

Over-Religious Activity, a Threat to Biodiversity (5): The Vedic Age Fire-Technology Ends With Air Pollution as Deepavali

Sachidananda Padhy

Vedic Science Research Centre, Bhaba Nagar, 1st Lane, Berhampur 760 004, Odisha, India
E-mail: sachi_padhy@rediffmail.com

KEYWORDS Air Pollution. Deepavali. Fire-technology. Over-religious activity

ABSTRACT Celebration of Deepavali is an important cultural function of India and highest regard for the Vedic age Fire-technology. But, the way it is followed is questionable, that changes the chemistry of the life saving air and a negative step of the humanity towards self and Biodiversity. The air pollution status of India due to Deepavali is discussed in this communication.

INTRODUCTION

Deepavali (Diwali) is one of the ancient functions of India celebrated throughout the country. In the epic Ramayana it is reflected that, the day Sri Ram Chandra along with Mother Sita, Laxmana, Hanuman and the whole army returned from Lanka; Deepavali was celebrated for the first time at Ayodhya. The public greeted them

with multiple *Deepa* lightening of their houses. Since then this tradition is followed in our country to remember the remarkable day. With the Prime event lightening, this function is celebrated in different states in specific modified form as suitable to their own culture (Table 1).

In course of time, bursting of firecrackers and lightening of different colourful fireworks became an integrated part of Deepavali celebra-

Table 1: Celebration of Deepavali in different States of India
(As Per Data Available)

Name of state	Deepavali celebration
Andhra Pradesh	There is belief that, the demon 'Narakasura' was killed by Satyabhama the wife of <i>Bhagawan</i> Srikrishna on <i>Naraka Chaturdashi day</i> (the day before Deepavali). The whole province celebrates this occasion in addition to Deepavali by worshipping the earthen idol of Satyabhama.
Karnataka	Celebrated for three days. After the death of Narakasura (as above) Srikrishna had a good bath being anointed with sesame oil to washout the blood stains of his body. Accordingly people after oil anointment go for a good bath on the first day. The next day of Deepavali is celebrated as 'Balipadyami'.
Madhya PradeshMeghalaya Jharkhanda Maharashtra	These three states are tribal dominated areas. Deepavali is celebrated with mass dancing and singing, as usual with lightening.
Odisha	In this state Deepavali is celebrated for four days. In the first day cow and calf are worshiped, followed by worshipping and opening of new business account note books and celebrated as 'Dhantaras'. On the day before Deepavali, people go for bathing before sunrise anointed with Haldi (<i>Curcuma longa</i>). On Deepavali day Goddess Laxmi is worshiped.
Punjab	Odia people celebrate the Deepavali with lightening and offering <i>Ssradha</i> to <i>Pitruloka</i> (Manes). They show burning light to the sky to brightened the pathway of Manes inhabitants for their easy movement to upwards.
Tamilnadu	The best Deepavali is celebrated in Punjab by lightening the <i>Swarna Mandira</i> . This day is very special for this state, as the sixth religious Guru Sri Haragovindji was freed from jail and the occasion is celebrated with much pomp and ceremony.
West Bengal	Day before the Deepavali, Tamil people clean their kitchen and decorate the fire place with coloured saffron powder. On Deepavali day they take a bath being anointed with sesame oil before sunrise and visit temples with usual lightening celebrations.
	It is a three day celebration in this state with the famous 'Kali Puja'. People decorate their houses and join the community kali puja or do it personally.

tion. As a result of this over-religious activity there is lot of smoke emission and air pollution, that works as a threat to biodiversity, is the topic of discussion in this communication.

ANCIENT FIRE-TECHNOLOGY

Human culture has begun with fire. With the growth of culture the fire-technology has expanded. If man could be rightly proud of any scientific discovery, the credit should go to the discovery of fire. In this scientific age the means of generating the fire is so simple that, it is difficult today to evaluate the importance of fire discovery as the for most achievement of man some time in the ancient past. There was a time when there was no fire on this earth. The sun alone was the source of light and heat. Human society has no biographical details of the first discoverer of fire (Sarasvati 1995).

