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The Spatio- Temporal Study of Net Irrigated Area in Pune District (2009-2024)

Jitendra Vitthal Madake

Abstract

This study examines the spatio-temporal changes in the net irrigated area across the tahsils of Pune district between 2009 and 2024. The research utilized secondary data on the net irrigated area collected from the Agriculture Department and the Socio-Economic Review and District Statistical Abstract of Pune District. The main objective was to analyse the changes in the net irrigated area and the factors responsible for its growth. The findings indicate a positive overall trend at the district level, with the total net irrigated area increasing by 61,109 hectares, from 2,69,896 ha in 2009 to 3,31,005 ha in 2024. The irrigation systems in the district are primarily a mix of canal irrigation, lift irrigation, and groundwater-based systems (dug wells and piezometers). However, the analysis revealed significant spatial variations. Tahsils in the relatively flat Deccan plains in the eastern and southern parts, such as Shirur (+51,378 ha), Purandar (+15,846 ha), Baramati (+9,090 ha), and Indapur (+6,453 ha), showed major increases in irrigated area. Conversely, several western tahsils experienced a decline, with Haveli recording the largest loss (-14,449 ha), mainly attributed to rapid urbanization and the conversion of agricultural land. Other declining tahsils included Bhor (-4,257 ha), Junnar (-2,162 ha), Mawal (-1,774 ha), Mulshi (-1,535 ha), and Velhe (-1,301 ha)

Keywords: *Agriculture, Irrigation, Growth*

Introduction

Etymologically agriculture geography deals with the arts and science of domestication of plants and animals (M. Husain, 2002). In modern sense the Agriculture consist of practice of cultivation of crops raising livestock, fish, pig farm, goat farm and poultry. Directly and indirectly, the Indian economy is depending on agriculture. The agriculture provides livelihood to about 65 per cent of total labour force. Agriculture is base of trade, transport and trade. In Maharashtra state about 65 per cent of the total workers depend on agriculture and allied activities. (Dr. M. R. Nangare and dr. Patil R.R. 2020)

Irrigation means the watering of land by artificial means to foster plant growth. (Webster Dictionry, 2004). Irrigation is the important inputs which is useful to increase area under irrigated crops and increase agriculture production. An irrigation artificial supply of water to maintain or increase yields of food crops a critical element of modern Agriculture. Irrigation can compensate for the naturally variable rate and volume of rain water natural ponds lakes, Streams, rivers and wells. Today portable irrigation system of lightweight.

Irrigation plays an important role in Indian agriculture due to uncertain, unreliable, irregular, variable, seasonal and unevenly distribution of rainfall. Irrigation is imperative for successful agriculture particularly in the arid, semi-arid and sub humid areas, which are prone to drought and famine conditions due to partial failure and delayed arrival or early withdrawal of Monsoon (Reddy & Reddy, 1992). Apart from that, there are certain crops such as Rice, Sugarcane, Jute, Cotton, etc. which require more water and have to be provide with irrigation even in area of heavy rainfall. In the present-day drip irrigation is most essential technological factor due to shortage of water resources. Hence an attempt is made here to examine the "The spatio temporal study of net irrigated area in Pune district (2009-2024)

Study Region:

For the present investigation Pune district is selected as a study region. The Pune district is one of the agricultural district in the Maharashtra state. Geographically Pune district is located between 17º 54' N to 19º 24' N latitude and 73º 19' E to 75º 10' E longitude. The total geographical area of the Pune district is 15,642 sq.km. The proportion of area of Pune district as compare to Maharashtra is about five (5.08 %) per cent. The district is surrounded by Ahamadnagar district to the north and east, Pune district in the southeast, Satara district in the south, Raigarh district in the west and Thane district in the northwest.

It is administratively sub-divided into 14 tahsils namely, Ambegoan, Baramati, Bhor, Daund, Haveli, Indapur, Junnar, Khed, Mawal, Mulshi, Pune City, Purandar, Shirur, Velhe etc. According to the 2011 census, Pune district has 14 tehsils having 35 towns and 1877 villages. The Pune district is a part of Bhima basin. The average annual rainfall in the district is 722 mm. Due to uneven physiography; rainfall is unequally distributed in study region.

