The taj mahal

Environment, Pollution

Taj Mahal - The Taj - is the " King Emperor" amongst the World Wonders. The Taj is the final achievement and acme of the Mughal Art. It represents the most refined aesthetic values. It is a fantasy-like grandeur. It is the perfect culmination and artistic interplay of the architects' skill the jewellers' inspiration. The marble in-lay walls of the Taj are amongst the most outstanding examples of decorative workmanship. The elegant symmetry of its exterior and the aerial grace of its domes and minarets impress the beholder in a manner never to be forgotten.

It stands out as one of the most priceless national monuments, of surpassing beauty and worth, a glorious tribute to man's achievement in Architecture and Engineering. The Taj is threatened with deterioration and damage not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction. A private sector preservation organization called " World Monuments Fund" (American Express Company) has published a list of 100 most endangered sites (1996) in the World.

Theenvironmentof Agra is today beset with problems relating to the inadequacy of its urban infrastructure for transportation, water and electricity. Residential fuel combustion, diesel trains and buses, and back-up generators cause the densestpollutionnear the Taj Mahal. Constitution of the proposed Agra Ring Road and Bypass that would divert the estimated daily 6, 50, 000 tons of trans-India truck traffic financing.

Strict controls on industrial pollution established in 1982 are being intensively enforced following a 1993 Supreme Court Order. The Asian Development Bank's proposed $300 million loan to the Indian Government tofinanceinfrastructure improvements would provide the opportunity to solve the chronic problems. Agra contains three World Heritage Sites, including the Taj Mahal. " According to the petitioner, the foundries, chemical/hazardous industries and the refinery at Mathura are the major sources of damages to the Taj.

The Sulphur Dioxide emitted by the Mathura Refinery and the industries when combined with Oxygen - with the aid of moisture - in the atmosphere forms sulphuric acid called " Acid rain" which has a corroding effect on the gleaming white marble. Industrial/Refinery emissions, brick-kilns, vehicular traffic and generator-sets are primarily responsible for polluting the ambient air around Taj Trapezium (TTZ). The petition states that the white marble has yellowed and blackened in places. It is inside the Taj that the decay is more apparent.

Yellow pallor pervades the entire monument. In places ugly brown and black spots magnify the yellow hue. Fungal deterioration is worst in the inner chamber where the original graves of Shah Jahan and Mumtaz Mahal lie. According to the petitioner the Taj - a monument of international repute - is no its way to degradation due to atmosphere pollution and it is imperative that preventive steps are taken and soon. The petitioner has finally sought appropriate directions to the authorities concerned to take immediate steps to stopair pollutionin the TTZ and save the Taj.

The court considered the affidavit filed by the board and directed the board to issue a public notice. Pursuant to the courts order, the board filed affidavit (5. 8. 93), wherein it stated that public notice was published in two national newspapers calling upon the industries to file their replies during the extended time. The affidavit also states that all listed industries were polluting industries and 507 out of them had not even installed any air pollution control device.

The 212industries that did not respond to the notice and failed to take any steps towards installing the pollution control devices were closed by order-dated 27. 8. 93. The court was assisted in its efforts to improve air quality in the TTZ by the reports prepared by the NEERI (National Environment Engineering Research Institute), Gas Authority of India Limited (GAIL) on the supply of fuel gas to industries in the area and the study conducted by the Vardharajan Committee, which was constituted in May 1994, by the MoEF.

Varadharajan Committee made, among others, the following recommendations: " Steps may be taken to ensure that no new industry including small industries or other units which can cause pollution are located north-west of the Taj Mahal. Efforts may be made to relocate the existing small industries particularly the foundries, in an area southeast of Agra beyond the Taj Mahal so that emissions from these industries will not be in the direction of the monuments. Similar considerations may apply to large industries such as Fertilizer and Petrochemicals.

Such industries, which are likely to cause environmental pollution, may not be located in the neighbourhood of the refinery. The Committee further

recommends that no large industry in the Agra region and its neighbourhood be established without conducting appropriate detailed studies to assess the environmental effect of such industries on the monuments. Location should be so chosen as to exclude any increase in environmental pollution in the area. ... The Committee wishes to record its deep concern regarding the existing level of pollution in Agra.

It recommends that an appropriate authority be created which could monitor emissions by industries as well as air quality at Agra on a continuous basis. This authority should be vested with powers to direct industries causing pollution to limit the level of emission and specify such measures as are necessary to reduce the emissions whenever the pollutant level at the monuments exceeds acceptable limits. The Committee particularly desires that recommendations made in regard to reduction of existing pollution levels at Agra should be covered to a time-bound programme and should be implemented with utmost speed.

The Committee also recommends that studies should be undertaken by competent agencies to explore the possibility of protecting the monuments by measures such as provision of a green belt around Agra in the region between Mathura and Agra. Even though assurances have been obtained from IOC that adequate precautions would be taken to contain the pollution on account of using coal in the power plant, the Committee is of the opinion that till such time this problem is studies in depth and suitable technologies have been found to be satisfactorily in use elsewhere the use of coal in the refinery power plant should be deferred. The National Environment

Engineering Research Institute (NEERI) gave an " Overview Report" regarding status of air pollution around the Taj in 1990. " The sources of pollution, including small and medium-scale industrial units, are scattered all around Taj Mahal. High air pollution load is thus pumped into the Taj air shed. Sudden rises in concentration level are often recorded in all directions in gaseous as well as particulate pollutant depending upon the local micro climatic conditions.