Vedic literature is the prime authentic expression of humanity. In Rigveda (RV), it is announced that, sage Atharvan was the discoverer of fire (RV.VI.16.13). Atharvan was the first to obtain fire by attrition rubbing or churning. He is also known with other names Atharva and Atharvaangiras. Being a historical personality he had contributed 1612 verses of Atharva Veda. Atharvan belonged to the clan Angirasa and hence had the specific name Atharvaangiras. After the discovery of technology to generate fire, many of the Angirasas became notable as 'churners of fire'. The name of such fifty Angirasas are reflected in different Vedas (Padhy 2011). It was not an easy task to churn out fire successfully from wood by attrition rubbing. The Angirasas were specialised in the craft of producing fire. They were highly in demand since the establishment of fire-ceremony or *Yajnya* as an essential part of daily duties (*Pancha Mahayajnya*, Padhy 2013a) and special sacrifices. It is interesting to note that, the burning live-coal is named '*Angaara*' after the respect for Angirasa.

The machine that was fabricated by Atharvan and used by the Angirasas is known as 'Aranimanthan' (*Arani*: wood ; *Manthan*: churning) (Fig. 1). Its' description and working principle are described in Rigveda (III. 29 (1-12). The system has four limbs:

1. *Adharaarani*, 2. *Uttaraarani*, 3. *Obili* and 4. *Netra*.
1. *Adharaarani* is the base plate on which attrition process is carried out.

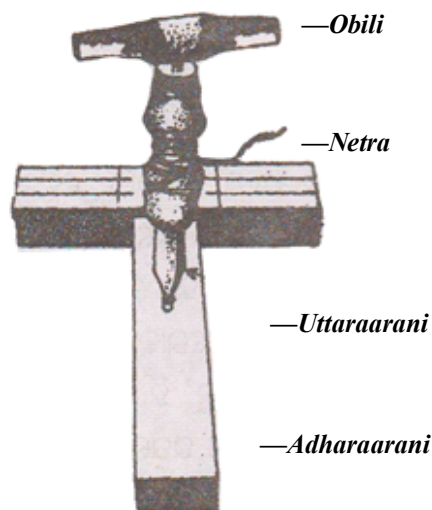


Fig. 1. Aranimanthan Instrument
Source: Padhy 2011

2. *Uttaraarani* is used for rotation. It has two parts: *Manthi* and *Obili*. The lower part is called *Manthi* which is connected with *Obili* through a Piece of wood.
3. The *Manthi* rotates and *Obili* is used to pressurize on the earlier.
4. A string called *Netra* (rounded around the connector wood) is used to rotate the *Manthi* with simultaneous pressure on *Obili*.

In fact whirling of the *Manthi*, inside a hole of the *Adharaani* generates mechanical heat. Light burning materials like cotton, dry leaves and dust of dry wood are used at the rotation point for easy catching of fire.

CONSERVATION OF FIRE

It was not an easy job to generate fire every time depending on someone. Methods were adopted for fire preservation in a village or community at a common place. In the early stage people might have used *Angaara* for the purpose. Every family used that fire from the common point when required. In course of time, the use of ghee and oil facilitated the fire preservation with the invention of *deepa*. The community developed a common worshiping place- A Temple, where the *deepa* was lighted constantly as a token of *Yajnya* (sacrifice) and regard to the divinity. Slowly the community *Deepa* lightening turned to a family/personal activity with the

