

Research Paper

A STUDY OF NOISE IN GORAKHPUR CITY, UTTAR PRADESH (INDIA)

Renasha Singh¹ and Govind Pandey^{1*}

*Corresponding author: **Govind Pandey**, ✉ pandey_govind@rediffmail.com

The present study indicates that Gorakhpur city is suffering from higher level of noise pollution as compared to standard stipulated by Central Pollution Control Board (CPCB), New Delhi. It was observed from the study that the places which must be peaceful are also in the grip of noise. The main causes of higher noise level in Gorakhpur city are population, traffic, and indiscipline among the public due to disobedience of Noise Act. For this purpose present study was carried out at different locations of silent zone, residential zone and commercial zone with Sound Level Meter to assess the day and night sound level. Gorakhpur city is one of the important cities of Uttar Pradesh. So an attempt has been made in city of Gorakhpur to measure noise level and also made recommendations to overcome this noise pollution in the prominent city.

Keywords: Gorakhpur city, Noise Pollution, Sound Level Meter; Permissible limit

INTRODUCTION

Noise is defined as unwanted sound. The word noise is derived from Latin word, *Nausea*. Noise may be defined as “wrong sound in the wrong place, at the wrong time”. The potential health effects of noise pollution are numerous, pervasive, persistent, and medically and socially, significant. Noise produces direct and cumulative adverse effects that impair health and that degrade residential, social, working, and learning environments with corresponding real (economic) and intangible (well-being) losses. It interferes with sleep, concentration,

communication, recreation, vegetation, animals and birds. Though noise pollution is a ‘slow and subtle killer’, yet very little efforts have been made to ameliorate the same. It is, along with other types of pollution has become a hazard to quality of life.

Increasing number of vehicles, musical instruments, industries, urbanization, population explosion are considered as main causes of noise pollution but indiscipline among the mob is more responsible for the ambient noise overall. It is more severe and widespread than ever before, and it will

¹ Department of Civil Engineering, Madan Mohan Malviya Engineering College Gorakhpur, Gorakhpur, UP, India 273001.

continue to increase in magnitude unless everyone is aware about its effects. Thus may not seem to be, but it definitely disturbs our whole system and often we become a part of it knowingly or unknowingly. Gorakhpur, being a prominent city in Eastern UP, happens to be the focal point of major business, commercial, industrial and other activities in the region.

About Gorakhpur City

The present district of Gorakhpur, 265 km east of capital Lucknow, on National Highway -28, lies between Lat. 26°13'2N and 27°29'2 N and Long. 83°05'2 E and 83°56'2 E situated on the basin of rivers Rapti and Rohini; the geographical shape of the Gorakhpur city is of bowl. The famous Ram Garh Tal has also been included in the National Lake Conservation list.

A city of saints and revolutionaries is situated on the banks of the river Rapti and Rohini, which originates from the Himalayan Kingdom, Nepal. It is named after the great saint of Nath cult Guru Gorakhnath who is said to be an incarnation of Lord Shiva.

Importance

Historical: Gorakhpur has been the center of Aryan culture and civilization. According to ancient history it was a part of “Madhyadesh” and was included in the famous kingdom of Kosala. In Valmiki Ramayana, it is referred to as Karupath and is described as a beautiful quiet country, which was assigned to Angad and Chandrakatu, the two sons of Laxman. It again finds in Mahabharata episode relating to Bhim’s conquest of the eastern part before the Rajsuya Yajus of Yudhisthir. In the sixth century BC, this was the original home of

Chandragupta Maurya and Ashoka. Also Gorakhpur rose to great eminence during the Buddhist period. Buddha spent his early life at Kapilvastu which was a part of Gorakhpur then. He attained parinirvan at Kushinagar, 52 km from the city. It is also considered as the origin place of Sarjupareen Brahmins.

