

Historic emergence of Air Pollution and Environmental events

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ABSTRACT: The oldest forms of air pollution are fire and even today forest fires cause air pollution. Air pollution, particularly in cities, remained significant even in the middle Ages because of the use of coal. The problems of poor urban air quality were even documented by the end of 16th century. The Industrial revolution during the 18th and 19th centuries was predominantly focused on the use of coal in the UK. The industries were usually located in towns and cities causing air pollution to a greater extent. Moreover, the use of coal in homes elevated urban air pollution to higher levels. Besides, under foggy atmospheric conditions, air pollution levels were critically high causing cities to halt, disrupting traffic, and even significantly increasing death rates. Such an increase of air pollution facilitated Public Health Act, which came into force in 1875 having smoke abatement measures in place. The world biggest sacrifice for saving trees in one village of Rajasthan was witnessed in 1730 A.D in which 363 people lost their life. An effort has been made by the authors in the present paper to highlight the global emergence of air pollution along with environmental events.

KEYWORDS: History, air pollution, episodes, global, atmospheric conditions, Khejri massacre

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I. INTRODUCTION:

The citizens of ancient Athens and Rome first voiced air pollution and its concern to its effects on human health and the environment. The Industrial Revolution on account of widespread use of coal in factories in Britain, Germany, the United States, and other nation's deteriorated urban air quality to great extent. Early laws to control air pollution were inadequate until the mid-twentieth century when air pollution disasters such as London's 'Great Smog' demonstrated the significance and importance of stringent national laws. The effects of coal smoke in the nineteenth and early twentieth century's were mainly local and regional. But after the Second World War, an alarming threat began to emerge in the form of acid rain, photochemical smog, ozone depletion and climate change which were globally witnessed. The Smoke Abatement Act of 1926 was introduced wherein strict industrial controls were enforced aimed at reducing smoke emissions from industrial sources(1).

II. EMERGENCE OF AIR POLLUTION AND ITS CONCERN:

Around 4,000 deaths were caused on account of The Great London Smog of 1952 which resulted to the enactment of the Clean Air Act of 1956 and 1968. These acts introduced smokeless zones in urban areas with a tall STACK to enable effective dispersion of air pollutants over a long distance away from urban areas and also to help in reducing the ground level concentration of air pollutants. Air quality improvements continued throughout the 1970s as a result of this act. However, in order to further strengthen, another act was formulated in the name of Control of Air Pollution Act of 1974, wherein regulations for the composition of motor fuel along with limits for the sulphur content of industrial fuel oil were introduced.

However, the number of motor vehicles in urban areas increased in 1980, resulting into significant air quality problems on account of vehicular air pollution. The main focus was on the effects of lead pollution on human health. The effects of photochemical smog were observed, which formed as a result of chemical reactions between vehicular air pollutants and sunlight, during the late 1980s and early 1990s. Accordingly, the Government of UK enacted Environment Act in 1995 to cover various environmental issues including setting of National Air quality standards in respect of common air pollutants. Comprehensive National Air Quality standards were prescribed and made mandatory in 1997 for the local authorities to achieve them by 2005

The problem of air pollution was felt later in India and accordingly Air (prevention and control) of pollution Act, 1981 was enacted by parliament to mainly take care of industrial air pollution and its control. Central and State pollution control boards were made responsible to regulate the provisions of this act. Subsequently, an umbrella act in the name of the Environmental Protection Act, 1986 was enacted to cover multifarious dimensions of environment and its implementations.

III. AIR POLLUTION EPISODES:

3.1 The Meuse Valley fog, 1930:

In Belgium, an incident occurred which killed many, many became ill and more over cattle were also affected. A fog that was air pollution caused industrial smog. In December 1930, an area of Belgium known as Meuse Valley which is densely populated and has many factories, people faced symptoms of Dyspnea (shortness of breath) due to which around 60 died and several thousand got sick within the period of two to three days.

**Figure 1: Showing Meuse Valley Episode
Meuse Valley, Belgium
1930**



Air inversion results in 60 dead and thousands sick from exposure to industrial air emissions.

3.2 The St. Louis smog, 1939

The 'Black Tuesday' of America. May be this was the reason for America's legislation towards air pollution. In St. Louis Missouri on November 28, 1939, smog was so immense that motorists needed their headlights on while driving and streetlights had to lit throughout the day. It was due to the coal burning and temperature that was quite high that day, it caused to form black could of smoke which remained for 9 days(2).

3.3 The Donora smog, 1948:

History is full of deaths caused by smoke, yet there isn't any proper majors are taken by government bodies all over the world. Such incident also took place in U.S., it is a town Donora located 39 southeast of Pittsburgh, where on 27th October 1948 a fog started to build up. Even New York Times described it as worst air pollution disaster in nation's history. Hydrogen fluoride and sulfur dioxide formed a wall of smog in Donora which was emission of U.S. Steel Plant, Donora Zinc Works, it lasted for 5 days. Over 70 people were died because of this incident at that time and 7,000 got sick within a month, even after 10 years mortality rate rose in this area than the others nearby(3).