growth of culture, population and easy availability of burning material. Such tradition of constant *Deepa* lightening is still available in our country. At Badrinath (Uttarakhand) the temple remains shut for six months during winter season. A *Deepa* is lighted there with sufficient burning oil for six months, in the absence of any human being. Similarly Sai Baba's fire is still burning at Shiridi since his departure. In many temples throughout our country, there is tradition for continuous lightening of *Deepa* for twenty four hours, whole year. In many rituals and public functions there is tradition to maintain burning fire from the onset of the activity till the end, may be days together. In the temple *Jwalamukhi* (Uttarakhand) there is constant burning of natural gas emitting blue flame being oozed from the soil since many years. All these activities are the influence of vedic age fire conservation philosophy. Even the Olympic fire is not away from the vedic ethics of fire preservation. This is how *Deepa* became an integrated part of human life and every family developed their own fire place for daily *Yajnya* and cooking in the *Agnikona* of the house; the corner of East and South direction.

Agni (Fire god) is regarded as an important *Devataa* of Indians. There are many communities and cultures throughout the world those who consider *Agni* as a divine resource for worshiping, mostly the Zoroastrians in addition to Hindus. *Agni* is the main basis of *Yajnya* process. Through *Agni* all the other *Devataas* are offered *Habbi* (respected food). Accordingly, *Agni* is honoured as the paternal parent of all *Devataas* (Ecological factors, Padhy 2013b). Human life is deeply associated with *Agni* from the birth place to burial ground. Deepavali is a community function to respect the divine power of *Agni*, but now it generates air pollution.

GLOBAL AIR POLLUTION

The Earth's vertically extended atmosphere is an envelope of gases, which is divided into four layers: 1. Troposphere- upto 5 Km, the lowest, 2. Stratosphere – 5 to 45 Km, 3. Mesosphere – 45 to 80 Km and 4. Thermosphere – above 80 Km. Mostly 75 percent of earth atmosphere lies within 16 Km. The atmosphere is an insulating blanket around the Earth. It protects our planet from lethal ultra violet radiations and meteoros.

The normal composition of clean air is: Nitrogen 78.084 percent, Oxygen 20.9476 percent, Argon 0.93 percent, Carbon Dioxide 0.0314 percent, Methane 0.0002 percent, Hydrogen 0.00005

percent and other gases like Neon, Helium, Methane, Krypton, N_2O , CO , O_3 , SO_2 , NO_2 in minute amount. Unfortunately, the concentration of different gases in the present atmosphere show variations due to pollution from different sources like: 1. Industrial Chimney wastes, 2. Thermal Power stations, 3. Automobiles and burning of fuels. The common air pollutions are: Carbon compounds (CO_2 , CO), Sulphur compounds (SO_2 , H_2S), Oxides of Nitrogen (N_2O , NO , NO_2), Ozone (O_3), Fluorocarbons, Hydrocarbons (Benzene, Benzpyrene), metals (Lead, Nickel, Arsenic, Tin, Vanadium, Titanium, Cadmium, Beryllium etc). Photochemical products (Olefins, Ozone, Aldehydes, PAN, PB_2N and photochemical Smog), Particulate Matter (Fly ash, dust, grit, suspended matter released from plants, by products of stone crushers, bacterial cells, fungal spores, pollen grains etc.) and different toxicants other than heavy metals (Arsenic, Asbestos, Carbon tetrachloride, Chloroform, Chromium, 1,4-Dioxane, 1,2-Dichloromethane, 1,2-Dichloroethane, Nickel, Nitrosamines, Vinyl chloride etc).

All the above referred pollution hazards are manmade. Human beings of earlier civilization too introduced foreign substances into the air by way of burning and other activities. In the description of different wars in Ramayana, Mahabharata and other puranic epics, the release of air pollutants due to action of variety of arrows is presented. The burning of *Khandaba Bana* (Forest) described in Mahabharata and *Sarpa Yajnya* (mission to burn the snakes as a revenge) of Bhagawata were man made significant pollution hazards of ancient days.

