

# Analysis of Noise Pollution in Kolhapur City and Technical remedy to Reduce Noise Level: A Review

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**Abstract:** As per “The Noise Pollution (Regulation and Control) Rules, 2000” increasing ambient noise level in public from various sources, inter-alia, industrial activity, construction activity, fire crackers, sound producing instruments, generator sets, loud speakers, public address systems, music system vehicular horns and other mechanical devices have deleterious effects on human health and psychological wellbeing of the people; it is considered necessary to regulate and control of noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise. Considering the recent situation and increased population, vehicles and industrialization in Kolhapur has motivated to carry out the research work on noise pollution in Kolhapur city.

**Keywords:** Inter-alia, deleterious effects, psychological wellbeing, industrialization

## 1. Introduction

Noise Pollution is an important aspect besides Air and Water pollution because it affects mental and physical health as well as interference with indices of human comfort and emotions such as effect on sleep, conversation, frequency of induced state of annoyance, hearing loss, cardiovascular problem, as well as steady mindset to support tasks performance (Singh&Davar 2004). Therefore noise pollution has become serious issue, hence “The Noise Pollution (Regulation and Control) Rules, 2000” have also been implemented by Government of India in the recent past for regulation and control of noise producing and generating sources. Kolhapur is Historic and tourist place. Lots of devotees and tourists visits city regularly, also industrialization has grown in city in large amount, which has caused increased number of vehicles. Increased vehicles, population has caused increased noise level of Kolhapur. This project will include the study of noise level of various points at various time and various conditions in Kolhapur and Technical measures to control Noise Level. On the basis of this study noise pollution can be reduced to some extent by enforcing rules as per given in “The Noise Pollution (Regulation and Control) Rules, 2000.”

### A. General aspect of noise pollution

Sound that is unwanted or disrupts one’s quality of life is called as noise. When there is a lot of noise in the environment

beyond certain limit, it is termed as noise pollution. 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 it can’t be seen, smelt, or tasted. World Health Organization (Report 2001) stated that “Noise must be recognized as a major threat to human wellbeing” Noise is normally defined as 'unwanted sound'. A more precise definition could be: noise is audible sound that causes disturbance, impairment or health damage. The terms 'noise' and 'sound' are often synonymously used when purely acoustical dimension is meant (e.g., noise level, noise indicator, noise regulation, noise limit, noise standard, noise action plan, aircraft noise, road traffic noise, occupational noise, etc.). The link between exposure and outcome (other terms: endpoint, reaction, response) is given by reasonably well-established exposure-response. Managing noise is crucial for enhancing the living condition of a dwelling. Noise can be generated internally within a building (e.g., noise from surrounding neighbors’ voices, music or appliances) or externally (e.g., traffic noise from automobiles, buses, trains, aircraft, industrial activities or surrounding construction activities). Noises (or impact of sounds) are transmitted through building materials from sound sources such as vehicular or foot traffic, banging, or objects being dropped to the floor and can also be associated with vibrations. The design solutions for limiting air borne and structure borne noises are not always the same as stated by Li et al (2000).

### B. Sources of noise pollution

- Transportation systems are the main source of noise pollution in urban areas. Construction of buildings, highways, and roads cause a lot of noise, due to the usage of air compressors, bulldozers, loaders, dump trucks, and pavement breakers.
- 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 as per environmental protection bureau (Anon. 2010a).

### C. Effect of noise pollution

The effects of noise are seldom catastrophic, and are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. Sleep disruption, the masking of speech and television, and the inability to enjoy one's property or leisure time impair the quality of life. In addition, noise can interfere with the teaching and learning process; disrupt the performance of certain tasks, and increase the incidence of anti-social behavior (Mangalekar et al 2012).

