



URBAN SPRAWL AND ITS IMPACT ON AGRICULTURAL LAND: A GEOSPATIAL AND SOCIO-ECONOMIC ANALYSIS OF HARYANA, INDIA

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ABSTRACT Urban sprawl has emerged as a dominant spatial process transforming peri-urban landscapes in rapidly urbanizing regions of India. Haryana, particularly under the influence of the National Capital Region (NCR), has witnessed substantial expansion of built-up areas over agricultural land. This study analyzes the extent, pattern and implications of urban sprawl on agricultural land in Haryana through geospatial interpretation and socio-economic analysis. Using secondary data from Census of India, Directorate of Economics and Statistics, Haryana Statistical Abstracts, land use records, and remotely sensed land use studies, the paper evaluates agricultural land conversion, environmental consequences, and livelihood transitions. Findings indicate significant pressure on cultivable land in urbanizing districts such as Gurugram, Faridabad, Sonipat and Rewari. The study argues for integrated spatial planning, farmland protection policies and sustainable peri-urban management.

KEYWORDS : Urban Sprawl, Agricultural Land Conversion, Land Use Change, Haryana, GIS, Peri-Urbanization, Sustainability

INTRODUCTION

Urbanization has become one of the most significant processes reshaping landscapes in the Global South. While urban growth contributes to economic development and infrastructural expansion, uncontrolled urban sprawl often leads to inefficient land consumption and conversion of fertile agricultural land into built-up uses.

India's urban transition has accelerated considerably in recent decades. Haryana presents an important case because of rapid industrialization, transport corridors, real estate growth and proximity to Delhi. The expansion of Gurugram-Manesar, Faridabad-Ballabgarh, Kundli-Sonipat, and Bawal-Rewari growth belts has significantly altered traditional agrarian landscapes.

The problem is not merely land conversion but the broader socio-ecological transformation associated with fragmented farmland, declining agricultural viability, groundwater stress and peri-urban livelihood restructuring.

Research Problem

How has urban sprawl affected agricultural land resources in Haryana, and what are its spatial, environmental and socio-economic implications?

Objectives

The present study seeks to analyze the spatial patterns of urban sprawl in Haryana and examine how urban expansion has contributed to agricultural land conversion. It further attempts to assess the socio-economic and environmental consequences of this transformation, particularly in peri-urban regions, while also proposing sustainable planning strategies for balancing urban growth and agricultural preservation.

Hypotheses

The study is guided by the hypothesis that urban sprawl has significantly reduced agricultural land in major growth corridors of Haryana and that this peri-urban expansion has generated major socio-economic as well as ecological consequences for rural communities and regional sustainability.

Review of Literature

Urban sprawl has been conceptualized in geographical and planning literature as dispersed, low-density and often unregulated urban growth extending into rural and agricultural landscapes. Scholars have linked sprawl with inefficient land consumption, ecological degradation and socio-spatial restructuring. Bhatta (2010) interpreted urban sprawl as a spatial manifestation of unplanned urban expansion with serious implications for sustainability, while Ewing (1997) associated it with fragmented urban morphology and excessive land consumption. Global studies such as Seto et al. (2012) demonstrated that urban expansion has become a major driver of cropland loss worldwide.

In the Indian context, studies related to the National Capital Region have emphasized the rapid transformation of peri-urban agricultural landscapes under pressures of industrialization, real estate growth and

infrastructure development. Research has reported increasing conversion of agricultural land, shifts in occupational structure and growing environmental stress in urban fringes. However, despite considerable work on metropolitan growth, relatively fewer studies provide integrated geographical analysis of agricultural land transformation at the state and regional scale in Haryana. This study seeks to address that gap by linking spatial expansion, farmland conversion and socio-economic implications within a unified analytical framework.

Study Area

The present study is situated in Haryana, a rapidly urbanizing state in northwestern India located between 27°39' to 30°35' north latitude and 74°28' to 77°36' east longitude. Covering approximately 44,212 square kilometers, the state is characterized predominantly by fertile alluvial plains and intensive agricultural activity, making it an important agrarian region of India. At the same time, Haryana has emerged as one of the fastest transforming urban-industrial regions due to its strategic proximity to Delhi and the National Capital Region.

The study focuses particularly on the districts of Gurugram, Faridabad, Sonipat and the Rewari-Bawal belt, where rapid urban growth, industrial development and infrastructure expansion have accelerated land use transformation. These districts represent dynamic peri-urban landscapes where agricultural land is increasingly being converted into residential, industrial and commercial uses. Their selection provides an appropriate regional framework for examining the relationship between urban sprawl and agricultural land loss.