The modern man accelerated the process of pollution in every sphere which has alarming proportions. Although the adverse effects of air pollution are well known, our existence in a pollution free urban atmosphere is still far beyond our reach at the present time. Air is one of the indispensable element in environment, vital for life. A normal man breathes nearly 22,000 times a day inhaling about 16 kg air. The air pollution effects the health and wealth of the ecosystem. It adversely affects the human health, damage the plants and animals, causes acid rain, global warming and depletion of Ozone layer. The harmful effects of individual air pollutant on biota is beyond the scope of this article. Ecologically air pollution causes reduction in sunshine, causes dust fall, smog and corrosion of metals. Human beings suffer from morbidity, respiratory ail-

ments, heart disease, stroke, lung cancer and chronic obstructive pulmonary disease (COPD) due to air pollution.

A study by an international commission in 2015 (published in the journal *The Lancet*, reported by national daily *The Hindu*, 21.10.2017, P. 1) estimated 9 million premature deaths linked to pollution worldwide. A staggering report 2.51 million pollution linked deaths in India, in the same year, ranks number one globally, accounted for about 28 percent. Moreover, the pollution death (2.51 million) accounts 25 percent of all deaths in India. Air pollution, the leading cause, killed 6.5 million people around the world and India claims 1.81 million out of that (27.84 %). Particulate matter pollution in the air is severe in several cities of India. The average annual concentration of particulates less than 2.5 microns in width are greater per cubic meter in our country. The pollution death data of Pakistan, China, Bangladesh follow the Indian results (*Source: The Lancet Commission on Pollution and Health*).

NEGATIVITY OF DEEPAVALI

The religious activity of Deepa lightening and celebration of Deepavali is now spread throughout the world. In many countries this function has turned to an official celebration. But alas, in India tagging of cracker bursting and burning of colourful fire work with Deepavali is a major cause of air pollution. It also

adds to sound pollution and accumulation of garbage in the streets.

This year's (2017) Deepavali was comparatively quietest in recent history. But it could not stop pollution levels. The air quality index (AQI) in five major cities of India for the years 2015, 2016, 2017 are comparatively presented in Figure 2. The condition of the AQI before and after the Deepavali- 2017 focuses on this year's pollution status (Table 3). A comparative AQI data at four points of Delhi on 19.10.2017 is as follows:

Station	11.11.2015	30.10.2016	19.10.2017
Mandir Marg	362	397	318
Anand Vihar	460	455	397
R.K. Puram	406	401	366
Punjabi Bagh	403	441	356

The overall AQI on Deepavali day in and around Delhi in 2015 was 327; 2016-426 and 2017-327. No doubt there is a declining trend of pollution data this year compared to last year, but all the records in three years either very poor (301-400) or severe quality (>401) (Koshy 2017). More to add here, in 2016 Delhi witnessed Owl killing on Deepavali night to drag the blessings of Goddess Laxmi (Padhy 2016).

Scientist claim that, the cracker smoke pollution peaks during Deepavali and the chemical waste gets embedded in our lungs for the rest of our lives (Kumar 2017). The children and older people are worst suffers due to air pollution. Ironically, the moment a minute child is born,

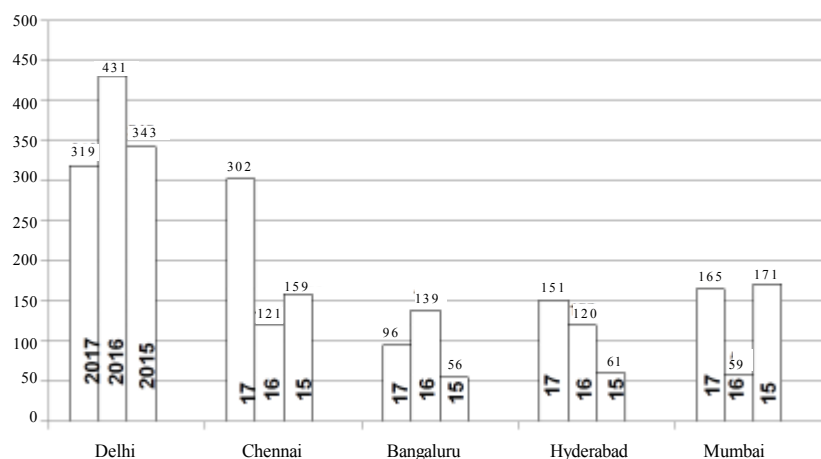


Fig. 2. Air quality index (AQI) in key cities on Deepavali days at 4 p.m. in the year; 2015, 2016 and 2017. *Source: CPCB*

