

REPORT ON  
AMBIENT NOISE AND STATUS OF AIR POLLUTION  
DURING DEEPAWALI FESTIVAL -2013  
IN BENGALURU CITY, KARNATAKA



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**1. Introduction**

Diwali, the spectacular Hindu festival of lights celebrated all over India. The festival symbolizes the victory of light over dark, good over evil and knowledge over darkness. "Diwali, a contraction of the word "Deepavali" meaning row of lights in Sanskrit is often celebrated with food, cracker bursting, parties and, of course, colorful lights hanging everywhere.

People in different regions in India may celebrate Diwali on various dates and it may last upto 5 days namely (starting from the first) 1. Dhanteras, 2. Choti diwali/ Naraka Chaturdashi, 3. Lakshmi puja, 4. Padwa/ Govardan puja and Bhai Dooj but however Lakshmi puja is celebrated with maximum gloom. In 2013, diwali is celebrated during 2<sup>nd</sup> to 4<sup>th</sup> of November but November 3, 2013 is marked as Deepavali day.

In olden days Diwali signified bringing of light and happiness around but presently burning of firecrackers is the highlight of Diwali and for most of the people, Diwali is just a synonym to a night full of crackers, noise and smoke; Brighter the sparkles, louder the noise the greater the thrill. Firecrackers are burst because it is believed that it drives away evil spirits. Today deepavali is an amalgamation of gloom, darkness, despair, health problems, environment degradation and murk. Bursting of fire crackers create significant pollution.

Noise and air pollution caused by firecrackers poses serious health hazard. The noise triggers annoyance and aggression, hypertension, high stress levels, hearing loss and sleep disturbance. The chemicals and gases released when fireworks are set off includes lead, barium and chromium, carbon monoxide, and nitrogen and sulphur oxides, which are harmful to humans, animals and overall environment.

CPCB for last few years is creating public awareness towards the high noise levels generated during the bursting of the crackers and its associated adverse health impacts. Noise standards for fire crackers have been notified vide GSR No.682 (E) dated 5th October, 1999 under the Environmental (Protection) Act. As per this notification, the manufacture, sale or use of fire crackers generating noise levels exceeding 125 dB (A) or 145 dB (C)pk at 4 meters distance from the point of bursting are prohibited for individual fire crackers. For fire crackers in series, these noise limits are suitably made more stringent depending upon the number of crackers in series. Fire crackers shall

not be used at any time in silence zones, as defined in S.O. 1046 (E) issued on 22.11.2000 by the Ministry of Environment and Forests. Observing that the 'Right to Sleep' is a fundamental right, the government of India has banned firecrackers between 10 pm and 6 am, on Diwali.

CPCB is monitoring the air and noise pollution level on the pre-Diwali day and on Diwali day to assess the impact of bursting of crackers.

## 2. Objectives:

- To assess the ambient noise and air pollution level caused by bursting of crackers and increased volume of traffic.
- Working towards furtherance and perseverance of clean environment
- To provide the information to the regulators and planners as to implement the control measures
- To create awareness about the ill-effects caused by the crackers and in general by pollution
- To educate the public about the legal provisions supporting to protect the environment and health.
- To study the trend of Deepavali pollution over the years

## 3. Monitoring Programme

To study the impact of bursting of fire crackers during deepavali, 2013 noise level and Ambient Air Quality monitoring was carried out at three residential locations namely Rajajinagar, Nagarbhavi and Rajarajeshwari Nagar in Bangalore on October 29, 2013(pre-deepavali day) and November 3, 2013 (deepavali day). The map showing the monitoring locations is shown as Figure-1. Ambient Noise was monitored using CR:800 C Series of Sound Level Meter on both days from 18:00 hrs to 24:00 hrs and reading was taken at every one hour interval. Ambient air quality was monitored at site and the samples were analyzed for RSPM, SO<sub>2</sub> & NO<sub>2</sub> at CPCB, ZO laboratory. The instruments and method used for monitoring and analysis is given at Table 1.