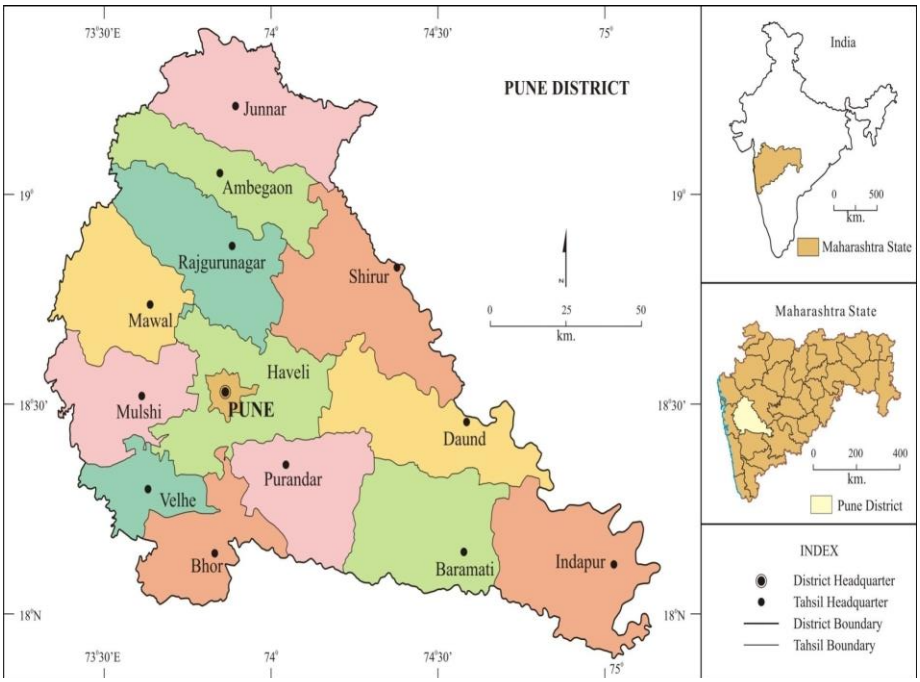

Fig. No. 01

Objective:

The main objectives of this paper are as following,

1. The spatio-temporal study of net irrigated area in Pune district.
2. To study the factor responsible for growth of net irrigated area in Pune district.

Database and Methodology:

The study was conducted in the Pune district in Maharashtra state. For the purpose of the study, only secondary information was collected from different sources. The secondary data like information related to net irrigated area and geographical information collected through Agriculture Department and Socio-Economic review and district Statistical abstract of Pune District from the year 2009- to 2024 used.

Result and Discussion:

The irrigation pattern in Pune district is primarily a mix of canal irrigation, lift irrigation, and groundwater-based systems. Canal irrigation uses a network of canals from rivers like the Bhima, while lift irrigation schemes draw water from rivers and other sources. Groundwater is also a significant source, with numerous dug wells and piezometers used for irrigation. 42 percent of the net cultivated area is under irrigation in Pune district in 2025.

Table No.1
Tahsil wise Net Irrigated Area in Pune District-(2009-2024)

Sr. No	Tahsils	Net Irrigated Area in Hectare		
		2009	2024	Volume of changes
1	Junnar	31478	29316	-2162
2	Ambegoan	14634	20475	5841
3	Shirur	20475	71853	51378
4	Khed	18005	17934	-71
5	Mawal	3478	1704	-1774
6	Mulshi	2999	1464	-1535
7	Haveli	23912	9463	-14449
8	Daund	42665	40715	-1950
9	Puranda	13035	28881	15846
10	Velhe	1871	570	-1301
11	Bhor	6570	2313	-4257
12	Baramati	41533	50623	9090
13	Indapur	49241	55694	6453
14	District	269896	331005	61109

*(**Source:** Compiled by researcher on the basis of Socio-economic Abstract of Pune District 2009 and 2024)*