Table 2: Concentration of certain Air Pollutants In Different Cities of India before and after Deepavali: 2017

<i>Name of city</i>	<i>Day of observation</i>	<i>SO₂</i>	<i>NO₂</i>	<i>CO</i>	<i>PM 2.5</i>	<i>PM10</i>
<i>Bengaluru</i>	Two days before Deepavali(A)	5	16	128	43	-
	Deepavali day (B)	6	64	59	-	150
	Next day of Deepavali (C)	10	76	71	-	214
<i>Chennai</i>	A	14	16	64	73	-
	B	52	32	70	298	-
	C	14	17	65	143	-
<i>Delhi</i>	A	32	141	121	353	398
	B	26	113	96	351	409
	C	45	130	103	430	465
<i>Hyderabad</i>	A	7	44	28	101	-
	B	68	33	22	218	179
	C	118	43	26	282	216
<i>Kolkata</i>	A	17	54	34	-	134
	B	33	21	-	-	34
	C	31	45	24	-	86
<i>Lucknow</i>	A	9	80	75	306	-
	B	73	61	78	357	-
	C	30	45	105	289	-
<i>Mumbai</i>	A	26	21	31	83	84
	B	30	25	37	-	169
	C	30	26	41	-	249
<i>Pune</i>	A	34	15	98	29	58
	B	34	16	81	55	87
	C	33	16	72	135	155
<i>Vishakhapatnam</i>	A	9	-	45	58	107
	B	9	-	70	115	116
	C	29	-	64	222	164

Source: Central Pollution Control Board – CPCB

AQI: Air Quality Index: Good (0-50), Satisfactory (51-100) Moderate (101-200), Poor (201-300), Very poor (301-400), Severe (> 401)

PM: Particulate Matter.

Observations: Whole Country – 4.00 pm (Highest & Lowest)

(A) 16.10.2017: Bhiwadi, Rajasthan – Overall AQI: 426 unhealthy level of pollution

Thiruvananthapuram – AQI: 54 – Satisfactory.

(B) 19.10.2017: Bhiwadi, Rajasthan – AQI: 425 – unhealthy

Durgapur, West Bengal – AQI: 35 – Good

(C) 20.10.2017 Ghaziabad, Uttar Pradesh – AQI: 412 - unhealthy

Durgapur, West Bengal – AQI: 30 – Good

Source: *The Hindu*, 17, 20, 21 Oct, 2017

and takes the first breath, he/she inhales air which is equivalent to smoking 10-12 cigarettes a day. This is the Deepavali gift we generate for our shelves and newborns.

LAST LINES

Deepavali is the festival of light and pleasure. But over-religious activity in any form causes a threat to the Biodiversity (Padhy 2016, 2017a, b; Padhy and Mohapatra 2016). This manmade air pollution adds diseases to the human society. Before the court orders or the government enforcement to stop/check this practice of religious cracker bursting, let us take positive steps

for rectification of our older traditions. A tradition which is good, healthy and educative is to be accepted. We cannot ignore our culture. At the same time, we should not follow a custom with a vow, that was adopted by our forefathers, even if it is unfavourable one now.