**Table 1: Specifications of instruments and methods used for monitoring**

Parameter	Equipment used for monitoring	Analysis method	Instrument used for analysis
PM <sub>10</sub>	Respirable dust sampler-APM 460NL	Gravimetric method	Mettler balance
SO <sub>2</sub>	thermoelectrically cooled attachment or gas sampler	Improved West Gaeke method	Spectrophotometer
NO <sub>x</sub>		Modified Jacob & Hochheiser method	

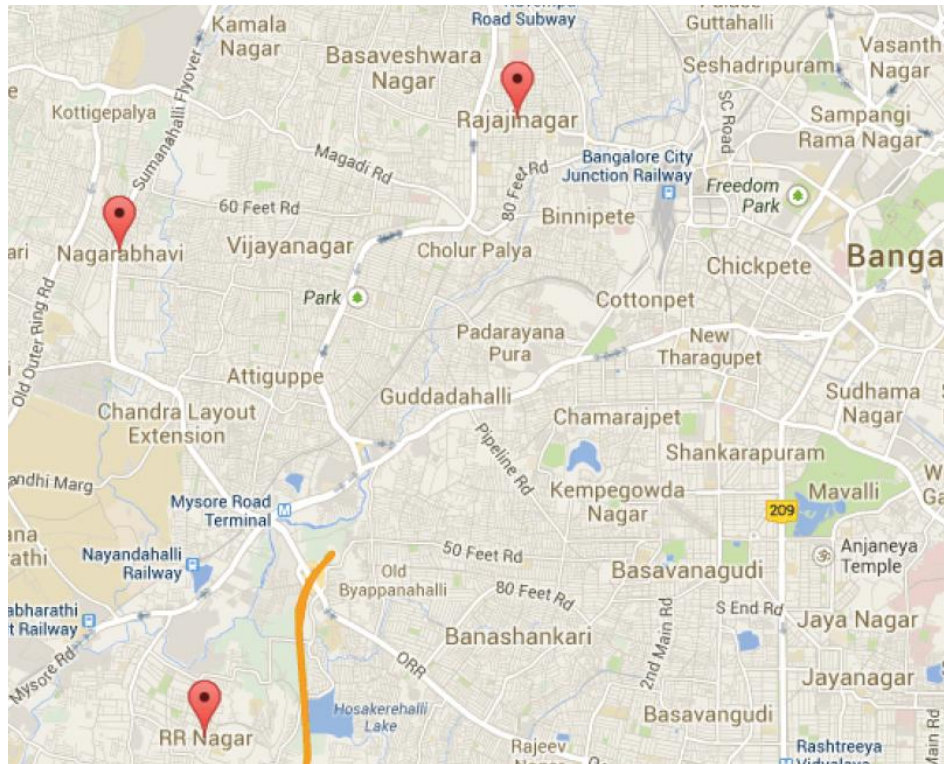


Figure 1: Map showing the monitoring locations

#### 4. Results and Discussion

##### 4.1 Ambient Noise Level Monitoring:

The ambient noise level monitored during deepavali, 2013 at all three locations is presented in Table 2.

**Table 2: Ambient Noise level in Leq dB(A) during Diwali period 2013 at Bangalore**

Noise Standards in LeqdB(A)	Day - 55 dB		Night-45 dB
	Pre- Diwali day	Diwali day	% increase in noise level on Diwali day as compared to pre-diwali
Location	29.10.2013	3.11.2013	
Rajajinagar (R)	67.9	85.2	25.5 %
Rajarajeshwari Nagar (R)	61.9	78.7	27.1 %
Nagarbhavi (R)	64.1	80.4	25.4 %