A typical photo of Donora with dangerous smog is shown in figure 3.



Figure 3: Smog over Donora



Figure: 4 Smog in New York City as viewed from the World Trade Center in 1988(4)

3.4 The Great Smog of London, 1952

December 5th to 9th, a severe air pollution episode took place in London. High concentrated air pollutants formed a thick layer of smog with the cold weather and calm wind condition. Like the other smoke incidents in history, this thick layer of smog which caused disruption in visibility and respiration, was also caused by air pollutants from burning of coal. By December 8th 4,000 people died due to smog. 100,000 people reported illness related with respiratory system. Even after these 4 days the fatalities was continuously rising and it rose up to 6000 in the following month. Although this incident was worst air pollution event in history of U.K. yet suffering from air pollution isn't any new for London, since 13th century it is suffered from its poor air quality which was highest in 16th century. But later London worked on its policy towards environment in 19th century (5).



Figure: 5 Nelson's Column during the Great Smog of 1952(5)

4.5 The group of forest fires in Indonesia, 1997:

The forest fires in history as well as today is the worst thing for environment because there is no control over it. Even today government has to wait for forest fires to extinguish by rain only. An incident that is worst in Indonesian history regarding air pollution is the forest fire that started in the middle of 1997 and lasted till 1998, which also affected the neighboring countries like Malaysia, Singapore and even Northern Australia with thick clouds of smoke.

This incident even affected the GDP of Malaysia by 0.30 percent. Rainy season in December brought some relief but soon the fire began which resulted into haze in Brunei, Thailand, Vietnam and Philippines. It caused around 8 million hectares of land to be burnt with an economic loss of around U.S. \$4.47 billion, human loss, long health impact and biodiversity loss. At that time around 13-40% extra carbon dioxide emission was recorded than usual all over the Southeast Asia.

Even after 1997 haze, in 2005 Malaysian government declared air pollution emergency. In the capital city of Kaula Lumpur, on August 10th, the air quality was so poor that citizens were advised to stay at home with closed doors, while schools remained closed to keep children from being exposed to the haze and on 11th August

emergency was declared at the 12th world's largest port Klang and Kaula Selangor as the air pollution index was greater than 500(6).

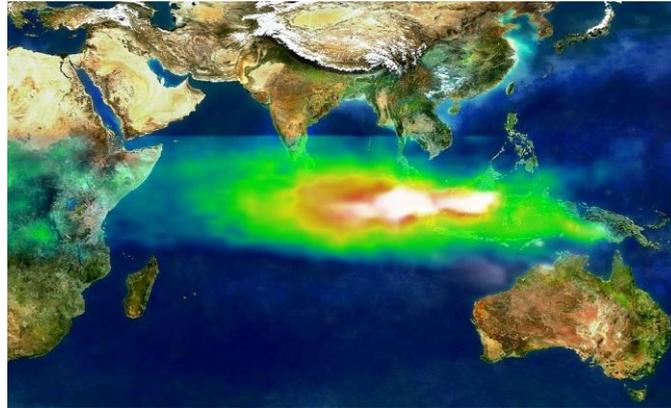


Figure: 6 Air pollution over Southeast Asia in October 1997(6)

Figure 1.7 shows smoke over Kuala Lumpur(7).



Figure 7 Smoke engulfing the country capital, Kuala Lumpur(7).

4.6 The Southeast Asian haze, 2006

Burning of Slash is common among farmers as it is quite cheaper than any other alternative. In Indonesia, a haze that affected many countries like Malaysia, Singapore, Thailand and even South Korea, which was a result of continuous burning of slash and cultivation, in 2006. This caused toxic pollutants in the air and poor health of people living in urban areas(7).



Figure: 8 Satellite photograph of the haze above Borneo(8)

3.7 The Bhopal disaster, 1984

A disaster which took place in 1984 but people are still suffering from it. This disaster took place in Bhopal, India and known as Bhopal Gas Tragedy. On a night in December 1984, a gas (methyl isocyanate) started leaking at the Union Carbide India Limited which was a pesticide plant in Bhopal, capital city of Madhya Pradesh state in India.

It wasn't just the worst tragedy of India but all over the world. Near about 500,000 people were exposed to the highly toxic gas. This gas caused 3,787 deaths and 558125 injuries. But soon it was estimated that 8000 or were died within two weeks. It was a result of inadequate maintenance of stack, pipes which resulted in backflow of water into the Methyl Isocyanate Tank(9).



Figure: 9 Memorial by Dutch artist Ruth Kupferschmidt for those killed and disabled by the 1984 toxic gas release

IV. ENVIRONMENTAL EVENTS:

An effort has also been made in the present paper to briefly state the greatest event that took place in a village in Rajasthan, known as Khejri Massacre, 1730, the details of which are as under

4.1 Khejri Massacre, 1730

While there are incidences which caused air pollution and ultimately turned out in deaths of many, there were moments when people died so that environment can be saved. History of environmentalist and environmental movements is not as sung as others, although it was a necessity in order to human survival. The way human is exploiting nature, it should be compulsory for them to know the environmental history. Trees are said to be the main source of many natural resources, like water (from drying), soil (from erosion), etc. This was even proved by the environmentalist Rajender Singh known as water man of India in modern days. Trees play main role in his technique of preserving water.

