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URBAN HEAT ISLANDS IN INDIA

Relevant for: null | Topic: Urbanization, their problems and their remedies incl. Migration & Smart Cities

Warming terrain: The temperature in a densely populated city is as much as 2 degrees higher than suburban or rural areas. | Photo Credit: V Sreenivasa Murthy

A recent study from IIT Kharagpur called “Anthropogenic forcing exacerbating the urban heat islands in India” noted that the relatively warmer temperature in urban areas, compared to suburbs, may contain potential health hazards due to heat waves apart from pollution. Arun Chakraborty an author of the study said, “Our research is a detailed and careful analysis of urban heat islands in India. We study the difference between urban and surrounding rural land surface temperatures, across all seasons in 44 major cities from 2001 to 2017.” He further said, “For the first time, we have found evidence of mean daytime temperature of surface urban heat island (UHI Intensity) going up to 2 degrees C for most cities, as analysed from satellite temperature measurements in monsoon and post monsoon periods.” Other researchers from elsewhere have also noticed similar rise in daytime temperatures in Delhi, Mumbai, Bengaluru, Hyderabad and Chennai.

We know of urban water lakes (as in Bhopal, Hyderabad, Bengaluru or Srinagar) which add pleasure and coolness, but an urban heat island? An urban heat island (abbreviated as UHI) is where the temperature in a densely populated city is as much as 2 degrees higher than suburban or rural areas. Why? This happens because of the materials used for pavements, roads and roofs, such as concrete, asphalt (tar) and bricks, which are opaque, do not transmit light, but have higher heat capacity and thermal conductivity than rural areas, which have more open space, trees and grass. Trees and plants are characterised by their ‘evapotranspiration’—a combination of words wherein evaporation involves the movement of water to the surrounding air, and transpiration refers to the movement of water within a plant and the subsequent lot of water through the stomata (pores found on the leaf surface) in its leaves. Grass, plants and trees in the suburbs and rural areas do this. The lack of such evapotranspiration in the city leads to the city experiencing higher temperature than its surroundings.

UHI s also decrease air quality in the cities, thanks to pollution generated by industrial and automobile exhaust, higher extent of particulate matter and greater amounts of dust than in rural areas. Due to this higher temperature in urban areas, the UHI increases the colonisation of species that like warm temperatures, such as lizards and geckos. Insects such as ants are more abundant here than in rural areas; these are referred to as ectotherms. In addition, cities tend to experience heat waves which affect human and animal health, leading to heat cramps, sleep deprivation and increased mortality rates. UHIs also impact nearby water bodies, as warmer water (thanks to the pavements, rooftops and so on) is transferred from the city to drains in sewers, and released into nearby lakes and creeks, thus impairing their water quality.

It is painful to realize that Bengaluru, once known for its salubrious climate, now has UHIs, even in places like Koramandala and Jayanagar. The rapid expansion of buildings, industrial parks and associated high-rise apartments in suburbs, such as Electronic City and Whitefield, has made the city insalubrious (read: <urba-heat-island-effect-report>, prepared by The Energy and Resources Institute, India). Some of its praiseworthy lakes are dirty and diseased. Likewise, when my family and I moved to Hyderabad in 1977, we were told that we do not need air conditioning or even ceiling fans at night. Now, we have UHIs, again due to reckless expansion of industrial parks, factories and associated buildings in what was once a vast suburb, which has now become the third city called Cyberabad. These have not only led to formation of UHI but also the associated pollution due to a drastic reduction in the Air Quality Index (AQI), thanks to

the exhausts from industries and automobiles. The ‘safe’ AQI is thought to be between 61-90 units (when particles from the air enter the human and animal bodies causing discomfort and illness), but in places like Delhi it has gone to very poor–to-dangerous levels of about 323. Fortunately, it is still on the safe side in Hyderabad and Bengaluru, but it is time to take steps to keep it low.

Industrialisation and economic development are vital to the country, but the control of UHIs and their fallouts are equally vital. Towards this, several methods are being, and can be, tried. One of them is to use greener rooftops, using light-coloured concrete (using limestone aggregates along with asphalt (or tar) making the road surface greyish or even pinkish (as some places in the US have done); these are 50% better than black, since they absorb less heat and reflect more sunlight. Likewise, we should paint rooftops green, and install solar panels there amidst a green background.

The other is to plant as many trees and plants as possible. It is interesting to realise how beneficial trees are to us. The organisation Treepeople lists as many as 22 benefits from trees and plants (see <Tree people .org/tree-benefits>). Relevant to the present context are: they combat climate change; clean the surrounding air by absorbing pollutant gases (NXOy, O3, NH3, SO2, and others) and trapping particulates on their leaves and bark; cool the city and the streets; conserve energy (cutting air-conditioning costs by 50%); save water and help prevent water pollution; help prevent soil erosion; protect people and children from UV light; offer economic opportunities; bring diverse group of people together; encourage civic pride by giving neighbourhoods a new identity; mask concrete walls, thus muffling sounds from streets and highways, and eye-soothing canopy of green; and the more a business district has trees, more business follows. So, plant as many trees and plants as you can around and between your buildings, schools, houses and apartment complexes. But, ‘token’ planting will not do, nurturing them year after year is vital!

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The WHO had to come up the name in line with the 2015 guidelines between the global agency, the World Organisation for Animal Health and the Food and Agriculture Organization.

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