**Note:**

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. R-Residential zone

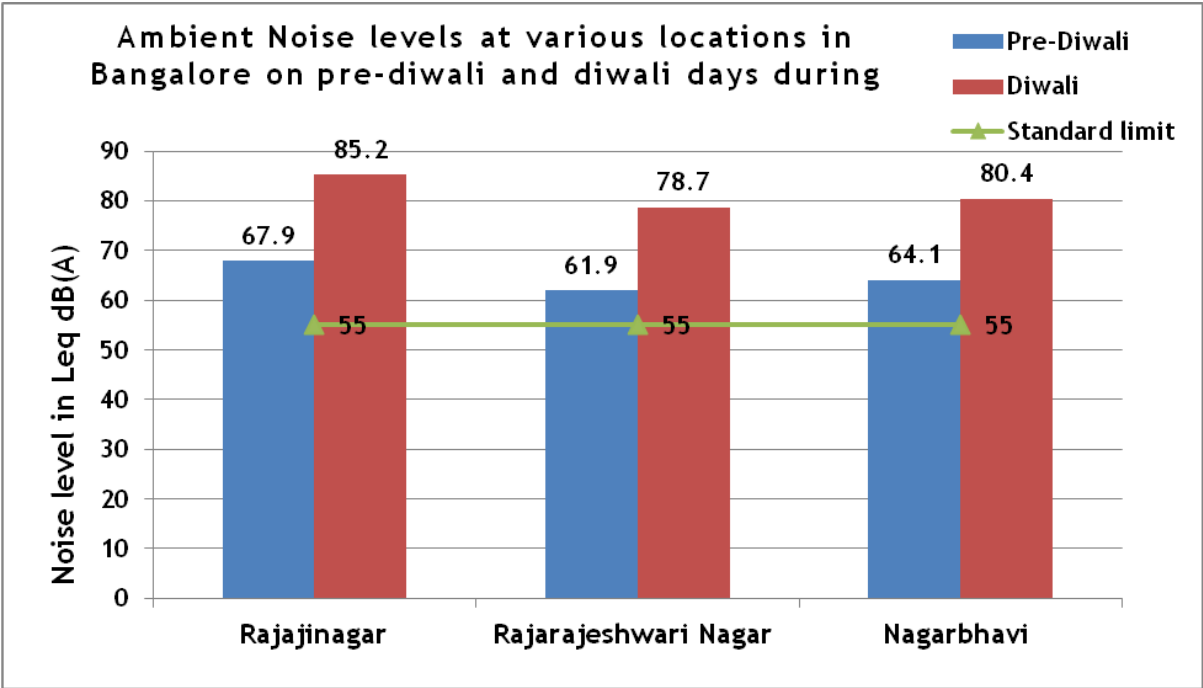


Figure 2: Ambient Noise levels at various locations

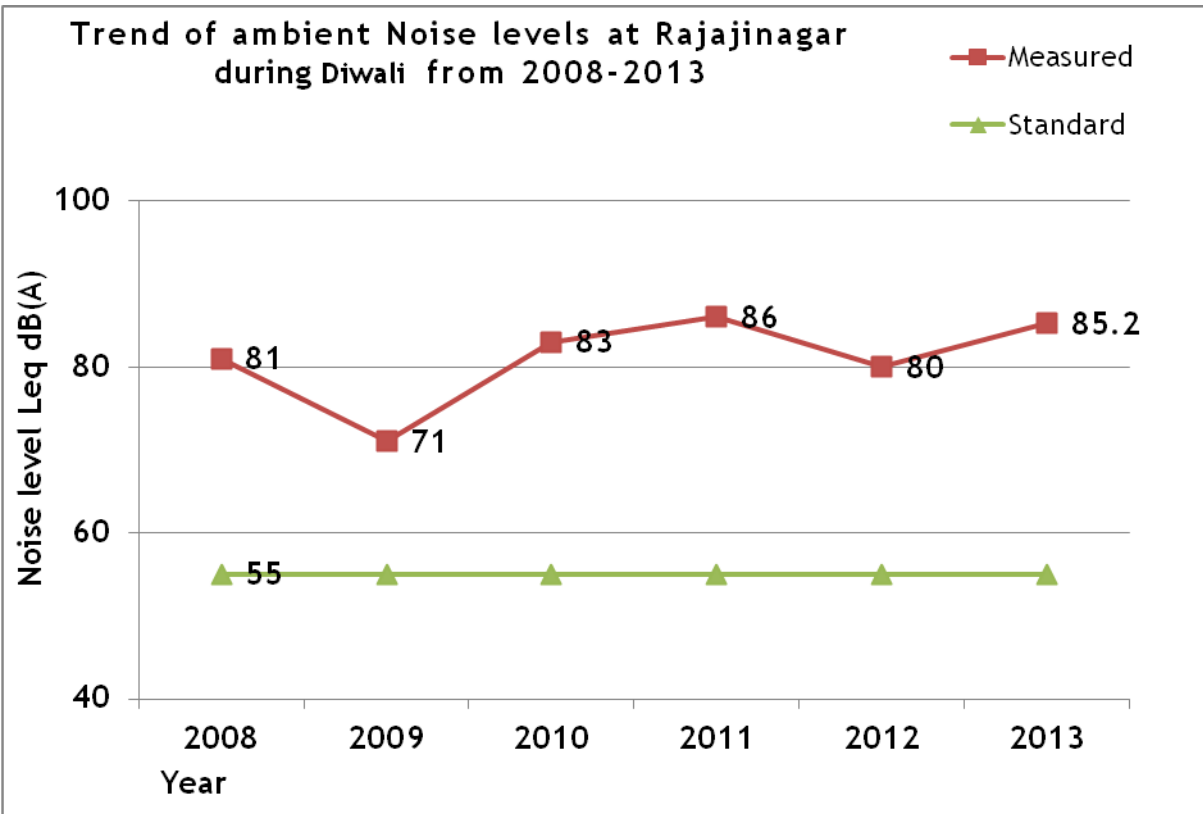


Figure 3: Trend of ambient noise levels at Rajajinagar during diwali

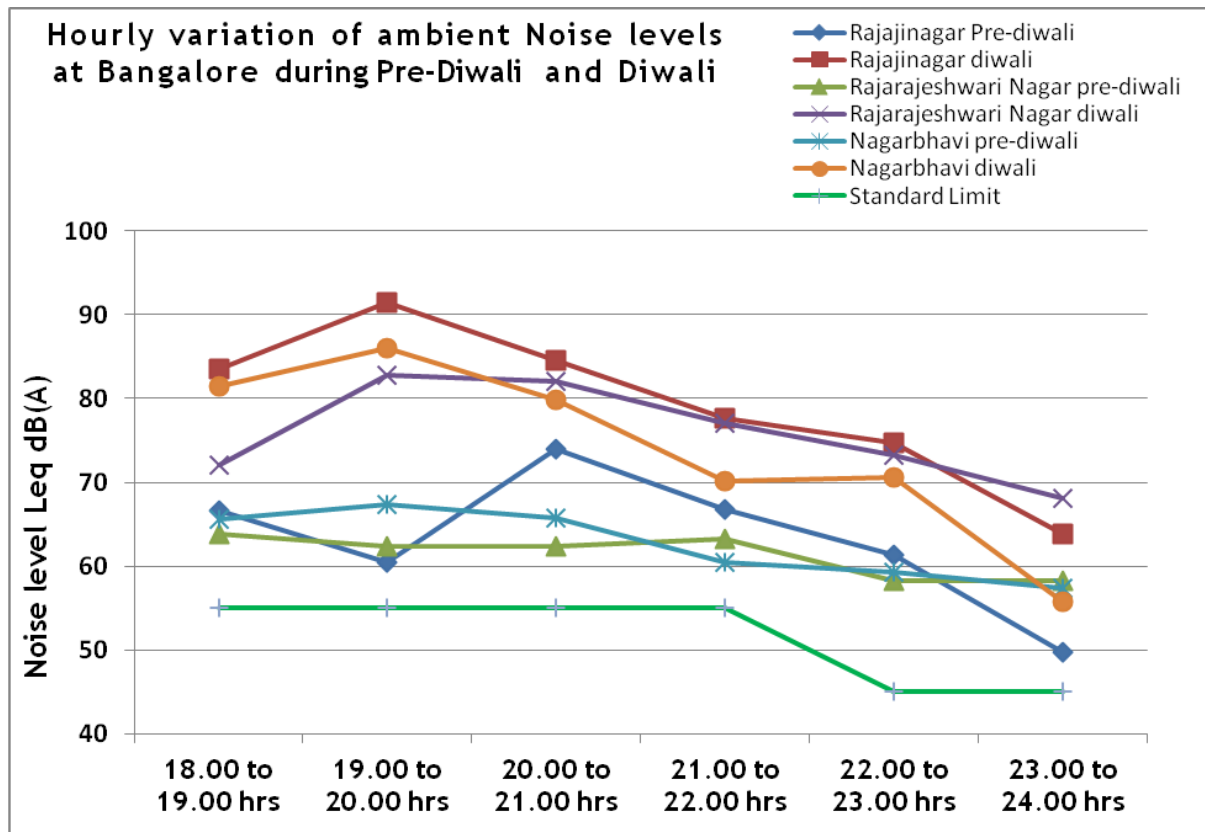


Figure 4: Hourly variation of ambient noise levels at Bangalore during diwali

**Rajajinagar:** Rajajinagar situated in the west of Bangalore is a residential colony. There is been 25.5% increase in noise level on diwali day as compared to normal day. The increase in ambient noise level observed during deepavali are exclusively from fire crackers which are bursted around 50 to 150 feet away from the monitoring location. The trend of ambient noise levels during diwali at Rajajinagar is remained almost consistent over the years from 2008 to 2013 with minor variations. Among the three locations, highest ambient noise level was recorded at this station.

**Rajarajeshwari Nagar:** Rajarajeshwari Nagar is a residential locality situated in southern part of Bangalore on Mysore road and has lot of greenery. There is been 27.1% increase in noise level on diwali day as compared to normal day.

**Nagarbhavi:** Nagarbhavi is a residential area located in west of Bangalore between Mysore road and Magadi road. There is been 25.4% increase in noise level on diwali day as compared to normal day.

The real time ambient noise monitoring levels at various locations in Bangalore, Chennai and Hyderabad during deepavali, 2013 is given in table 3.

