

Architectural Conservation - Addressing Air Pollution Challenges Through Solid Initiatives

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Abstract -- This paper explores the challenges posed by air pollution in conservation of heritage buildings and focuses on policy intervention. India is abode of innumerable historical monuments and invaluable heritage buildings. Every state in India has its own historicity and heritage sites. Air pollution is alarming in India that India accounts for 1.1 million deaths due to air pollution and double this number die from co-related pollution disorders every year. Urban centers are facing havoc situation with air pollution and India is supposed to beat China in coming years in air pollution measurable. But the increasing challenges of air pollution are causing greater damage to heritage buildings. Vehicular traffic emission, fly ash dust, coal heating, burning of trash, factory smoke etc are causing heavy damage to historical buildings etc Chemical pollutants such as Sulphur dioxide and nitrogen dioxide along with carbonyl are causing damage to outer surfaces of heritage buildings As a result, the buildings are fading and quickly decaying, thus giving a jolt to Indian heritage & historical identity. There is a need to create awareness about architectural conservation and understand the dangers caused by air pollution to Indian heritage preservation. A concrete policy on air pollution containing can prevail to assist and support awareness initiatives & there by join hands in preserving historical antiquity.

Indexed Terms: Architectural Conservation, air pollution, impact on heritage buildings, challenges,

I. INTRODUCTION

Reducing the deaths and ill-health from air pollution is one of the targets of sustainable development goal. United Nations Climate Change Conference held in Paris, was focusing attention of all countries towards increasing menace from Air pollution and insisted governments to recognize the need to curb carbon foot print emissions to reduce global warming. United Nations Environmental Program - The Asian Brown Cloud – Climate & other environmental impacts - 2012 argued that there is an immediate inevitability to understand the damages caused by increasing air

pollution. Environmental Preference Index (2012) Listed India at the 174th position out of 178 countries for poor air quality. A WHO survey indicated that 13 out of the 20 most polluted cities were from India. The situation was so dangerous that North Indian cities has become out of control during winters as smog and green gasses became almost fatal.

II. CAUSES FOR AIR POLLUTION IN INDIA

In India the impact of air pollution is increasing every day. There are various causes for air pollution which can be listed as under.

1. Burning of trash, – the Indian slums and plastic burning has become menace. rubber and plastic Pollutants
2. Coal combustion – the coal combustion
3. Dust – the dust caused by vehicles
4. Fly Ash – The cities and urban centers are facing the butt of fly ash.
5. Vehicular carbon emission – India is reeling under the pressure of heavy boom of vehicular traffic. As per government records 24 million vehicles ply every day.

III. IMPACT OF AIR POLLUTION ON HERITAGE BUILDINGS

Increasing air pollution is leading to corrosion of the entire surfaces of the heritage buildings. Besides it is leading to deterioration of the whole structure through fading the walls, ages the outer walls, finally to impulsive decay of the entire construction. Hydrogen sulphide tarnishes the external environment of the heritage structure. As a direct influence of bio chemical activity, heritage buildings rusts speedily, outer layers of the buildings become paler which reduces the life of the outer walls and gradually inner walls also weaken. The following

table lists the pollutant chemical which harm the heritage buildings more extremely.

Sr No	Name of the pollutant chemical which harms the heritage buildings
1	Sulphur dioxide
2	Nitrogen di oxide
3	Ozone-3
4	Hydrogen sulphide
5	Carbonyl
6	Acidic acid

Source

The above-mentioned pollutant chemicals cause damage to heritage buildings with following effects on the textile s, tiles, paints and paintings of the heritage building

Sr No	Name of the pollutant chemical	Effect of the pollutant chemical
1	Sulphur dioxide	tarnish metals, damages paints, discolors paints, embrittles surface color, reduces the strength of the textiles, reduces the root photographic materials
2	Nitrogen di oxide	Influences fading process, decays the look of the structure
3	Ozone-3	Cracks rubber induces fading cracking of the outer surfaces
4	Hydrogen sulphide	Tarnishes the external environment surrounding the building
5	Carbonyl	Influences the bio chemical activity, fastens rusting of the iron grills, window panes , doors locks , door columns.
6	Acidic acid elements	Corrodes outer layers leads to oxidation
7	Air chemicals	Reduces the life of the walls, blots the figures
8	Other smaller particles	Corrosion of the entire surfaces leading to deterioration of the structure, ages the walls, leads to premature decay of structure

Source:

IV. INFLUENCES OF AIR POLLUTION ON HERITAGE BUILDINGS

The followings table lists the impact of air pollution

Sr no	Materials impact on heritage buildings
1	Outer wall paintings
2	Outer layers of the sculptures
3	Paintings outside the structures
4	Photographic materials
5	Smooth surfaces encircling the outer doors
6	Stone sculptures
7	Structure wall Joints
8	Structure walls
9	Textiles

As a direct impact of air pollution, Paintings, structure walls, photographic materials, outer wall paintings, stone sculptures etc. of the heritage buildings, start to show lighten colors, weaken wall paintings, fade surface designs, paints become colorless all these influences add to the complete decay of heritage building in course of time.

V. CREATION OF AWARENESS ON POLLUTION MONITORING

As increasing air pollution is leading to the amplified decomposing of the historical structures there is an immediate need for attention. There is need for creation of responsiveness on air pollution influences through innovative air pollution control initiatives and pollution monitoring initiatives. But the need for framing rigorous guidelines in controlling carbon emission caused by ever increasing vehicular traffic is very important. As the table below lists

1.	Creation of awareness among people with door to door information sharing on air pollution effects. Groups of people with knowledge about devastating influences of air pollution on heritage buildings will share the knowledge among their groups. This will bring historical awareness as well as pollution prevention awareness.
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2.	Supporting the government authorities with pollution monitoring statistics can be very supportive in air pollution prevention. NGOs can play an important role in collecting and transmitting pollution monitoring statistics to heritage building supervision authorities so that they can incorporate right measures at right time
3.	Quick Data coverage of variations in pollution levels can be made available through software applications. This will arm the people with extra safe guards to fight air pollution.
4.	Stringent guidelines on controlling carbon emission through vehicular traffic needs to be attended by concerned governments. Unless and until vehicular traffic is not controlled the emission of carbon gases will be increasing and this will lead to further pollution. Several countries have come up with innovative ideas in controlling vehicular traffic,
5.	There is a need to introduce easy absorbent surface finishes to structures of historical importance. Engineering technology has become so much advanced that spongy, pours absorbent surface finishes are available in the market.

There is need for creation of awareness on pollution monitoring on the level of models initiated by western countries. Heritage architects cross the globe are using indoor air quality designs, setting up carpet padding, use of seal nuts, use of low gas emitted adhesives to articulate substances which cause air pollution inside the structures. This technology has helped several heritage structures to avoid air pollution.

Besides these engineering techniques there is a need to follow up the air pollution

1.	Augmenting research funding towards reduction of automotive pollution
2.	Initiating superior vehicle maintenance policy
3.	Introducing cost effective rail way network
4.	Introducing fast railway network
5.	Introducing traffic management policy
6.	Limiting manufacturing of diesel variants vehicles,

7.	Pioneering superior automotive technology
8.	Quality checks on Use of adulterated fuels,

VI. CONCLUSION

A concerted and coordinated effort across the governing authorities with the involvement of related ministries, including Environment, forestry, water management, finance, agriculture, rural development, power and transport is needed to fight air pollution effects. The need to create universal awareness among public towards following operational guidelines monitoring the air pollution is the instantaneous stipulation.

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