

Acidic and irritating smog in Kathmandu

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Increase of air pollution due to vehicle emission in Kathmandu Valley started with the import of car during Rana rules. Now, the major contributors of air pollution in valley are the vehicles, industries and construction work.

The valley is bowl-shaped and surrounded by high hills on all sides. Phulchoki in southeast, Shivapuri in eastnorth, Chandragiri in southwest, and Nagarjun in western side of the valley. The wind velocity is very low, less than 5 km per hour on average. More than 109,613 different vehicles, 2,173 industries are within the valley and major portion of industrial emission is from brick factories.

There are more than 120 brick kilns in the valley. Researches conducted by the Department of Hydrology and Meteorology and NESS show that the Total Suspended Particles (TSP) and Particulate matter in different places of Kathmandu are respectively 3-4 and 2-6 times higher than World Health Organization (WHO) standard. H B Mathur, in 1993, estimated that around 56 tons of carbon monoxide, 18 tons of hydrocarbons, 7 tons of nitrogen oxides, 0.4 tons of sulphur dioxide, and 0.69 tons of particulate matter are discharge daily by the vehicles in Kathmandu. On the other hand, S R Devkota in 1993 found the NO_2 and SO_2 concentration as 26 and 36 $\mu\text{g}/\text{m}^3$ respectively. These values should have increased by 10-15 percent annually as the emission source of these components has increased. The emitted carbon monoxide, nitrous oxide, hydrocarbons, suspended particles, particulate matters in the presence of sunlight forms nitrogen dioxide, nitric oxide, ozone, hydrogen peroxide, peroxyacyl nitrate (PAN) and it is brownish haze, also called photochemical smog.

When we consider the present situation of Kathmandu Valley and nearby areas a similar condition as the photochemical smog that was first seen 59 years back in Los Angeles can be said to prevail. This smog was also seen in cities like Denver, Sydney, Mexico city and Buenos Aires. Actually the chemical reaction of carbon monoxide, lead components, unburned or partially burned hydrocarbons and NO_x leads to the formation of photochemical smog. Leaded fuel, unburned hydrocarbons from vehicles and industries, dry wind from the desert and pollutants from neighbouring countries are forming a lid over the sky of Kathmandu valley. The amount of pollutants is very high in the atmosphere of the valley because of the vehicle emission and smoke generated from forest fires in more than 15 districts, a few weeks back.

Trapping of more heat from the sun and stagnant atmospheric condition at present is more favourable for photochemical smog in the valley. Photochemical smog is brownish in colour with a pungent, choking odour due to Nitrogen dioxide which is a component.

Photochemical smog causes eyes, nose, and respiratory tracts irritation, has unusual odour and reduces visibility. Many in the valley are experiencing tears, irritation, cough, chest pains and throat problems. A week ago, two big aeroplanes could not land due to

lack of visibility. Even today, the brownish haze is surrounding and covering the valley and its near by areas.

This situation will continue till the first rain or high-speed wind. Rain water will dilute the pollutants whereas wind will disperse them. Dispersion will just carry pollutants to other areas whereas rain will bring them back to the earth. When SO_2 and NO_x react with water they form sulphuric and nitric acid respectively. Rain with higher concentrations of these is acid rain. This time, the first rain in Kathmandu is likely to be highly acidic as the concentration of pollutants is very high and it has not rained for a long time. So, it is better to stay inside during first and second rain. The rain may not be highly corrosive but it can cause irritation and allergy to the skin. To minimize the present smoggy situation, we should use vehicles less, minimize or stop industrial work, and construction work in and near roads. The concentration of photochemical smog is very high at noon but the concentration of pollutants at ground level is high in the morning due to inversion condition. So, it is not healthy practice to go for morning walks.

Even in the winter, morning walk is not recommended as thermal inversion takes place in the valley. Though we feel fresh air and do not see the smoke in the morning, the concentration of pollutants will be very high at ground level. We can do nothing about the topological and natural condition of the valley, but we can reduce air pollution.

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