Political: During the regime of Mughal emperor Akbar, Gorakhpur was made the headquarter of one of the five sarkars of Oudh (Under British rule, the district was under the charge of Mr. W Paterson (collector), Mr. W Wynyard (judge) and Mr. F Bird (joint magistrate). Gorakhpur rose to great eminence due to the historic ‘CHAURI CHAURA’ incident of February 4, 1922, which was a turning-point in the history of India’s freedom struggle

Commercial: Gita Press is located in Gorakhpur. It is the world’s largest publishers of Hindu religious texts. Gorakhpur is also the Head Quarter of Air Force and known for Squadrons of Jaguar jet fighters. It is the Headquarter of N E Railway and a strategic-cum-civilian airport is also located here.

| Table 1: General Information About Gorakhpur | |
|---|----------------------|
| Total Area | 3483.8 sq. km |
| Total population | 37,69,456 |
| Urban Population | 19.60% |
| Rural population | 80.40% |
| Literacy | 73.25% |
| Male literacy | 84.38% |
| Female Literacy | 61.54% |

PERMISSIBLE STANDARDS AND FEW LEGISLATIVE POINTS

The aim of enlightened governmental controls should be to protect citizens from the adverse effects of airborne pollution, including those produced by noise. People have the right to choose the nature of their acoustical environment; it should not be imposed by others. Central Pollution Control Board (CPCB) has requested to all State Pollution Control Board (SPCB) and Pollution Control Committees (PCC) for providing information on the identified authority for implementation of THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 in their respective state⁹.

- a. Restrictions on the use of loud speakers/ public address system and sound producing instruments :
 - i. A loud speaker or a public address system shall not be used except after obtaining written permission from the authority.
 - ii. A loud speaker or a public address system or any sound producing instrument or a

musical instrument or a sound amplifier shall not be used at night time except in closed premises for communication within, like auditoria, conference rooms, community halls, banquet halls or during a public emergency.

- iii. Notwithstanding anything contained in sub-rule (2), the State Government may subject to such terms and conditions as are necessary to reduce noise pollution, permit use of loud speakers or public address system and the like during night hours (between 10.00 p.m. to 12.00 midnight) on or during any cultural or religious festive occasion of a limited duration not exceeding 15 days in all during a calendar year. The concerned State Government shall generally specify in advance, the number and particulars of the days on which such exemption would be operative.
- b. Restrictions on the use of horns, sound emitting construction equipments and bursting of fire crackers:-
 - i. No horn shall be used in silence zones

Table 2: Noise Level Standards in Some Countries and WHO

| Country | Industrial | | Commercial | | Residential | | Silent Zone | |
|--------------|------------|-------|------------|-------|-------------|-------|-------------|-------|
| | Day | Night | Day | Night | Day | Night | Day | Night |
| Australia | 65 | 55 | 55 | 45 | 45 | 35 | 45 | 35 |
| India | 75 | 70 | 65 | 55 | 55 | 45 | 50 | 40 |
| Japan | 60 | 50 | 60 | 50 | 50 | 40 | 45 | 35 |
| US | 70 | 60 | 60 | 50 | 55 | 45 | 45 | 35 |
| WHO | 65 | 65 | 55 | 55 | 55 | 45 | 45 | 35 |

Note: (Noise levels are in dB)

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.; 2. Night time shall mean from 10.00 p.m. to 6.00 a.m.; 3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority; 4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority; 5. A "decibel" is a unit in which noise is measured.

or during night time in residential areas except during a public emergency.

- ii. Sound emitting fire crackers shall not be burst in silence zone or during night time.
- iii. Sound emitting construction equipments shall not be used or operated during night time in residential areas and silence zones.

METHODOLOGY

Noise levels have been recorded by means of a *Precision Noise Level Meter of Make 'Bruel and Kjaer, Denmark (2232)'*. The basic parts of a sound level meter include a microphone, amplifier, weighting networks and a display reading in decibel (one-tenth part of "bel", unit of sound). The data has been collected for overall 10 h on the respective day at the selected sites. The time being selected the most prior ones: around 5 a.m. to 6 a.m., 8 a.m. to 9 a.m., 9 a.m. to 10 a.m., 10 a.m. to 11 a.m., 2 p.m. to 3 p.m., 3 p.m. to 4 p.m., 5 p.m. to 6 p.m., 7 p.m. to 8 p.m. and 10 p.m. to 11 p.m. The time has been selected so as to cover most part of the day, from calm mornings, rush hours, pleasant evening, to silent nights, as they should be respectively. Possibly, the readings have been taken from at least 1.5 m above the ground level, at the concerned hours for 10 min duration at fixed intervals of 15 s, so that gives about 40 readings for each observation hour. Further, calculations have been done using formula of

L_{eq} ,

$$L_{eq} = 10 \log \sum_{i=1}^{i=n} 10^{L_i/10} \times t_i$$

where,

n = total number of sound samples

L_i = noise level of any i^{th} sample

t_i = time duration of i^{th} sample expressed as fraction of total time sample

RESULTS AND DISCUSSION

The noise was recorded in different area of Gorakhpur city categorized in silent, residential and commercial zones, respectively. It is revealed that the range of noise levels in all the areas were much higher than the permissible values as per standards.

