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CAPITAL REGION TURNING INTO HOT SPOT, LITERALLY

Vij, Guntur Become Urban Heat Islands Due To Greenery Loss: Study

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Vijayawada: In a stunning revelation, experts in civil engineering and weather sciences have found that the entire capital region is fast turning into a virtual 'hot spot' due to the loss of greenery in the last few months. While Vijayawada and Guntur have already become the urban heat islands (UHIs), a majority of the area in the capital city area has started witnessing high temperatures. As large-scale developmental activities are expected to take place in the entire region, the experts warn the capital region development authority (CRDA) to take adequate steps to bring down increasing temperatures in the region.

A team of experts comprising Andhra Pradesh Public Service Commission (APPSC) chairman Dr Pinnamaneni Udayabhaskar, chief of civil engineering department at Usha Rama Engineering College K Sundara Kumar and Kollipara Padma Kumari of JNTU, Kakinada, carried out a research on UHIs in the capital region.

"Our study is mainly about the development of UHIs in the micro-climate of the CRDA region. Vijayawada and Guntur are becoming potential urban heat islands as the area is already reporting high temperatures. Land Surface Temperature (LST) is 10 to 12 degree Celsius more than the air temperature in the region which is very high," professor Sundara Kumar told TOI. He said they had obtained maximum temperature of 58.2 degree Celsius LST while the minimum is 23.9 degree Celsius. Low temperature was observed in water bodies, wet lands, forests, dense tree-clad areas and agricultural land.

Air temperature primarily depends on LST and the other factors that influence it include wind velocity and humidity. Changes in land surface temperature occur due to conversion of green lands (thermal absorber) into concrete, barren lands (thermal insulator). Hence, they are anthropogenic in nature. "We need to handle the issue better with perfect urban planning because we can control only certain things. For example, there is no human influence on humidity or wind velocity as they are meteorological," he explained.

The team used satellite images to develop surface temperature images along with Land Use Land Cover (LULC) images describing the pattern of greenery, concrete, water and others in the capital region. These are validated by taking field observations at more than 100 points in both Krishna and Guntur districts.

Experts in the field said that UHI is an upcoming serious issue which causes discomfort to city dwellers and increases power consumption because of the increased requirements of cooling. Increased heat waves also result in the rise of the death roll, particularly of old people. UHI is also linked to other micro climatological factors like humidity and rainfall. "Large-scale conversion of forests and agricultural lands into impervious surfaces including roads, buildings and other infrastructural amenities is the main cause of the problem. The conversion of vegetative land into impervious one is changing the energy budget and is responsible for excess heat development," said Prof Kumar.

LST has been classified into three categories - low (below 30 degree C, medium (30 degree C - 40 degree C) and high (40 degree C). While the capital city area, which was left barren without crops, has entered the medium category from the previous low, both Vijayawada and Guntur have been included in the high category with more than 40 degree C. The only region - Krishna delta in Guntur and forest area of Kondapalli reported low temperatures with less than 30 degree C.

Normally, green areas with vegetation receive sunlight and utilise it in the process of photosynthesis. The energy will be converted into mass in the form of carbohydrates. Detection of urban heat island (UHI) is useful for protection of the urban area from the potential evil effects of UHI effect. Proper environmental management with suitable strategies to control deforestation and de-vegetation together with development of green spaces can reduce the intensity of the problem. Conventional measurement of temperatures with thermometers could be very cumbersome and their interpretation in the form of maps is very tedious. Application of satellite images can be a right option for this. Several researchers used satellite technology for study of UHI effect.

Within the new capital region, several infrastructural projects including an outer ring road, an inner ring road, capital city development project and airport development project are proposed. The researchers observed that all these projects would need a lot of land and there would be a significant change in the land use and land cover. "These changes can affect the environmental conditions of the area in the future," said an urban planner.

The study found that land surface temperature is inversely proportional to vegetation cover in the region. Higher values of LST were observed only at built-up surfaces. Forests, agricultural areas and other light vegetative areas showed low temperature. The LST is increasing from rural areas to the urban areas. The non-evaporating and non-transpiring surfaces such as stone, metal and concrete raise the radiant temperature. "To reduce this effect, the trees must be grown and vegetation cover must be increased. In the capital region, Vijayawada and Guntur have become heat islands. In these cities a temperature rise of nearly 12 degree C is observed, which needs to be contained on a war-footing," the experts said.

The study was published in the latest issue of International Journal of Advanced Remote Sensing and GIS.

THE HEAT IS ON

- APPSC chief, 2 others do a study on rising temperatures in capital
- Team uses satellite images to develop surface temperature images
- Land surface temperatures classified into 3 categories - low, medium & high
- UHI linked to climatological factors like humidity and rainfall
- High temperatures being reported from Vijayawada, Guntur
- High land use for infra projects to affect environment in the capital
- Non-evaporating surfaces to raise radiant temperature

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