On four occasions during the five-year air quality monitoring, the 4 hrly average values of SO2 at Taj Mahal were observed to be higher than 300 ug/m3, i. e. 10 folds of the promulgated CPCB standard of 30 ug/m3 for sensitive areas. The values exceeded even the standard of 120-ug/m3 set for industrial zones. Statistical analysis of the recorded data indicate that 40% (cumulative percentage level) has crossed the standard set for sensitive receptors/zones.

The SPM levels at Taj Mahal were invariably high (more than 200 ug/m3) and exceeded the national ambient air quality standard of 100 ug/m3 for SPM for sensitive locations barring a few days in monsoon months. Another study during 1985-87 brought to fore that the overall status of the ambient air quality within the trapezium has significantly deteriorated over this period. " The Taj Mahal marble samples analyzed by NEERI in 1993 reveal that the black soot on certain protected surfaces contains 0. 6% Calcium and traces of Sulphate.

X-ray diffraction studies indicated that soot and quartz (Silicon Dioxide) and the major constituents of the black coating at Taj Mahal (Lal and Holden, ES

& T, April 1981). The origin of soot can be traced back to the fuel consumption around the sensitive receptor, while quartz is derived from geocrustal origin and causes surface abrasion. Soot in itself is not chemically destructive, but with tar it acts as a soiling agent. Absorption of the acidic gases is enhanced due to the presence of soot/smoky matter resulting in long-term effects.

Further, the presence of soot reduces the aesthetic value of the monument. Ambient air around Taj Mahal is polluted primarily from point/line sources and has adverse impacts on building material by alteration of marble and sandstone structures at microcrystalline level. The earlier studies have revealed that the concentrations of gaseous pollutants and SPM (predominantly soot and carbon particles) are relatively high during winter months due to the frequent inversion conditions restricting vertical dispersion.

During monsoon seasons, suspended particles are washed away and this cycle of pollutant builds up and subsequent removal continues exposing fresh surface of the monument to the pollutant. The period industrial development of Agra-Mathura region has resulted in acidic emissions into the atmosphere at an alarming rate. This causes serious concern on the well being of Taj Mahal. ... The gaseous pollutants being acidic in nature, significantly both the as well as the biotic components of the ecosystem like plants and building material like marble and red stone.

The sources of pollution in Agra region as per the report of the Central Pollution Control Board are iron foundries, Ferro-alloyed industries, rubber

processing, lime processing, engineering, chemical industry, brick refractory and vehicles, Mathura Refinery and Ferozabad Glass Industry. On 3 August 1995, the court formed a tentative view that polluting industries in the TTZ would have to be relocated and sought the assistance of the Union Government to device an appropriate solution. Taj, being a cultural heritage is an industry by itself.

More than two million tourists visit Taj every year and this is a good source of revenue for the country. The court had monitored this petition for over three years with the objective of preventing and protecting the Taj from deterioration and damage due to atmosphere and environmental pollution. It cannot be disputed that the use of coal/coke by the industries emits pollution in the ambient air. The objective behind this litigation is to stop pollution while encouraging development of the industries. The old concept that development and ecology cannot go hand in hand is no longer acceptable.

The development of the industries is essential but not at the cost of the environment. Orders passed by the court time to time indicate that the relocation of the industries from TTZ is to be resorted to only if the Natural Gas, which has been brought at the doorstep of TTZ is not acceptable/ available by/to the industries as a substitute for coal/coke. The GAIL has already invited the industries in the TTZ to apply for gas connections and industries operating in TTZ with the gas connections need not relocate.

The atmospheric pollution in the TTZ has to be eliminated at any cost as it's not just the preservation of monument, which is essential, but also the human life. In August 1999, the Supreme Court struck again, ordering the

closure of 53 iron foundries and 107 other factories in Agra that had not cleaned up their act. The order has become a call to arms for foundry owners, workers, trade union representatives and small-scale industry. However, industry is buying time: it filed a review petition through the Uttar Pradesh State government and obtained a reprieve on the court order's implementation.

The matter comes again before the Supreme Court this summer. In the meantime, Agra's Iron Founders' Association is building up their case. They argue that 3, 000 cottage and engineering units depend on the foundries, and that they directly or indirectly employ about 300, 000 workers. They hold that thetechnologyfor using natural gas in their industries is not yet ready. Taj trapezium project's phase II gets green signal Buoyed by a decline in the pollution levels around the Taj trapezium with the successful implementation of the first phase of the afforestation project, the state administration has okayed the Rs 15. 0-crore second phase. The success of the plantation scheme assumes significance since a report prepared by the National Environmental Engineering Research Institute (NEERI), Nagpur, had pointed out how " pollution inventory of Agra reflected high concentration of NO2, SO2 and CO2". Apart from a vigorous re-run of the plantation campaign in the Taj city, this phase envisages greening of " sensitive receptors" of pollution like the heritage monuments and the 42-hectare land strip along the NH-2 (Delhi-Agra-Kanpur), NH-3 (Delhi-Agra-Mumbai) and NH-11 (Jaipur-Agra) highways. A 3