Case 1: The permissible noise limits of the silent zone are 50 dB in the day time and 40 dB in the night time. However, noise levels at all the observation sites were found insatiable and reasons being mostly the shops and traffic.

- The noisiest observation site is Normal Area with night noise 185.75% of the permissible limit 40 dB and the day noise also very high 164.34% of the permissible limit 50 dB.
- The least noisy site among is Carmel in the day time while Jubilee in the night time but still affected by noise pollution.

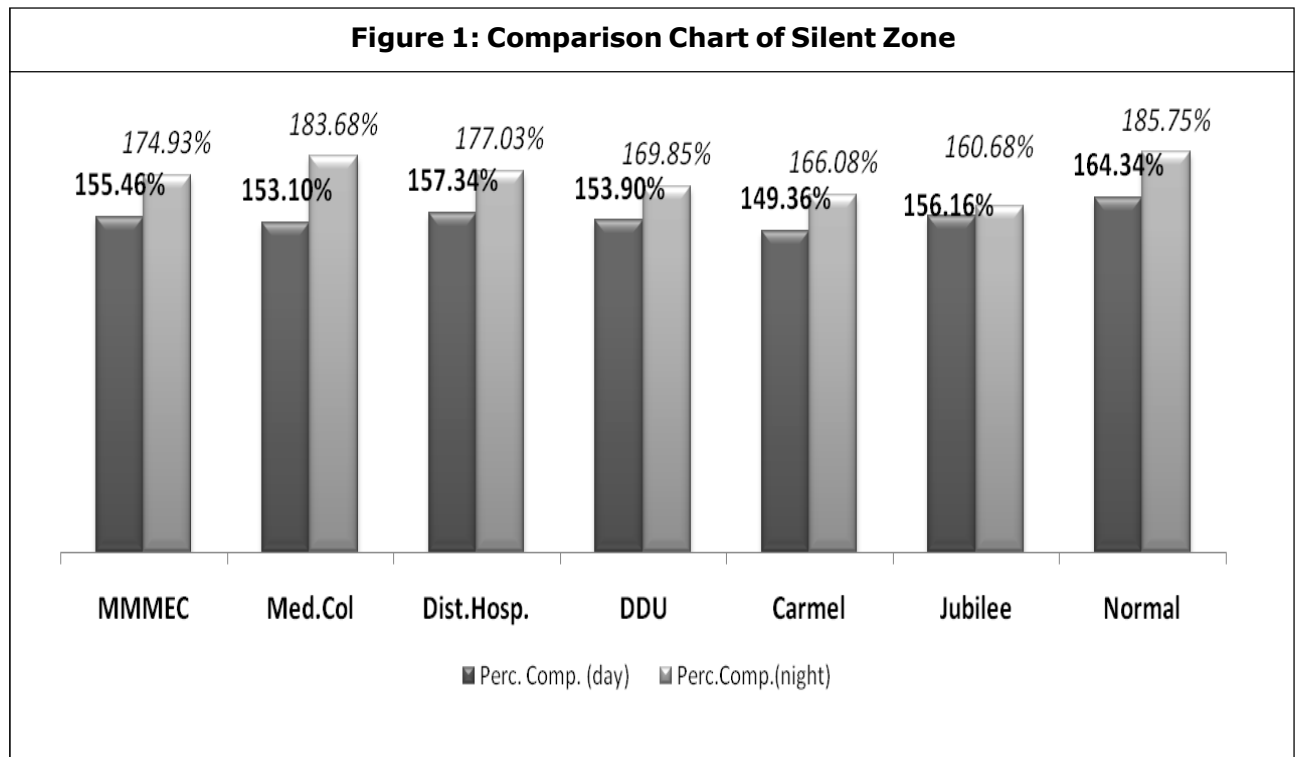
Case 2: The permissible noise limits of the silent zone are 55 dB in the day time and 45 dB in the night time. The sources mostly seemed to be domestic, loudspeakers and automobiles.

