

# USING SATELLITE IMAGERY TO STUDY URBAN EXPANSION OF HANOI, VIETNAM

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Urbanization results in the expansion of administrative boundaries, mainly at the periphery, ultimately leading to changes in landcover. Agricultural land, naturally vegetated land, and other land types are converted into residential areas with a high density of constructs, such as transportation systems and housing. These changes can be identified by comparing satellite images acquired at different time periods. We analyzed satellite images from Landsat MSS (1975), Landsat TM (1993) and Landsat ETM+ (2000) for Hanoi, Vietnam. In addition, other images, including Aster, Ikonos, and QuickBird images, and a number of historical maps were also used to help identify differences between high and low construction densities in the inner city and periphery. The results indicate that the spatial growth of Hanoi is limited by natural barriers, such as streams to the northeast and east, water bodies to the north, and wetlands to the south. Spatially, expansion of the urban center stretches in obvious directions, and urbanization has taken place along main transportation axes connecting the inner city to neighboring areas, whereas the administrative boundaries have extended into other directions.

**Keywords:** Urbanization, Spatial city expansion, Land cover change, Remote sensing, Hanoi