1. Urban Heat Islands in India

Prelims Level: Geography - Climatology

Prelims Tag: Geography, Climatology, Urbanisation, Population and associated Issues.

Mains Level: GS-I Important Geophysical Phenomena such as Earthquakes, Tsunami, Volcanic Activity, Cyclone etc.

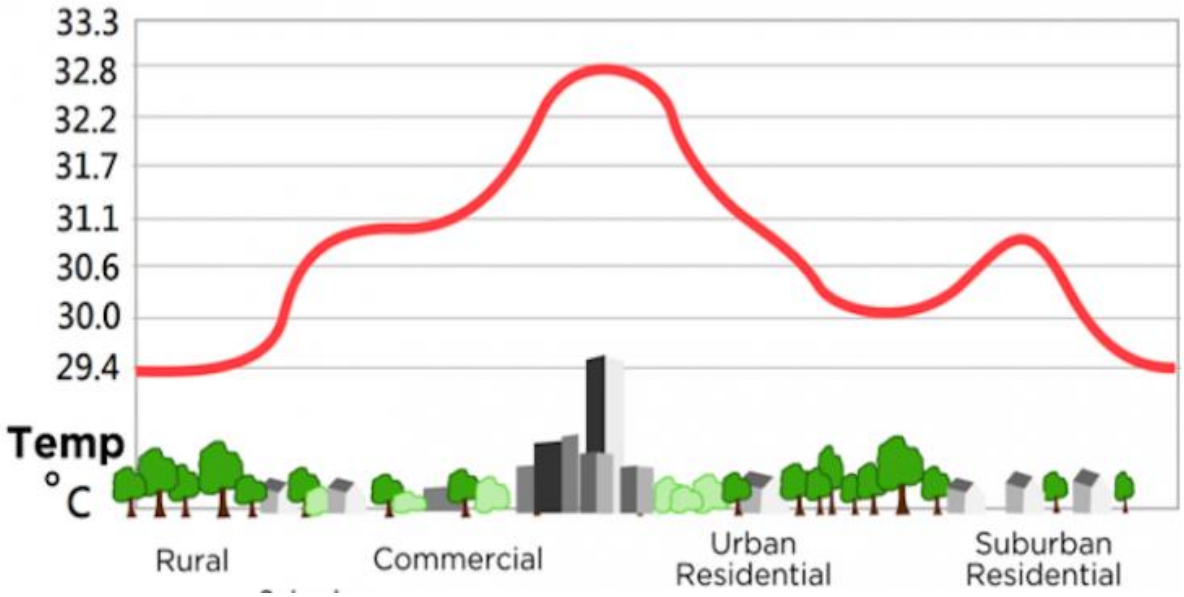
Mains Tag: Geography, Climatology, Urbanisation, Population and Associated Isues.

Why in News?

- A recent study from IIT Kharagpur named "Anthropogenic forcing exacerbating the urban heat islands in India" noted that mean daytime temperature of surface urban areas going up by around 2 degrees Celsius in average, when compared to neighboring areas.
- The same study also said that the relatively warmer temperature in urban areas, compared to suburbs, may contain potential health hazards due to heat waves apart from pollution.

What is Urban Heat Island?

- Urban Heat Island effect is defined as the presence of significantly higher temperatures in urban areas compared to the temperatures in surrounding rural zones mainly due to human factors
- Usually urban heat islands have a mean temperature 8 to 10 degrees more than the surrounding rural areas
- These can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality.



So why are these urban areas Hotter than Surrounding Suburbs?

- This happens because of the materials used for pavements, roads and roofs, such as concrete, asphalt (tar) and bricks, have higher heat capacity and thermal conductivity than rural areas, which have more open space, trees and grass.
- Trees and plants are characterized 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 evapo-transpiration in the city leads to the city experiencing higher temperature than its surroundings.
- The higher temperatures of urban heat islands can be attributed to human activity, particularly to changes in land surfaces. Urban development requires the use of significant amounts of cement and asphalt for roofing purposes and to pave sidewalks and roads. These materials have thermal bulk properties that absorb more solar radiation than the surfaces found in rural areas. Additionally, these materials have different surface radiative properties, which means they emit energy as thermal radiation or heat.