and ceilings.

Noise Control Strategy

> Workers should be provided with equipment's such as ear plugs and earmuffs for hearing protection .

> Similar to automobiles, lubrication of the machinery and servicing should be done to minimize noise generation.

> Soundproof doors and windows can be installed to block unwanted noise from outside.

Noise Control Strategy

> Workers should be provided with equipment's such as ear plugs and earmuffs for hearing protection .

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Noise Control Strategy

> Regulations should be imposed to restrict the usage of play loudspeakers in crowded areas and public places.

> Factories and industries should be located far from the residential areas

>Community development or urban management should be done with long-term planning, along with an aim to reduce noise pollution>

Noise Control Strategy

> Social awareness programs should be taken up to educate the public about the causes and effects of noise pollution.