



Unveiling The Trend And Pattern Of Irrigation Extent In Haryana State: A Comparative Analysis

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Abstract:

This research paper presents a comprehensive analysis of the trend and pattern of irrigation extent in Haryana State, India. Irrigation plays a crucial role in sustaining agricultural productivity, especially in regions with arid or semi-arid climates. Understanding the evolving trends and discernible patterns in irrigation practices is essential for effective water resource management and informed policy formulation. Through an in-depth examination of historical data, this study reveals the trajectory of irrigation extent in Haryana State over a specified period. Factors influencing the trend, such as technological advancements, policy interventions, and shifts in agricultural practices, are explored to provide insights into the drivers of change. The development of irrigation facilities in Haryana gained momentum after India's independence, with canal irrigation playing a pivotal role in the initial phase, followed by the significant contribution of tube well irrigation and groundwater utilization. Based on the identified trends and patterns, this research paper offers recommendations to enhance the efficiency, equity, and sustainability of irrigation practices in Haryana State. The well-established network of irrigation facilities, primarily consisting of canals and tube wells, has transformed the cropping pattern in the state. These insights can aid policymakers, researchers, and stakeholders in promoting sustainable and efficient irrigation practices for agricultural development in Haryana.

Introduction:

Irrigation plays a pivotal role in agricultural productivity and sustainability, particularly in regions with arid or semi-arid climates like Haryana State. Understanding the trend and pattern of irrigation extent in Haryana is crucial for effective water resource management, agricultural planning, and policy formulation. Irrigation plays a vital role in agriculture in Haryana, serving as a crucial input in the production process and shaping the cropping pattern. It involves the artificial application of water to land or soil, aiding in crop growth and reestablishing vegetation in dry areas or periods of inadequate rainfall. With a predominantly semi-arid climate and varying annual rainfall between 300mm to 1000mm, Haryana relies heavily on irrigation to address the moisture deficiency and sustain agricultural activities.

Understanding the recent trends and changing patterns of irrigation is essential for comprehensively assessing the shifts in cropping patterns. Irrigation enables farmers to cultivate multiple crops on the same plot of land throughout different agricultural seasons. Given that approximately 70 percent of Haryana's population is engaged in agriculture, irrigated agriculture plays a fundamental role in the state's economic development. The significance of irrigation in Haryana becomes apparent as the region experiences not only inadequate but also unreliable rainfall. Development of water resources and irrigation has been crucial in meeting the soil moisture requirements and ensuring agricultural productivity, even during the rainy season. Traditionally, irrigation served a protective role, mitigating the risks associated with unpredictable rainfall, such as droughts and dry spells.

The development of irrigation facilities in Haryana gained momentum after India's independence. Canal irrigation played a pivotal role in the initial phase, leading to agricultural progress. Subsequently, tube well irrigation and the utilization of groundwater resources significantly contributed to both the quantitative and qualitative aspects of irrigation. While Haryana is a relatively small state, the availability of irrigation potential varies widely across districts, influencing crop production choices. Haryana benefits from a well-established network of irrigation facilities, primarily consisting of canals and tube wells. These irrigation sources have transformed the cropping pattern in the state. This research paper aims to delve into the intricate details of irrigation practices in Haryana State, exploring the evolving trends and discernible patterns over a specified period.

Study Area:

Haryana, situated in the northwestern part of India, encompasses an area of 44,212 sq. km, accounting for 1.44% of the country's total geographical expanse. It is positioned between latitudes 27°39' N and 30°55'5" N, and longitudes 74°27'8" E and 77°36'5" E. The state shares its borders with Himachal Pradesh to the north, Uttar Pradesh and Delhi to the east, Punjab and Chandigarh to the northwest, and Rajasthan to the southwest. As of 2011, the population of Haryana stands at 25,353,081, with an average density of 573 persons per square kilometer. Haryana comprises twenty-two districts and six divisions, including Gurgaon, Ambala, Rohtak, Karnal, Faridabad, and Hisar.

Objectives:

1. To assess the historical trajectory of irrigation extent in Haryana State, analyzing its growth and evolution over time.
2. To analyze the spatial distribution of irrigation practices in Haryana State, identifying regional disparities.

