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Investigating Urbanization-LULC Transition Dynamics: Impact of Surface Waterbody Encroachment on Increased Intensity of Waterlogging and Vectorborne Diseases

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ABSTRACT

Rapid population growth in cities and limited land resources have led to the conversion of surface waterbody to urban uses thereby increasing the prevalence of impervious surfaces. Depletion of surface waterbody accelerated environmental and ecological degradation which fueled urban local climate change dynamics. Expanding cities are increasingly susceptible to waterlogging and flooding, having significant public health implications, including a heightened prevalence of vector-borne diseases such as malaria and dengue. This study attempts to establish a relationship between rapid urbanization and increased waterlogging which in turn influences climate change dynamics contributing to the incidence of vector-borne diseases in the urban context of Rajarhat-Gopalpur, West Bengal. The area witnessed a population rise of 37.5% between 2011-2023 that led to increased demand for housing and developable land. During the same time period a reduction of 34.9% in the share of surface waterbodies was observed. The area is prone to frequent waterlogging or urban flooding. There also has been reports of rising vector borne diseases in these areas. The study employs overlay analysis of satellite imagery across time and uses statistical methods to identify key drivers of LULC transitions. Regression analysis was applied to examine the relationship between waterlogging, LULC transitions, and other physical factors. The results demonstrated a significant correlation exists between the depletion of water bodies, increased waterlogging, and the surge in dengue cases indicating transition of surface waterbodies as a contributing factor to the adverse effects of climate change. It also highlights the need to prevent the shrinkage of urban waterbodies.

Keywords: Climate change dynamics; Housing demand; Public health; Urban flodding; Waterbody depletion