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Full paper available on: www.jeb.co.in

J. Environ. Biol.
33, 999-1002 (2012)
ISSN: 0254-8704
CODEN: JEBIDP

Preliminary information on noise pollution in commercial banks of Balasore, India

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Publication Data

Paper received:
28 January 2011

Revised received:
02 July 2011

Accepted:
06 August 2011

Abstract

The environmental noise in some commercial banks of Balasore, in terms of standard noise indices was worked out in the present study. Noise pollution was assessed in twenty different commercial banks of the city on 31st August, 2010 and during first week of September, 2010. The present noise monitoring was conducted with the help of sound level meter, which was calibrated acoustically using an external reference source, and placed over the microphone. It is inferred that the noise levels were more than the permissible limit i.e. 50 dB as prescribed in USA in all the investigated banks of Balasore and the maximum noise levels were around double of the said permissible limit, which is a contradiction with that of developed countries. Analysis of variance was also computed for all the banks during peak hour (10a.m.-12noon). The mean values of noise levels in different banks ranged from 75.5 to 90dB; from 69 to 83.6dB and 71.5 to 83.5dB during 10a.m.-12noon, 12-2p.m. and 2-4p.m., respectively. It was categorically observed that noise levels were more during 10a.m.-12noon than other investigated time intervals in all the 20 investigated banks. It is imperative to mention here that such an attempt of assessing noise in banks is first of its kind in India.

Key words

Indian Banks, Noise pollution

Introduction

The studies on traffic noise, highway noise and noise in different zones of the Indian cities have been worked out for last few decades (Rao *et al*., 1987; Ravindranath *et al*., 1989; Kumar and Jain, 1994; Chakraborty *et al*., 2002; Nirjar *et al*., 2003; Banerjee and Chakraborty, 2006; Ziaudin *et al*., 2007). However, the study on environmental noise of banks was not empirically assessed so far except a preliminary assessment of Khudesia and Tiwari (2007) in some commercial banks of Rourkela. Now a days, there are records of high level of dissatisfaction due to noise incidence in different offices, especially in banks of India. The increase in number of customers and increased transactions of different industrial establishments make the environment of bank noisy. On the last working day of the month or during first week of the month, huge crowd rush into the banks to collect their salary. Unlike environmental noise in commercial banks of foreign countries, where recommended noise level is 50 dB (Rettinger, 1977), there is no standard for noisy Indian banks. The Indian banks are usually much noisier due to large customers' inflow and other factors. The objective of the study was to assess the level of noise pollution of the selected banks of Balasore (Orissa) and to compare with the recommended noise levels for banks in USA (50 dB)(Kudesia and Tiwari, 2007; Rettinger,1977).

Materials and Methods

Study area : Balasore city is the district head quarter of the Balasore district (a north-eastern coastal district of Orissa, India) (Fig. 1). The district is located between $21^0 03'$ and $21^0 59'$ N latitude and between $86^0 20'$ and 87^0 E longitude. The present noise monitoring was conducted with the help of sound level meter (Model LUTREN, SL-4010). The noise levels were measured following standard procedure (Pandya and Dharmadhikari, 2002) using calibrated sound level (dB) meter on 31st August, 2010 (last working day of August) and during first week of September, 2010 at selected banks (1-20) around Balasore at 2hrs intervals. Altogether 120

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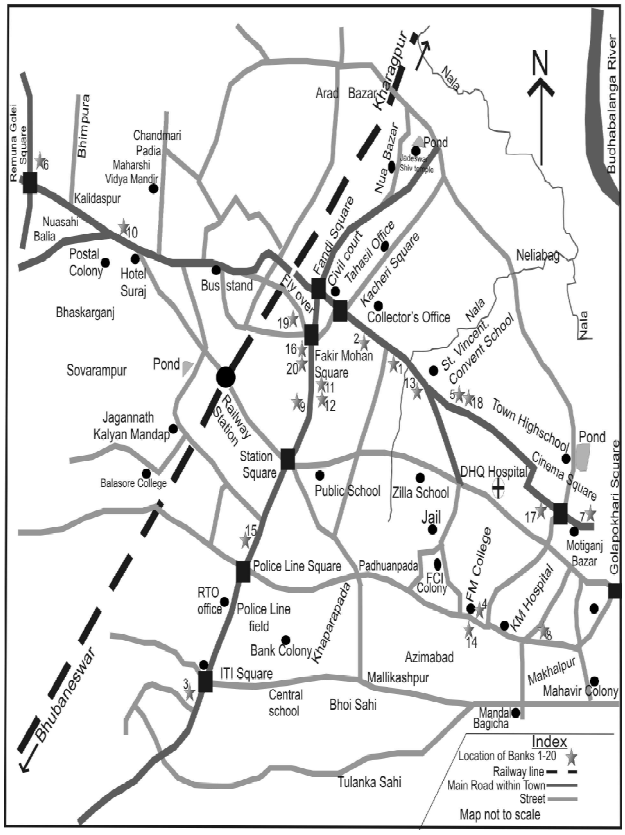