In addition to Deepavali, cracker bursting during marriage ceremony and tyre burning as a mass protest against the government or any organization also adds to air pollution. At some places yearly cracker bursting competition ceremony is carried out as a mass entertainment. Hardly any-one bothers for air pollution, either educated or uneducated, entertainment tops the activity list. Moreover, Dr Christopher Sola Olo-

pade, Professor of Medicine, Department of Pulmonary and Critical Care Medicine, University of Chicago, US, who has done extensive research on the threat from indoor air pollution in Nigeria says that, overall exposure to household air pollution (due to kitchen smoke) accounts for about four million premature deaths every year globally; of these, a million occur in India (Perappadan 2017)

In Bhagavad Gita Srikrishna has said: *Pavanah Pavataamasmi* (10/31) among purifiers, I am the wind.

The air as described above is a purifier, now do not stand with purity to support the quality of the living organisms. Man has the right to use the environment, but not to misuse it for (so called) self-development and amusement. Human activities in the name of religion, development and better life have changed the chemistry of the air from pure to pollute that is not supporting his own breath (Padhy 2015).

Deepavali comes in the juncture of rainy and winter season. Rain favours the growth of biodiversity. This way the proliferation of insect population can be marked before Deepavali; varieties surround the street lights and also enter inside residences. People have faith that, the lightening on Deepavali attracts them and cracker sound and smoke kills a major population. Infact this happens. Insect population gets reduced substantially after Deepavali. This pro-scientific idea favours the negative impact of Deepavali. But, the smoke and sound which is injurious to insects cannot be helpful to human beings. May be the change of season drops the insect population.

ACKNOWLEDGEMENT

Publication of air pollution data and allied research work in the National daily English pa-

per *The Hindu* is highly acknowledged, which is reflected in this communication.

REFERENCES

- Acharya SS, Sharma BD 2001 *Yajurveda, Samhita*. Bhubaneswar: Yugashakti Gayatree.
- Koshy J 2017. Delhi Pollution Bursts at the Seams. *The Hindu*, 21.10.2017, P. 7.
- Kumar A 2017. 84 Infant Smokers Created Every Minute *The Hindu*, 22.10.2017, P. 2
- Padhy SN 2011. *Baidika Tathyaara Baigyanika Bisle-san* (Vol-III) Bhubaneswar: The Odisha State Bureau of Text Book Preparation and production.
- Padhy SN 2013a. *Pancha Yajnya* (Five Sacrifices): The Scientific Philosophy of Human Ecological Responsibility since the Vedic age – A review. *J Biodiversity*, 4(1): 25-44.
- Padhy SN 2013b. Ethno-ecological introspection into *Bhagawatgeetaa*: 4. Ecological Responsibility of human beings. *J Biodiversity*, 4(2): 79-82.
- Padhy SN 2015. Ethno-ecological introspection into *Bhagawatgeetaa*: 6. The present distorted environment compared to five thousand years ago. *J Hum Ecol*, 51(3): 227-240.
- Padhy SN 2016. Over-religious activity, a threat to biodiversity: A case study (2): Save the Owl (Aves: *Strigidae*). *J Biodiversity*, 7(2): 104-109.
- Padhy SN 2017a. Over-religious activity, a threat to biodiversity (3): Conserve 'Kusha' (*Desmostachya bipinnata*) before its extinction. *J Biodiversity*, 8(1): 44-50.
- Padhy SN 2017b. Over-religious activity, a threat to biodiversity: A case study (4): The Indian National Bird: Peacock (*Pavo cristatus*) is in Danger. *J Biodiversity*, 8(1): 51-54.
- Padhy SN, Mohapatra R 2016. Over-religious activity, a threat to biodiversity: A case study. *J Biodiversity*, 7(1): 1-3.
- Perappadan BS 2017. When Kitchen Smoke Can Kill. *The Hindu*, 22 October 2017, P. 15.
- Sarasvati SSP 1995. *Founders of Science in Ancient India*. (Part 1). Delhi: Vijaya Kumar Govindram Hasanand.

Paper received for publication on November 2017
Paper accepted for publication on December 2017