# Chapter 5
# Investigation of Urban Environment Using Tasseled Cap Transformation:
## Vegetation and Urban Indices in Indian Sub-Continental City (Kharagpur)

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## ABSTRACT

*Urban settlements have more complex environments, in unremitting fruition, where most of the world population lives. Most of the cities in developing countries have been developed without a rationale, and the life conditions are repeatedly insufferable. For this research work, NDVI is particularly used to assess the status of vegetation cover. Tasseled cap is another index that creates three band images for this study. Brightness, greenness, wetness are the three bands that represent the area under consideration. The present study aims particularly at comparing high NDVI area and greenness values given by tasseled cap and low NDVI values and high brightness values and status of urban environment. Based on the overlapping of tasseled cap image, an NDVI image is observed in which most of the area of healthy vegetation is located in the north west and south east part of Kharagpur city, which extended from south west to north east and north to south respectively.*

DOI: 10.4018/978-1-7998-5027-4.ch005

## INTRODUCTION

Urban settlements have more complex environments, in unremitting fruition, where most of the world population lives. Most of the cities in developing countries have been developed without a rationale and the life conditions are repeatedly insufferable. Urban development is an organic process, and which has been analyzing the urban built-up area expansion characteristics is advantageous when determining the urban land use trend and intensive land use degree (*Lin Wang et al. 2018*). The difference between the characteristics of surface cover in urban and non-urbanized areas in terms of 3-d geometry of the built area, heat absorption, the building materials, surface albedo and vegetation cover lead to different air and surface temperatures within a city relative to the surrounding area because of the various band comparison. Therefore, urban expansion can lead to radical changes in the nature of the surface of the urbanized area (*Azad Rasul et al. 2015*). Urban landscapes are characterized by various types of buildings, settlements, roads, gardens, exposed soil, fallow land and water body. In order to understand the heterogeneous landscapes better, the standardized model that describes these component surfaces should be defined. Despite the existing remote sensing instruments are already able to extract useful information in this scenario, so far scarce interest has been focused by the scientific community toward specific applications for developing countries. In this paper we present a project whose goal is the efficient exploiting of existing remote sensing sensors data and Geographical Information System (GIS) facilities in order to provide various statistical numerical instruments to analyze the status of urban monitoring and organization processes in the study area. Updated information on the status and trends of urban ecosystems is needed to develop strategies for reasonable development and to improve the livelihood of cities. Interpretation of the evolution and the management of land features such as NDVI which has been widely used for mapping vegetation and NDBI for interpreting urban (*Y. ZHA, 2003*) were used a technique of combining the NDBI and the NDVI with a specific processes calculation to extract the built-up areas and were retched an accuracy of 92.6%, (*Y. Limin, 2003*). Tasseled Cap Transformation (TCT) components can be used to determine urban environment, vegetation and urban indices. Brightness, wetness and greenness are components of TCT. High reflectance of the various features like built-up areas, man-made features, roads and soil which are the brightness component these topographic features can be observed. The tasselled cap transformation (TCT) is a useful tool for compressing spectral data into a few bands associated with physical scene characteristics with minimal information loss. TCT was originally evolved from the Landsat multi-spectral scanner (MSS) launched in 1972 and is widely adapted to modern sensors (Baig et al., 2015).