- According to the MCI, there are direct links between noise and health. Also, noise pollution adversely affects the lives of millions of people.
- Noise pollution can damage physiological and psychological health.
- High blood pressure, stress related illness, sleep disruption, hearing loss, and productivity loss are the problems related to noise pollution.
- It can also cause memory loss, severe depression, and panic attacks.
- Noise is a disturbance to the human environment and is escalating at such a high rate that it will become a major threat to the quality of human lives.
- Noise in all localities, especially urban areas, has been increasing rapidly during the last few decades. To prevent this and ensure that the level of pollution emission will not exceed the legal limits, Gilchrist et al (2003) have described some positive measures to eliminate the noise pollution.

### 2. Sound absorbing materials and their use

- Sound absorbing materials are used in almost areas of noise control engineering to reduce sound pressure levels. To use them effectively, it is necessary to:
- Identify the important physical attributes and parameters that cause a material to absorb sound.
- Provide a description of the acoustical performance of sound absorbers used to perform specific noise control functions
- Develop experimental techniques to measure the acoustical parameters necessary to measure the acoustical parameters of sound absorbing materials and the acoustical performance of sound absorbers.
- Introduction of sound absorbing materials in noise control enclosures, covers and wrappings to reduce reverberant build up and hence increase insertion loss
- Introduction of sound absorbing materials onto surfaces of rooms to control reflected sound.

### A. Sound absorption

- Absorptive materials are used to control airborne sound by reducing reflections (foams, mineral wool).
- These are applied in the passenger compartment and increasingly in the engine bay (under the bonnet, on

firewall, on under-trays).

- For an absorptive boundary, the absorption coefficient is defined as the ratio of absorbed intensity to incident intensity.

### B. Porous absorptive materials

Porous absorbing materials are usually more than 90% air. The small pores lead to dissipation of the sound propagating through them. At high frequencies, a porous material has acoustic impedance similar to that of air. Most incident energy enters the porous material and is absorbed there. At low frequencies, a layer of porous material behaves acoustically like stiffness. This leads to large reflection and little absorption.

### C. Mechanism of sound absorption in fibrous materials

*Thermal Losses:* the oscillating pressure acting at the material causes the air molecules to oscillate in the pores at the frequency of the excitation. This results in sound energy being dissipated as heat due to friction losses. This mechanism is important at high frequencies. *Momentum Losses* Changes in flow direction as well as expansions and contractions of the flow through the irregular pores gives rise to a loss of momentum in the direction of wave propagation. This mechanism is important at high frequencies.

## 3. Conclusion

It is frequently necessary to use techniques that lower the level of noise on the roadside or at source. A variety of methods is available for noise reduction but they can be basically grouped as follows: passive and active medium. Active medium differ from passive mediums in that it is necessary to apply external energy in the noise reducing process. The absorbing materials, as such, are passive mediums that lower noise by disseminating energy and turning it into heat given by Environmental Protection Department Hong Kong (Anon. 2006a).

The techniques employed for noise control can be broadly classified as:

- Control at source
- Control in the transmission path
- Using protective equipment

### A. Noise barrier

Noise barriers are typically constructed of cast-in-place concrete or masonry block in certain areas, where space allows and where soil material is available, earth berms are constructed as noise barriers. The barriers effectively reduce noise levels, but often cause undesirable secondary impacts, such as blocked views of houses, blocking the entry point for houses, frontal view, scenic features, and decreased visibility from the roadway, large shadows cast across a resident's front yard and backyard for extended periods of the day. Raising noise barriers to achieve further noise reduction often exacerbates these secondary impacts (Anon. 2006c). Innovative noise barrier designs and treatments have been successfully implemented in other countries for a number of years. These innovative designs

have allowed the construction of a noise wall as a traditional wall. Some of the innovative materials and designs that have been researched and used in other jurisdictions include transparent panels, semi-translucent concrete materials, acoustical treatments, and specially designed top treatments, such as curved or angled tops, irregular top edges, or T-top treatments. Many of these designs have their own advantages and disadvantages (Anon. 2006c). This research paper deals with one such barrier: provision along the road side to find the noise levels reduction at OMR.

The noise barriers selected are:

- Noise barrier made of thatched leaves (porous material)
- Noise barrier made of plain cement concrete (non porous material)
- Noise barrier made of fly ash bricks (non porous material)

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