- The noisiest site is Paidleyganj while Taramandal is least noisy but still not under permissible limit.

Table 3: Results of Silent Zone

| S.No. | Site | Range of Noise Levels (in dB) | | Comparison* of Max. Noise level with CPCB limit (in %) | | Whether in limit? (Yes/No) |
|-------|-------------------|-------------------------------|----------------|--|--------------------|----------------------------|
| | | In Day Hours | In Night Hours | Day Hours (50dB) | Night Hours (40dB) | |
| 1 | MMME College | 66.17-77.73 | 46.66-69.97 | 155.46 | 174.93 | No |
| 2 | Medical College | 68.87-76.55 | 45.52-73.47 | 153.10 | 183.68 | No |
| 3 | District Hospital | 50.96-78.67 | 38.78-70.81 | 157.34 | 177.03 | No |
| 4 | DDU University | 68.22-76.95 | 37.19-67.94 | 153.90 | 169.85 | No |
| 5 | Carmel School | 70.62-74.68 | 36.81-66.43 | 149.36 | 166.08 | No |
| 6 | Jubilee School | 57.73-78.08 | 36.40-64.27 | 156.16 | 160.68 | No |
| 7 | Normal School | 67.17-82.17 | 56.57-74.30 | 164.34 | 185.75 | No |

Note: % = (Max. Leq/Permissible Noise Limit)*100; Day Hours are reckoned from 6 am to 10 pm; Night Hours are reckoned from 10 pm to 6 am.



Case 3: The permissible noise limits of the silent zone are 65 dB in the day time and 55 dB in the night time. Generator, traffic

congestion, indiscipline and over commercialization were basically responsible for the high noise pollution.

Table 4: Results of Residential Zone

| S.No. | Site | Range of Noise Levels (in dB) | | Comparison* of Max. Noise level with CPCB limit (in %) | | Whether in limit? (Yes/No) |
|-------|-------------|-------------------------------|-------------|--|--------------------|----------------------------|
| | | Day Time | Night Time | Day Hours (55dB) | Night Hours (45dB) | |
| 1 | Paidleyganj | 69.46-98.47 | 56.57-82.09 | 179.04 | 182.42 | No |
| 2 | Bilandpur | 52.69-89.70 | 35.43-74.24 | 163.09 | 164.98 | No |
| 3 | Taramandal | 46.20-70.86 | 36.81-48.33 | 128.84 | 107.40 | No |
| 4 | Raptinagar | 66.52-73.99 | 35.45-52.69 | 134.53 | 117.09 | No |
| 5 | Humayunpur | 72.27-82.75 | 48.34-76.33 | 150.45 | 169.62 | No |
| 6 | Rasoolpur | 48.09-72.71 | 35.29-52.14 | 132.20 | 115.87 | No |

Note: % = (Max. Leq/Permissible Noise Limit)*100; Day Hours are reckoned from 6 am to 10 pm; Night Hours are reckoned from 10 pm to 6 am.

