

# The Link between Urbanization and Climatic Factors: A Concept on Formation of Urban Heat Island

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**Abstract:** - Increasing the number of population, pollutions, urban expansion and many other kinds of urbanization factors in metropolitan areas are affected climatic factors and vice versa. In fact, there is a correlation between these two factors in general. This paper put forward the conceptual model and two hypotheses. In order to test the model, UHI mapping has been carried out in Tehran as a case study. The investigation has been done at macro-level to get surface temperature. The methodology employed is to use satellite image with a thermal band (obtained on 18 July 2000). To map out the UHI, mapping of LST and NDVI were necessary and then overlaid them and extracted maximum temperature value for both urban and rural areas. The results show that the maximum urban and rural temperature values are 39°C and 27°C respectively. Therefore, daytime Tehran surface UHI shows 12°C of difference between urban and rural areas which is quite strong. Analyzing the data specified that the urbanization factors have direct impact on increasing the UHI intensity in Tehran metropolitan area.

**Key-Words:** - Climatic Factors, Environmental Challenge, Tehran, Urban, Urban Heat Island, Urbanization Factors

## 1 Introduction

Since urban heat island is due to two factors, urbanization and climatic factors, many features of the physical structure of the city can affect the urban climate and with negative impacts lead to increase UHI intensity. In addition, it is not always a one way influence from urbanization toward climate. Increasing of temperature and sunlight, decreasing wind speed, humidity and precipitation can be major factors on formation of UHI. As a matter of fact, existing the interaction between urbanization and climatic factors may influence greatly on formation of UHI. In other words, the percentage of UHI formation is high when great interaction exists.

Therefore, according to the above concept, it becomes increasingly important to investigate effective factors on formation of UHI and the correlation between these factors in order to recognize the formation way of UHI [1].

Thus, this paper explores a conceptual model in order to show the correlation between these two factors and how they can influence on formation of UHI on different layers of city. However, this paper

only focuses on urbanization factors and surface UHI.

## 2 Recognition of all dimension of urban heat island

The majority of cities are sources of heat, pollution and the thermal structure of the atmosphere above them is affected by the so-called “heat island” effect. A heat island is best visualized as a dome of stagnant warm air over the heavily built-up areas of cities [2]. The heat that is absorbed during the day by the buildings, roads and other constructions in an urban area is re-emitted after sunset, creating high temperature differences between urban and rural areas [3]. The exact form and size of this phenomenon varies in time and space as a result of meteorological, locational and urban characteristics [4]. Therefore, urban heat island morphology is strongly controlled by the unique character of each city. As it can be seen in Fig. 1, Oke [4] stated that a larger city with a cloudless sky and light winds just after sunset, the boundary between the rural and the urban areas exhibits a steep temperature gradient to