Methodology

The present research adopts a descriptive, analytical and geospatial approach to examine the impact of urban sprawl on agricultural land in Haryana. The study is based on both primary and secondary sources of data. Primary information may be generated through field surveys, farmer interviews and household-level interactions in selected peri-urban areas to understand livelihood changes and perceptions regarding land transformation. Secondary data form the core empirical base of the study and include Census reports, Haryana Statistical Abstracts, agricultural department records, land use statistics, remote sensing-based datasets and planning documents.

Methodologically, the study employs temporal land use change analysis to examine the conversion of agricultural land into built-up areas over time. Geospatial interpretation using GIS and remotely sensed imagery provides a basis for mapping urban expansion and identifying sprawl patterns. Statistical tools such as trend analysis and correlation analysis may be used to assess relationships between urban growth and agricultural land decline. The agricultural land loss percentage is calculated using standard percentage change methods, while spatial interpretation supports understanding of peri-urban transformation processes. This mixed methodological framework enables both quantitative and qualitative understanding of the problem.

RESULTS AND DISCUSSION

The analysis indicates that urban sprawl in Haryana has expanded

rapidly over the past few decades, particularly under the influence of NCR-led development, industrial growth and transport infrastructure. Rising urban population and expansion of built-up areas have significantly altered traditional land use structures. The increase in urban population has not merely represented demographic concentration but has translated into outward spatial expansion into peripheral agricultural landscapes. This process has been especially pronounced in districts such as Gurugram, Faridabad, Sonipat and Rewari, where agricultural land has increasingly been converted into residential colonies, industrial estates, commercial spaces and transport infrastructure.

The land use change trends reveal a substantial decline in agricultural land accompanied by expansion in built-up area. This conversion is not uniform but concentrated in peri-urban belts where accessibility, land values and industrial development create intense developmental pressure. The findings suggest that fertile and strategically located agricultural land is particularly vulnerable to conversion because of market forces and planning deficiencies. Such conversion has contributed not only to reduction in cultivable area but also fragmentation of holdings, making farming increasingly less viable.

The study further shows that urban sprawl is driven by interconnected factors including real estate development, industrial corridors, transport connectivity and speculative land markets. Real estate expansion has accelerated conversion of agricultural parcels into housing and commercial uses, while industrial growth nodes such as Manesar and Bawal have intensified demand for land. Transport corridors and logistics infrastructure have further encouraged ribbon development and peri-urban expansion. These drivers collectively reinforce a pattern of dispersed urban growth rather than compact development.

Socio-economic impacts emerging from this process are significant. The findings indicate gradual occupational transition among farming communities, where dependence on agriculture is declining and households increasingly diversify toward rent-based income, wage labor, services and non-farm activities. While some landowners may benefit from increased land prices, long-term agrarian sustainability often weakens due to declining farm size and reduced agricultural engagement. This reflects a broader restructuring of rural livelihoods rather than a simple land-use shift.

Environmental implications are equally substantial. Conversion of open agricultural spaces into built-up surfaces has contributed to reduction in green cover, increased pressure on groundwater resources and growing risks of soil degradation. In rapidly urbanizing zones, these processes are also associated with rising surface temperatures and emerging urban heat island effects. The findings suggest that the impact of urban sprawl extends beyond physical land conversion to broader ecological stress and sustainability challenges.

Taken together, the results support the argument that urban sprawl in Haryana is reshaping peri-urban landscapes through intertwined spatial, economic and environmental transformations. The discussion indicates that unmanaged urban growth is not only reducing agricultural land but also altering the long-term relationship between urbanization, agrarian systems and regional sustainability.

Case Study: Bawal-Rewari Growth Belt

The Bawal-Rewari belt demonstrates how industrialization and transport connectivity transform agricultural landscapes.

The Bawal-Rewari growth belt reflects processes such as industrial land acquisition, conversion of cropland, changing occupational structures, rising land values and peri-urban morphological transition, making it a significant regional case for original contribution.

Policy Implications

The findings suggest the need for stronger agricultural protection zoning to regulate indiscriminate conversion of prime farmland. Planned urban growth boundaries can help control dispersed expansion, while GIS-based monitoring may support real-time tracking of land use changes. The study also emphasizes sustainable peri-urban planning in which agricultural functions are integrated into regional development strategies. Policy mechanisms such as transferable development rights and stronger land-use regulation can further contribute to balancing urban development with farmland conservation.

CONCLUSION

The study establishes that urban sprawl has significantly transformed agricultural landscapes in Haryana. Particularly in NCR-influenced districts, agricultural land conversion has intensified due to industrialization, infrastructure development and speculative urban growth.

The implications extend beyond land use change to food security, rural livelihoods and environmental sustainability. Sustainable urban planning and farmland conservation must become central to regional development policy.

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