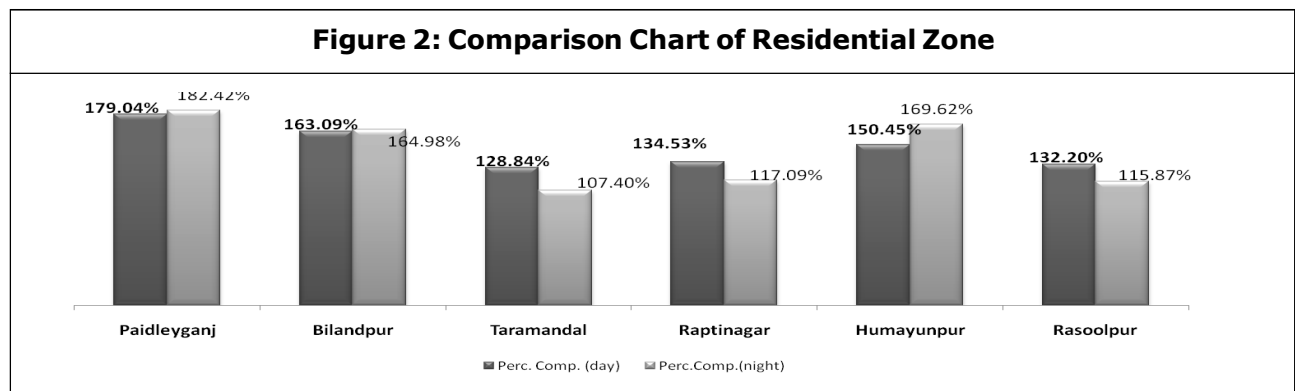
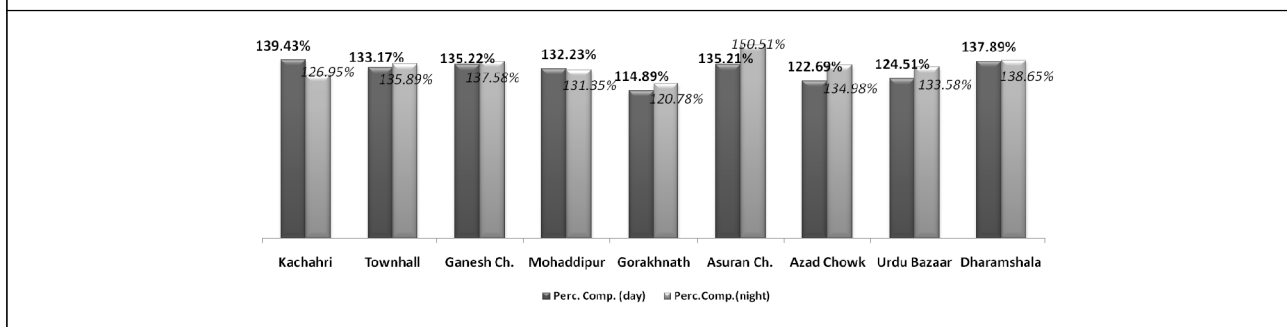


Table 5: Results of Commercial Zone

| S.No. | Site | Range of Noise Levels (in dB) | | Comparison* of Max. Noise level with CPCB limit (in %) | | Whether in limit? (Yes/No) |
|-------|-------------------|-------------------------------|-------------|--|--------------------|----------------------------|
| | | Day Hours | Night Hours | Day Hours (65dB) | Night Hours (55dB) | |
| 1 | Kachahri Chauraha | 74.26-90.63 | 53.84-69.82 | 139.43 | 126.95 | No |
| 2 | Townhall | 70.35-86.56 | 37.18-74.74 | 133.17 | 135.89 | No |
| 3 | Ganesh Chowk | 70.17-87.89 | 36.87-75.67 | 135.22 | 137.58 | No |
| 4 | Mohaddipur | 74.46-85.95 | 64.62-72.24 | 132.23 | 131.35 | No |
| 5 | Gorakhnath Mkt. | 65.80-74.68 | 36.81-66.43 | 114.89 | 120.78 | No |
| 6 | Asuran | 74.30-87.89 | 57.73-82.78 | 135.21 | 150.51 | No |
| 7 | Rustampur | 50.96-79.75 | 45.52-74.24 | 122.69 | 134.98 | No |
| 8 | Urdu Bazaar | 50.97-80.93 | 35.29-73.47 | 124.51 | 133.58 | No |
| 9 | Dharamshala | 68.88-89.63 | 51.99-76.26 | 137.89 | 138.65 | No |

Note: % = (Max. L_{eq}/Permissible Noise Limit)*100; Day Hours are reckoned from 6 am to 10 pm; Night Hours are reckoned from 10 pm to 6 am.

Figure 3: Comparison Chart of Commercial Zone

CONCLUSION AND RECOMMENDATIONS

During the study period it was found that all the values of noise level at all the selected sites was high than the prescribed limit of CPCB. The noise in all the areas of Gorakhpur city is drastically higher and therefore suitable control measures need to be adopted urgently in the city before it is too late. Here are some recommendations.