Database and Methodology:

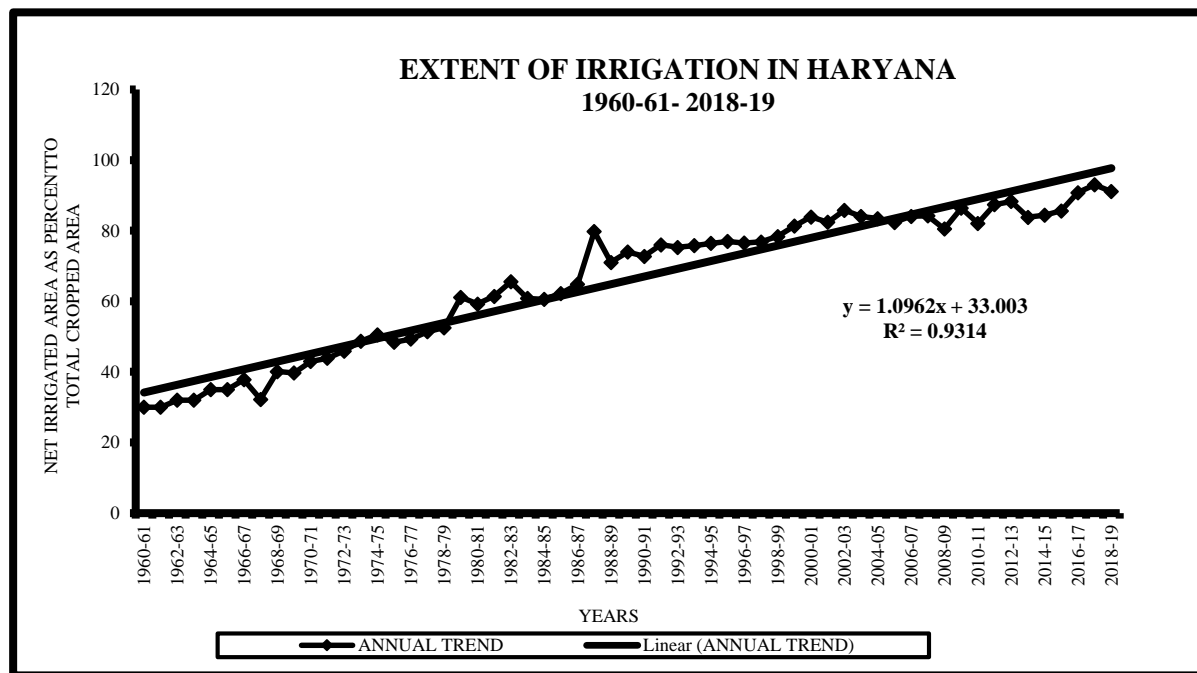
This research study utilizes a comprehensive database comprising both published and unpublished secondary data. The dataset encompasses a time-series analysis of various agricultural aspects, including net area sown, canal irrigated area, net irrigated area, and gross irrigated area at both the state and district levels. The data for the period from 1960 to 2020 has been sourced from the Statistical Abstract of Haryana, published by the Department of Economic and Statistical Analysis, Government of Haryana. To account for the dynamic nature of agriculture, which is influenced by geo-climatic conditions, the study minimizes the impact of weather and climatic fluctuations by using triennial averages for the years 1998-2001 and 2016-19. This approach provides a more stable and representative analysis of the variables.

Trends of Extent of Irrigational Development in Haryana:

The trend line shows that how much irrigation development has taken place in the state of Haryana since its inception. Figure 1.1 shows that the extent of irrigation in the state has increased consistently over last six decades. The net irrigated area as percent to net sown area increased from 30 percent in 1960-61 to 88.4 percent in 2018-19. But it seems to have stagnated since 2002-03. But the consistent expansion of irrigated area has been most important contributor to agricultural growth of the state. A growth rate of 194.67% over the specified period indicates a substantial increase in the net irrigated area as a percentage of the net sown area in Haryana.