Fig.1: Location map of banks (1-20) in Balasore, India

measurements were made within 2hr duration (i.e. at one minute interval) during specified time from 10 a.m.-12 noon, 12-2 p.m. and 2-4 p.m. in the common corridors of all twenty investigated banks by holding sound level meter in hand at arms length at the chest level in order to reduce errors due to reflection of sound from the body of investigator holding the instrument. The noise levels of different banks in different time intervals were predicted along with their equivalent noise levels (L_{eq}). The value of L_{eq} in dB (A) unit was calculated using the following formula (Robinson, 1971).

$$L_{eq} = L_{50} + (L_{10} - L_{90})^2 / 56$$

L_{eq} represents the equivalent energy sound level of a steady state and invariable sound. It includes both intensity and length of all sounds occurring during a given period. The analysis of the measured noise levels depicts that there are existence of variations of noise as the time of day varies. In order to determine the statistical significance of the variations of noise, analyses along with F-test were assessed during peak time (i.e. during 10a.m.-12 noon) on the data.

Results and Discussion

Noise pollution was assessed and analyzed in different commercial banks of the city (Table 2). It was observed that peak levels of activity occured in the banks in the forenoon i.e. during 10-12 noon. There were fairly less noise during 12-2 p.m. and 2-4 p.m. While conducting noise survey, it was observed that main sources of noise in the investigated commercial banks were generators, air conditioners, fans, printers and chattering among the (bank) employees or the customers. It is pertinent to mention here that due to the power failure, the generators were generally used in all the investigated banks.

The noise data collected from different banks displayed wide ranges of noise level varying in aforesaid three different times (10a.m.-12 noon, 12-2p.m. and 2-4p.m.). The noise levels ranged between 60.1 to 111dB; 60 to 110.5dB; 65 to 106.3dB; 64.6 to 106.8dB; 59.3 to 101dB; 64.3 to 104dB; 58.9 to 98.3dB; 60.1 to 99.9dB; 57.8 to 101.6dB; 58 to 108.6dB; 59.9 to 99.3; 60.1 to 102.3dB; 58.6 to 99.7dB; 65.1 to 101.3dB; 53 to 93dB; 55.6 to 92.6; 58.9 to 102.6dB; 55.9 to 98.4dB; 60.5 to 101dB and 61.1 to 98dB at the common corridor of SBI Main Branch, Indian Overseas Bank, SBI Industrial Estate Branch, SBI FM College Branch, UCO Bank-Main Branch, UCO Bank-Ganeswarpur Branch, Syndicate Bank, Bank of Baroda, Bank of India, Canara Bank, Andhra Bank, Punjab National Bank, Dena Bank, Oriental Bank of Commerce, Axis Bank, HDFC Bank, Allahabad Bank, Bijaya Bank, Cooperative bank and ICICI Bank, respectively (Table 1). The maximum mean noise level was assessed in main branch of SBI (90dB), while minimum in Axis Bank (71.5dB).

All these commercial banks are located in the heart of this city and along the main road. Thus, the noise from road traffic was also major contributor to the noisy banks. It was also noticed that the problem of noise in banks was aggravated due to multiple reflections of sound from concrete walls and bare floors (Kudesia and Tiwari, 2007). In all the cases, even the minimum noise levels were beyond the permissible limit (50 dB). As most of the people experienced annoyance, and in turn disturbance in their work when the noise level crossed 65 dB (Kudesia and Tiwari, 2007); it is evident that all the employees of the banks might be experiencing some degree of noise related annoyance.