**Table 3: Real Time ambient Noise during diwali, 2013**

S.N	City	Stations	Ambient Noise level in Leq dB (A-24 hrs)			Trend
			2011	2012	2013	
1	Bangalore	Nisarga Bhawan	60	51	59	↑
2		Parisar bhawan	64	62	61	↓
3		BTM layout	65	63	62	↓
4		Marathahalli	57	55	61	↑
5		Peenya	59	57	56	↓
6	Chennai	Triplicane	69	63	65	↑
7		T. Nagar	69	70	69	↓
8		Guindy	75	74	69	↓
9		Perambur	75	86	65	↓
10		Eye Hospital	65	60	66	↑
11	Hyderabad	ABIDS	71	70	70	-
12		Jeedimetla	61	61	60	↓
13		Jubilee Hills	-	54	55	↓
14		Punjagutta	75	76	76	-
15		Zoo Park	-	52	55	↑

#### 4.2 Ambient Air Quality Monitoring

	SO <sub>2</sub> µg/Nm <sup>3</sup>		NO <sub>2</sub> µg/Nm <sup>3</sup>		PM <sub>10</sub> µg/Nm <sup>3</sup>	
	Pre-diwali	Diwali	Pre-diwali	Diwali	Pre-diwali	Diwali
Rajajinagar	2	6	33.1	15.7	57	85.5
Rajarajeshwari Nagar	2.47	2.47	22.9	15.9	58	21.7
Nagarbhavi	3.84	2	20.9	8.72	27	60.3
Concentration range	BDL-8.81	BDL-26	12.7-59.2	5.13-26.3	10-81	2.68-223
<b>Standard limit</b>	<b>80</b>		<b>80</b>		<b>100</b>	
All values are expressed in 24 hourly basis (µg/m <sup>3</sup> ), BDL: PM10- 5 µg/m <sup>3</sup> ,SO <sub>2</sub> : 4 µg/m <sup>3</sup> , NO <sub>x</sub> : 9 µg/m <sup>3</sup>						

## 5. Effects noticed in Bangalore city during Deepavali, 2013

- As many as 95 cases of cracker related eye injuries were reported during diwali, 2013 in Bangalore city. Apart from this seven cases of burns were also reported.
- Crackers mainly contains metal salts, sulphur and nitrates and when burnt are considered hazardous. During Deepavali, huge quantity of cracker waste is generated and it is mixed with garbage. Analysis of heavy metals is under progress.

## 6. Observations:

- The ambient noise levels on Diwali and as well as on normal day is not complying with the national ambient noise standard of 55dB.
- Due to consistent persuasion and continuous public awareness created by CPCB and KSPCB to observe “Right to Sleep”, the bursting of crackers was considerably reduced after 10:00 PM which is clearly depicted in Fig 4.
- CPCB strictly prohibits bursting of crackers that produce sound levels exceeding 125dB.
- SO<sub>2</sub>, NO<sub>x</sub> and PM<sub>10</sub> values are within the National Ambient air quality standards at three locations where monitoring was conducted.
- The ambient air quality in respect of SO<sub>2</sub>, NO<sub>x</sub> and RSPM were less during Deepawali day as compared to normal day which may be attributed to less vehicular traffic flow during diwali.
- The state government through Police department carried out intensive surveillance of the city to oversee the bursting of crackers after 10:00PM in the night. This has also resulted in recording of lower noise levels at late night hours.

## 7. Recommendations

- The cumulative effort of the actions being taken by the society and regulatory authorities is to be further strengthened to minimize pollution levels during diwali.
- Manufacture of crackers that produce sound levels exceeding 125 dB must be strictly prohibited.
- The manufacturer should obtain certificate indicating the expected noise level of each brand of cracker from recognized noise level testing laboratories and copy of the same should be given to the authorized sellers who in turn sell firecrackers. The stated noise level must be printed on the crackers.



- The test for the fire crackers limits as mentioned in the label may be carried out in advance before entering to the market so that, the crackers violating the limits may be banned.
- Adhering to the time limit for bursting crackers through surveillance by the regulatory bodies should be strictly enforced.
- The sale of garland and rocket crackers may be discouraged to avoid continuous noise emission and mishappenings.
- Collective participation of the community for bursting of crackers at play ground, stadium and open places should be encouraged rather than bursting near individual houses and at thickly populated area.
- The traffic being a major sources of noise and air pollution, there should be proper implementation of Traffic Management Rules especially during festival season.
- There should be continuous education and awareness among the public and students through electronic media rather than only during festival period.
- Awareness is to be created through mass media in advance so as to educate the public to avoid bursting of crackers.
- The concerned authorities must take prior measures to handle excess garbage generated during diwali.
- Series of interactive meetings prior to Diwali festival among public, firework manufacturers and Zonal office should be taken up in order to propagate the celebration of festival in an environmentally friendly manner.

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