This growth implies that the proportion of land receiving irrigation has more than doubled during the analyzed timeframe. It signifies a significant expansion of irrigation infrastructure, increased water availability, and improved agricultural practices in the state. Several factors could contribute to such a notable growth rate. These factors may include government initiatives and investments in irrigation infrastructure, the adoption of advanced irrigation techniques such as sprinkler and drip irrigation, and the increasing reliance on groundwater resources through tube wells.

Figure 1.1



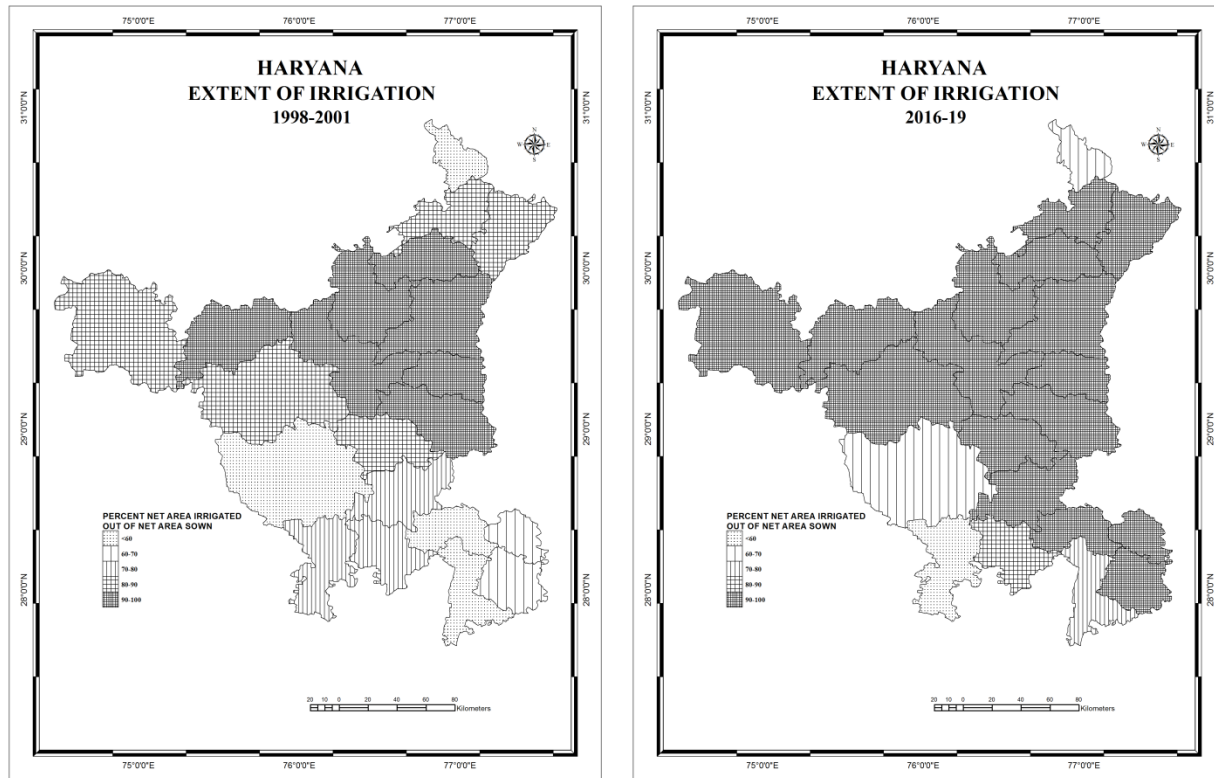
Spatial Pattern of Irrigational Development

The figure 1.2 presents the percentage of net irrigated area out of the net area sown for different districts in Haryana during two time periods: 1998-01 and 2016-19. It provides insights into the temporal changes in the extent of irrigation across these districts. In 1998-01, the district of Panchkula had a net irrigated area that accounted for 44.28% of the net area sown. Over time, there has been a noticeable increase, with the percentage rising to 65.67% in 2016-19. This indicates a significant expansion of irrigation in Panchkula district, likely driven by advancements in irrigation infrastructure and increased water availability.