L_{10} values of all the 20 monitored banks ranged between 90.5 to 105.2dB, 83.2 to 98.6dB, and 87.1 to 98dB during 10a.m.-12 noon, 12-2 p.m. and 2-4 p.m., respectively. Similarly, L_{50} and L_{90} values of all the 20 banks varied from 75.5 to 90dB and 67.5 to 78dB; 67.8 to 84.3dB and 55.7 to 69.8dB; 71 to 86dB and 56.8 to 70.5dB during 10 a.m.-12 noon, 12-2 p.m. and 2-4 p.m., respectively. Accordingly, the calculated Leq (equivalent noise levels) values ranged from 84 to 105.5dB; 81.3 to 99.7dB; and 79.9 to 99.4dB during 10 a.m.-12 noon, 12-2 p.m. and 2-4 p.m., respectively. All these values clearly show higher noise levels in banks of Balasore city, mostly during 10a.m.-12 noon.

Analysis of variance was computed (Table 2) at peak hour i.e. 10 a.m.-12 noon. The observed value of F was 2.5. Here, the calculated F value was more than the tabulated values and was significant at 5% and 1% level of significance. It clearly depicts that the noise levels in all the investigated banks differed significantly at its peak hour i.e. 10 a.m.-12 noon.

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Table- 1: Noise level (dB) variations of different commercial banks of Balasore at different time intervals

Sl.No	Location	10a.m.-12 noon							12noon-2p.m.							2p.m.-4p.m.						
		Min	Max	Mean ±SD	L_{10}	L_{50}	L_{90}	L_{eq}	Min	Max	Mean ±SD	L_{10}	L_{50}	L_{90}	L_{eq}	Min	Max	Mean ±SD	L_{10}	L_{50}	L_{90}	L_{eq}
1	SBI Main Branch	70.2	111	90±6.9	104.3	90	74.8	105.5	60.1	96.7	79.4±8.2	92.3	79.5	68	90	63.6	99	81.8±5.4	95.6	80.5	68.7	93.1
2	Indian Overseas Bank	68.5	110.5	86.8±6.2	102.3	87	72.1	103.2	60	97.5	79.5±7.4	95.6	79	63	97.9	64.3	96.5	82.2±5.8	94.5	82.6	68	94.6
3	Industrial SBI	72.3	106.3	88.5±5.1	101	88.8	78	98.2	65	95.2	78.8±6.1	93.8	78.3	68	90.1	66.7	97	80.7±9.3	94	77.8	69.3	88.6
4	SBI (FM College Branch)	72.5	106.8	88.1±7.4	105.2	88.5	77.3	102.4	65	93.3	78.8±5.1	91.8	77.8	68.3	87.6	64.6	94.7	80.3±7.2	93.8	78.9	69	89.8
5	UCO Bank	69.8	101	83.1±6.1	99.5	82.5	72.3	95.7	59.3	94.1	78.7±3.8	90.5	79.3	65.7	90.2	63	98.9	80.7±6.2	94.6	80.5	67.6	93.5
6	Ganeswarpur UCO Bank	69.8	104	82±8	99.5	84.6	71.6	98.5	64.3	96	78.5±7.4	94.7	77.5	68.3	89.9	66.8	98.5	80.3±4.7	95.6	78.3	68.3	91.6
7	Syndicate Bank	68.5	98.3	83.8±7.9	95.8	81.3	74.8	89.1	58.9	91.3	74.2±4.5	88.6	72.5	62.6	84.5	59.3	89.3	74.3±3.1	87.1	71.8	65.7	79.9
8	Bank of Baroda	69	99.9	81.5±8.7	95.7	79	70.1	90.7	60.1	92.1	75.9±7.8	88.5	77.2	63	88.8	62.5	98.6	79.5±3.9	94.6	77.8	67.1	91.3
9	Bank of India	69.3	101.6	84.8±7.6	99	82	73.7	93.4	57.8	96.1	81.7±6.1	94.5	83	66.8	96.7	64	101.3	83±6.1	95.8	81	70.5	92.4
10	Canara Bank	67.8	108.6	86.5±5.8	101.5	88	72.5	103	58	92.3	78.4±6.3	91	80.1	62.3	94.8	66	98.3	83.5±6.7	96.8	86	70	98.8
11	Andhra Bank	70.5	99.3	85.3±9.0	98.5	87	72.3	99.2	59.9	92	75.9±5.5	89.3	75.3	66.8	84.3	62.8	99	81.8±7.3	95.8	83.7	67.5	98
12	Punjab National Bank	67	99	83±7.3	95.6	82.8	69.3	95.1	60.1	94.8	79.3±6.8	93.7	77.5	67.8	89.4	62.8	102.3	81.3±5.8	93.6	80.1	68.6	91.2
13	Dena Bank	64	97	83.6±8.0	95.6	82	74	90.3	58.6	95.1	76.4±4.8	92.6	78	64.7	91.9	60.5	99.7	82.1±5.9	98	82	66.7	99.4
14	Oriental Bank of Commerce	68.3	96.7	84.1±5.9	95	84.3	70.9	94.6	68.3	100.1	83.6±6.2	98.6	84.3	69.8	99.7	65.1	101.3	82.1±6.83	95.6	81.5	67.5	95.6
15	Axis Bank	67.5	93	75.5±6.0	90.9	75.5	69	84	55.3	88	69±7.0	83.2	67.8	55.7	81.3	53	89.9	71.5±6.8	87.1	71	56.8	87.3
16	HDFC Bank	68	92.6	79.2±7.3	90.5	79.7	68.9	88	55.6	88.2	73.1±7.1	86.5	72.1	58.6	86.2	58.8	90.1	75.2±7.0	88.9	76.1	62.9	88.1
17	Allahabad Bank	66.6	102.6	83.1±6.2	100.1	82.6	68.5	100.4	58.9	93.6	74.5±8	90.1	73.6	59.9	89.8	68	94.5	80.4±8.5	92.6	78.9	65.8	90.7
18	Vijaya Bank	65.6	98.4	81.3±7.4	93.9	80.5	68.3	92.2	55.9	94.9	78.2±6.6	91.3	80.1	62.7	94.7	65.3	96.1	79.2±4.7	94.8	78.5	68.5	90.8
19	Co-operative Bank	68	100.1	84.3±6.6	95.6	87.4	69.9	97.1	60.5	98.3	76.3±6.4	92.1	71.6	62.6	87.1	67.3	91.1	78.4±7.8	89.3	77.6	68.5	85.3
20	ICICI Bank	63.6	97.5	79.3±6.7	91.3	78.5	67.5	88.6	62	98	77.4±5.9	94.6	77.8	64.7	93.7	60.1	92.3	76.1±5.5	91.5	75.6	62.8	90.3