1. There should be no submergence of the silent zone with the other zones to avoid the interference of noise pollution by any means.
2. The residential areas should be guarded by the noise barriers like green belt development to enhance the sustainable development, turn down global warming and coherently reduce the noise pollution.
3. The commercialization of the residential areas should be immediately barred to avoid the chaos in the city.
4. The commercial areas apart from being separated from the other zones must be kept under the CPCB guidelines. Strict penalty should be put on the persons responsible for noise from generator. Traffic should be handled in a proper way by providing parking space and broadening the roads without affecting the eco-system.
5. The unlawful use of loudspeakers by the persons in disguise of religious aspects or other reasons without permission should be heavily penalized.
6. A committee can be organized to maintain the peaceful environment in the city, with the anonymous public complain system and penalize whosoever against it.
7. Apart from the above official measures, proper awareness must be spread among the people, about the negative impacts of noise pollution and the legislative rules, through schools, engineering and other educational institutions. This can be further supported by other communication means of entertainment like radio, etc., thus teaching people to be in discipline the first thing being taught to a child.
8. Technically, the noise pollution can be controlled by advancing the automobile horn system and public traffic system by using sensors, etc.
9. More research and development seems to be needed in this area, followed by more and more surveys.

Often neglected, noise pollution adversely affects the human being leading to irritation, loss of concentration, loss of hearing, etc. Intentionally or unintentionally, each one of us contributes to noise pollution, because most of our day-to-day activities generate some noise. Hence, controlling the noise pollution is impossible unless each one of us is aware about it. It is high time and everyone should play his part in curbing the noise pollution, which is otherwise agreeably or disagreeably a *SLOW POISON*.

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REFERENCES

1. Agarwal S and Swami B L (2010), "Status of Ambient Noise Levels in Jaipur City", *Environment Conservation Journal*, Vol. 11, No. 1, pp. 105-108.
2. Bhaven Tandel (2011), "Urban Corridor Noise Pollution: A case study of Surat city, India", *International Conference on Environment and Industrial Innovation*, Vol. 12, pp. 144-148.
3. Chauhan Avinash (2010), "Assessment of noise level in different zones of Haridwar City Uttarakhand", *Researcher*, Vol. 2, No. 7, pp. 56-59.
4. Dooling R J and Propper AN (2007), "The Effects of Highway Noise on Birds", *The California Department of Transportation*, *Journal of Human Ecology*, Vol. 16, No. 3, pp. 181-187.
5. Frank Theakston (2011), "Burden of Disease from Environmental Noise", WHO Regional Office of Europe.
6. *Gorakhpur City Guide* (2005), A Times of India Publication, Bennett, Coleman & Co. Ltd., New Delhi, pg.8-10.
7. Harris C M (1979), "Hand Book of noise control", McGrawHill, USA.
8. Information about Gorakhpur from <http://gorakhpur.nic.in/>
9. Isabelle Lane, Noise Pollution, MPHP 439, Case Western Reserve University, http://www.cwru.edu/med/epidbio/mphp439/noise_pollution.pdf
10. Khursheed Ahmad Wani Jaiswal Y K (2010), "Assessment of Noise Pollution in Gwalior M.P. India", *Advances in Bioresearch*, Vol. 1, No. 1, pp. 54-60.
11. Kisku G C et al. (2006), "Profile of noise pollution in Lucknow city and its impact on environment", *Journal of Environmental Biology*, Vol. 27, No. 2, pp. 409-412.
12. Lisa Goines and Louis Hagler (2007), "Noise Pollution: A Modern Plague", *Southern Medical Journal*, Vol. 100, No. 3, pp. 287-294.
13. Mangalekar S B (2012), "Study of Noise in Kolhapur City, Maharashtra India", *Universal Journal of Environment Science and Technology*, Vol. 2, No. 1, pp. 65-69.
14. Oyedepo Sunday Olayinka (2012),

- “Noise Pollution in Urban Areas: The neglected Dimensions”, *Environmental Research Journal*, Vol. 6, No. 4, pp. 259-271.
15. Pooja Verma (2010), “Assessment of Noise Pollution in Commercial Areas of Gorakhpur City”, M.Tech. Thesis (unpublished), Department of Civil Engg., Madan Mohan Malviya Engineering College Gorakhpur, Gorakhpur.
16. The Noise Pollution (Regulation and Control) Rules, 2000, CPCB Delhi from <http://cpcb.delhi.nic.in>
17. Vidya Sagar T and Nageshwar Rao G (2006), “Noise Pollution Levels in Visakhapatnam City (India)”, *Journal of Environmental Science and Engineering*, Vol. 48, No. 2, pp. 139-142.
18. Wazir Alam (2011), “GIS based Assessment of Noise Pollution in Guwahati City of Assam, India”, *International Journal of Environmental Sciences*, Vol. 2, No. 2, pp. 731-740.