In history as well, there is this story of 363 martyrs, they were villagers. They might not know how to study but they knew the importance of nature, importance of trees. It happened in 1730 A.D. when a king named Abhey Singh of Marwar (in Rajasthan) wanted to build a palace which would need a lot of wood. More need of wood means cutting of more trees. On suggestion of his royal minister Giridhar, he ordered his personals to cut Khejri (*Prosopis cineria*) trees from a nearby village.

A lady villager named as Amrita Devi Bishnoi with her three daughters (namely Asu, Ratni and Bhagu) opposed the army while they were following the orders. On this Giridhar tried to bribe her in exchange of trees. But they stuck to the trees saying that they could die but cannot let the trees cut down. Then without any mercy army officials cut her head with ace. The three daughters didn't shake seeing their mother's death and offered their head too with other villagers. They all voluntarily sacrificed themselves but didn't let the trees harm. In this massacre 363 villagers were beheaded. They didn't just do so because it was a rule in their community but they understood it by heart. They understood the meaning of the trees. Last words of Amrita Devi were, "Sir sante runkh rahe to bhi sasto jaan". It means "if the trees are saved in exchange of our heads. It will be a cheap transaction".



Figure 10: A painting that describes about the Massacre (10)

When the king heard about what his one order caused then he came by himself to apologize and vowed that in his reign no one would cut trees or animals. Chipko movement in 1970's was also inspired by this Khejri Massacre.



Figure 11: Memorial of 363 martyrs in Khejri (11)

4.2 Other Environmental events:

Other salient environmental events that took place during different periods are shown in table 1 below:

Table 1: Showing salient events during different periods

E	Period	Events took place
1	Late 13th century:	Banning of coal was ordered by by King Edward I of England, but was unsuccessful
2	Late 18th century & early 19th century	Industrial revolution brought extensive use of coal but resulted into main cause of air pollution.
3	1936:	Smoking was banned in all public transportation in one American city, Milwaukee
4	1948:	Extensive air pollution in the form of smog was caused by the local manufacturing plant in which almost 7000 people became sick and several died In Pennsylvania
5	1948:	The Federal Water Pollution Control Act came into existence to control water pollution by the U.S. Congress
6	1952:	About 4,000 people died in London because of air pollution and worst meteorological conditions
7	1955:	The Air Pollution Control Act. Was passed by Congress to deal with air

		pollution,
8	1962:	A book in the name of "Silent Spring" was published by Rachel Carson in U.S. which was greatly appreciated.
9	1963:	The Clean Air Act. Was enacted
10	1969:	Chemical waste blown out into flames in Cuyahoga river in Ohio.
11	1970:	Earth Day was first celebrated in U.S to raise the awareness about natural resources protection
12	1970:	U.S. Environmental Protection Agency was formed by President Richard Nixon to protect human health and environment.
13	1970:	Stricter air quality and auto emission standard was introduced in Clean Air Act .
14	1972:	Clean Water Act, 1977 was introduced by amending Federal Water Pollution Control Act
15	1974	Water(Prevention and Control of Pollution) Act, 1974 was enacted by India through an act of parliament
16	1975	To reduce auto emissions , catalytic converter was invented.
17	1981	Air (Prevention and Control of Pollution) Act, 1981 was enacted by Indian Parliament
18	1984:	120,000 civilians got severely injured and near about 20,000 died. in Bhopal Gas Tragedy from pesticide plant
19	1986	Environmental Protection Act, 1986 was enacted by Indian Parliament
20	1987	Indoor Air Quality Act was enacted.
21	1988:	Ban of industrial and medical waste was imposed for discharge into the ocean by U.S. congress in the form of Ocean Dumping Ban Act
22	1989:	Oil tanker spills was witnessed in which about 11 million gallons of crude oil discharged into Prince William Sound sea of Alaska. .This incident harmed birds, fish and many other wildlife in 3000 square mile area.
23	1990	U.S. government banned smoking in flights.
24	1990	Prohibition of smoking in public buildings, including bars and restaurants was introduced in San Luis Obispo, California.
25	2002	Reduction of greenhouse gas emissions from motor vehicles by 30 percent by 2016 under law was passed by California .
26	2003	Banning of smoking introduced in all workplaces, including bars and restaurants in New York City.
27	2005	Reduction of greenhouse gases in all countries emerged through Kyoto Protocol, but was rejected by U.S. president George Bush due to economic factors while only China was exempted from this protocol.

V. CONCLUSIONS

Air pollution problem is growing on a rapid pace in as much as that about 7 million people died globally every year out of which 3.8 million from indoor air pollution and remaining 3.2 million on account of outdoor air pollution. The historical events also tend to indicate various episodes took place causing deaths due to air pollution. All such incidents should be known to masses for better understanding of the gravity of air pollution. Moreover, environmental events that took place should also be known to make the people aware. The biggest environmental movement of the world regarding saving of trees should be known globally in order to inculcate motivation among people, especially younger generation.

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