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Table- 2: Analysis of variance in different banks of the study area

SV		SS	DF	MS	F values	
					Observed	Tabulated
10 a.m.-12 noon	Between Samples	4511	19	237.4	F= 2.5	$F_{0.01}$ = 1.88
	Within Samples (Error)	48877.6	522	93.6		
	Total	53388.6	541			$F_{0.05}$ = 1.57

SV: Source of variation; SS: Sum of squares; DF: Degree of freedom; MS: Mean square

It is evident that headache, bad temper, hearing problem, loss of concentration during working hours were some of the significant effects manifested by noise pollution (Goswami, 2009; Jakovlijevic *et al.*, 2009; Goswami *et al.*, 2011). It warrants a systematic survey of annoyance to estimate the extent of disturbance in the work of bank employees. One of the most annoying aspects of noise is that it interferes with speech. In the presence of background noise, one has to raise the voice to carry out conversation and this contributes to further noise pollution.

The present study clearly demonstrates that most of the bank employees and customers had to speak in a louder voice due to speech interference, which irritated them and reduce their working efficiency (Jakovljevic *et al.*, 2009; Kudesia and Tiwari, 2007; Bluhm *et al.*, 2004; Diniz and Zannin, 2004).

The present study also revealed that one of the imperative sources of noise pollution in the banks was portable electric generator. It is interesting to note that all the 20 investigated banks are using generators at the time of regular power failure daily from 10-11am. Hence, highest noise levels were recorded during 10am-12p.m. in all the 20 commercial banks.

Noise pollution is not properly recognized despite the fact that it is steadily growing in the public offices of developing countries like India. It is well established now that noise is a potential hazard to health and has an adverse impact on work efficiency. It is becoming an unjustifiable interference and imposition upon human comfort, health and quality of modern life. Noise pollution is an interfering air-pollutant, which possesses both auditory, and a host of non-auditory effects on the exposed population (Thakur, 2006; Krishna Murthy *et al.*, 2007; Ozer *et al.* 2009).

Protections related to planning, technical, biological, legislative and educational issues should be taken in order to avoid negative effects of noise pollution on environment (Jakovljevic *et al.*, 2009; Ouis 2001; Pandya, 2001). Therefore, authorities should attempt to take up some imperative steps and regulatory measures to abate noise pollution in the respective banks so that work efficiency can be increased.

Acknowledgment

The authors are thankful to Mr. Santosh Kumar Panda, Head, Department of Physics, Dr. J.N.College, Rasalpur for helping us in noise monitoring.

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