Similarly, in Ambala district, the percentage of net irrigated area saw a substantial growth from 85.7% in 1998-01 to 94.9% in 2016-19. This upward trend suggests the successful efforts made to improve irrigation facilities and support agricultural productivity in the region. Yamunanagar district also experienced a notable increase in the percentage of net irrigated area, rising from 84.49% to 96.63% over the specified time period. This upward trajectory reflects the commitment to expand irrigation infrastructure and enhance water access for agricultural purposes. Other districts, such as Jind, Kurukshetra, Karnal, Sonipat, and Fatehabad, displayed high percentages of net irrigated area, indicating a well-established irrigation network. These districts witnessed minimal changes or marginal fluctuations in the percentage of net irrigated area, suggesting a stable

irrigation system over time.

Figure 1.2



On the other hand, districts like Mahendragarh and Nuh experienced a decline in the percentage of net irrigated area. These changes might be attributed to various factors, such as changes in land use patterns, shifting agricultural practices, or challenges in irrigation development.

Overall, the table highlights the temporal changes in the extent of irrigation across districts in Haryana. It indicates a positive trend towards increased irrigation coverage and improved access to water resources for agricultural purposes. Understanding these changes can inform policymakers and stakeholders in identifying areas that require additional support for irrigation infrastructure development and water resource management, ultimately contributing to enhanced agricultural productivity and sustainable growth in the state.

The spatial pattern of irrigational development reveals that there was a marked growth in irrigation facilities throughout Haryana. This expansion can be attributed to various factors, including the implementation of irrigation projects, the construction of canals and tube wells, and the utilization of groundwater resources. However, despite the overall increase in irrigation, there remains a regional imbalance in the development of irrigation facilities within the state. This imbalance can be attributed to the prevailing physio-socio-economic conditions that pose restrictions and challenges to irrigation development in certain areas.

Factors such as topography, soil conditions, water availability, economic disparities, and agricultural practices can contribute to the regional variations in irrigation development. Some regions may have favorable conditions for irrigation expansion, while others face constraints that limit the pace and extent of irrigational

growth. Addressing the existing regional imbalance in irrigation development is crucial to ensure equitable access to water resources and promote balanced agricultural growth across Haryana. Efforts should be made to identify the specific challenges and constraints faced by different regions and implement targeted interventions to overcome them.

Conclusion:

The analysis of irrigation extent in Haryana State reveals a significant increase in the net irrigated area as a percentage of the net sown area over the past six decades. The growth rate of 194.67% signifies the substantial expansion of irrigation infrastructure and improved agricultural practices in the state. However, the growth seems to have stagnated since 2002-03.

The spatial pattern of irrigational development indicates a marked expansion of irrigation facilities throughout Haryana, but regional imbalances persist due to various physio-socio-economic factors. Efforts should be focused on addressing these imbalances to ensure equitable access to water resources and promote balanced agricultural growth across the state. Understanding the temporal changes and spatial patterns of irrigation extent is crucial for informed decision-making, policy formulation, and targeted interventions to enhance irrigation infrastructure, water resource management, and agricultural productivity in Haryana State.

References

- Basu, S. (1984). Impact of D.V.C. Irrigation in Changing the Land-Use and Cropping Pattern of the Lower Damodar Valley. *Geographical Review of India*, 46(4), 70-78.
- Chandrasekaran, K., & Soundararajan, V. (2019). Adoption of modern irrigation technologies in India: A review. *Agricultural Reviews*, 40(3), 299-310.
- Chauhan, T. C. (1990). Irrigation Development in the Arid Lands of Rajasthan. In R. K. Gurjar (Ed.), *Geographical Perspectives on Irrigation* (pp. 57-68). Jaipur: Rawat Publications.
- Chatterjee, N. (1986). Impact of irrigation on Agriculture in Southern West Bengal. *Geographical Review of India*, 48(1), 73-81.
- Dhillon, S.S. & Sandhu, D. (1979). Irrigation Development in Punjab its Potential and Limitations. *Geographical Review of India*, 41 (2), 115-122.
- Jain, R., Kishore, P., & Singh, D. K. (2019). Irrigation in India: status, challenges and options. *Journal of Soil and Water Conservation*, 18(4), 354-363.