

Assessment of anthropogenic activities in Akot, district Akola, Maharashtra: A thermal atmospheric study

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ABSTRACT

The present study deals with the thermal atmospheric status of Akot city. Certain direct and indirect human domestic thermal activities contribute the excess warming of atmospheric air. Small scale commercial activities of the locality emit the heat in atmosphere. The present data of winter studies indicates the fluctuation of atmospheric temperature in the various places in the city, although considerable variations in the atmospheric temperature in market area due to heat activities in hotels and restaurants. The average deflection in ambient temperature is recorded by 2°C. In the age of modernization and urbanization of localities, the use of certain appliances and their collective emission of heat in the air increase the air temperature, while the mass domestic activities of localities contribute to increase in environmental temperature and ultimately global warming. The tools and methods used in present study may provide new strategies in the thermal atmospheric study. The study may reflect the light on possible causes and sources responsible to contribute the atmospheric warming.

Key words : *Global warming, air, temperature, pollution, thermal activities.*

INTRODUCTION

The process of urbanization produces radical changes in the nature of the surface and atmospheric properties of a region, because the natural vegetation is removed and replaced by non-evaporating and non-transpiring surfaces such as metal, asphalt and concrete and other anthropogenic activities, (Cueto *et.al.* 2009). Surface temperature in many Asian cities have been elevated due to urbanization and global warming, (Makato *et al.* 2006). Lynn *et.al* (2007) found that the Chicago area could see an increase in the average summer temperature of approximately 10 degrees Fahrenheit by 2080 as a result of anthropogenic climate change.

During the next three decades, the world population is expected to increase from 6.1 to 8.1 billion, with nearly all of this growth concentrated in urban areas located in less developed countries. Such concentrations of people and activity are exerting increasing stress on the natural environment. In recent decades, air pollution, urban warmth and emissions of carbon dioxide have become important problems of cities causing urban

haze with serious impacts on public health (Roth, 2009)

Area of Akot city has a great religious importance since the last decades. In Vidharbha region of Maharashtra state, Akot is located near the base of Satpuda foot hills. The area around the city is blessed with the successful agriculture and commercial business lines, in the population of locality more than one lack. But in last couple of decade Akot city witness maximum urbanization and hence face resulted consequences.

Urbanization and industrialization have resulted in deterioration of ambient air quality of most Indian cities (Dutta and Mena, 2008). The impact of anthropogenic emission in to the atmosphere and their movement into the biosphere is responsible for variety of chronic and acute diseases at local, regional and global scale, (Chaudhary and Banerjee, 2009). In the age of industrialization, atmosphere is suffering from the problem of heat waves due to increase of green house gases, (Menon, 1989). However, the fast growing urbanization in India resulted in to increase of human

population in small cities. This interns increasing the domestic organic sewage and garbage in the city. Man introduce large amount of gases wastes and fine particulate materials in to the atmosphere, which fluctuate the meteorological conditions of the atmosphere, (Annonymous, 1970).The traditional system of sewage and garbage management is facing the problems of proper disposal of the wastes and sewage. So, most of the organic matter retains in the city area in an exposed condition.

On the other hand, the use of domestic and commercial machineries is increasing on large extent with increase of cement and steel structures of residential colonies. Certain facts about the thermal activities of man in the urban and rural societies shows remarkable picture about the thermal pollution of air. The increasing biodegradation processes of wastes and sewage and heat producing activities of human beings are also taken in to consideration while studying the thermal ecology.

MATERIAL AND METHODS

Three sampling areas were selected in the Akot city to survey the sources of heat in addition to solar radiation. Station 'S1' is the sampling area located beyond the residential areas, at Daryapur road. Station 'S2' is the middle of residential area named as Bargan in Akot. Station 'S3' is the middle of the market area in Akot. Certain generalized facts in the rural and urban localities were taken in to consideration, to assess the sustained minor thermal emission sources. Municipal garbage and sewage disposal system was observed and the garbage dumping habits of locality was studied.

The temperature variation is measured by the standard Hicks make thermometer during the months of August, September, October and November 2007. The thermal based human activities were recorded including the domestic activities and low scale commercial activities. Periodical visits were performed to the various areas to know daily use of minor heat emission sources. The post monsoon and winter temperature from different stations of the city was recorded, (Kumar, 1998).

RESULTS AND DISCUSSION

Average temperature of air in Akot city ranges from 25.69° C to 33.01° C during August, September and October months. Average difference between the air temperature of market areas having hotels, canteens and restaurants, and the residential areas, and the open lands beyond the city area, is recorded 1° C to 2° C. (Table 1.1). The enhanced values of air temperature at market area may attribute to the continuous burning or large amount of kerosene and LPG in the commercial stoves of hotels and tea canteens and coal burning in the furnaces in the restaurants. The wide hearth of

furnaces for continuous warming of food in restaurants emits plenty of heat in the atmosphere with the emission of carbon dioxide, (Roether, 1980).

According to Krishan and Saha, (2008) global warming is largely associated with an increase in atmospheric CO₂ concentration due to burning of fossil fuel. Padma *et al.* (2009) reported that domestic fire and automobile vehicles are the main sources to increase atmospheric temperature in urban areas. According to survey of Bhaskaran, (1995) 65% of total coal in the world is used to produce the electricity and remaining 35% of it is used for the burning in to houses and factories. Kate and Paul (2008) have investigated the effects of urbanization on the local weather and climate of Chicago. However in the residential areas of rural and urban localities, the atmospheric temperature showed lesser values by 1° C than the values of market area, (Table 1.1).

Recently, similar results have been observed by Saini *et al.*, (2009) at Roorkee city, Uttarakhand and Dutta and Meena (2008) in Ajmer city, Rajasthan. Municipal channels containing the load of domestic organic wastes, warms the air in certain limits. Biochemical degradation by microbes in the open municipal drainage channels may also contribute to evolve the green house gases, (Asthana and Asthana, 1998). On the other hand, exothermic degradation processes are responsible to warm the surrounding environment. In vegetable market area, the daily disposal of large amount of green leaves on land and its microbial degradation contributes the heat and gases to the atmosphere.

Comparatively lesser values during the month of August may attribute to the frequency of precipitation and more humidity in the air. Increased milk production in the rural areas of Akot also produces the large quantity of bovine waste matter. The dumping of this cattle dung on land results in to its microbial degradation with emission of heat and carbon dioxide, methane, hydrogen sulphides etc, that contributes to the green house effect.

The revolution in the number of automobiles and improper conditions of roads in the Akot city, resulted in to the disposal of fine dust particles in to the air. The absorption and conduction of heat in to the air by dust particles increase the air temperature values at the market and the residential areas. M.I.T. reports during 1970, have been reported the increase of fine particles in the atmosphere containing dust and ash, due to human activities.

However highly illuminating sodium vapor lighting in the market area, emits plenty of heat in the air during night. On the other hand, every house including lower class to