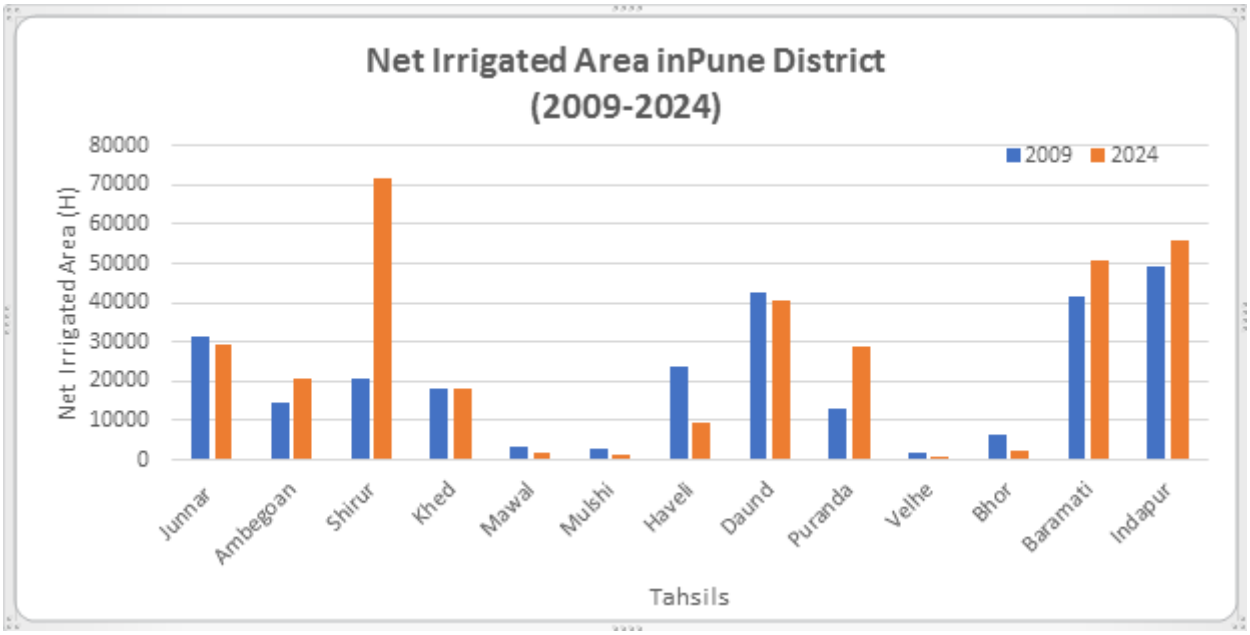

Fig. no. 02

The table No. 01 presents the changes in net irrigated area (measured in hectares) across various tahsils of Pune district between 2009 and 2024. The figures highlight significant spatial variation in irrigation development during the 15-year period.

The total net irrigated area in Pune district increased from 2,69,896 ha in 2009 to 3,31,005 ha in 2024, marking a net rise of 61,109 ha. This shows a positive trend in irrigation expansion at the district level. Tahsils with analysis shows that, Shirur Tahsil recorded the highest increase of 51,378 ha, indicating major irrigation development likely due to canal irrigation or improved groundwater utilization. Purandar (15,846 ha), Baramati (9,090 ha), Indapur (6,453 ha), and Ambegaon (5,841 ha) also showed significant growth, suggesting improvements in irrigation infrastructure or water resource management. The Khed Tahsil showed a minimal decline (-71 ha), and Daund (-1,950 ha) recorded a small reduction, indicating a relatively stable irrigation pattern.

Tahsils with decline in net irrigated area is found in eight tahsil: Several tahsils experienced a reduction in net irrigated area Haveli (-14,449 ha) witnessed the largest decline, possibly due to urbanization (expansion of Pune city) and conversion of agricultural land for non-agricultural purposes. Bhor (-4,257 ha), Mawal (-1,774 ha), Mulshi (-1,535 ha), Velhe (-1,301 ha), and Junnar (-2,162 ha) also registered losses, possibly due to hilly terrain, deforestation, or reduced water availability.

The eastern and southern tahsils (e.g., Baramati, Indapur, Shirur, Purandar) show major increases in irrigated area, these regions are part of the relatively flat Deccan plains, where canal and well irrigation are more feasible. Conversely, western tahsils (Mawal, Mulshi, Velhe, Bhor, Junnar) generally show decreases due to their hilly terrain, heavy rainfall but low water storage capacity, and forested landscapes.

Conclusion:

The total net irrigated area in Pune district increased by 61,109 hectares, growing from 2,69,896 ha in 2009 to 3,31,005 ha in 2024, which demonstrates a positive trend in irrigation expansion. The irrigation methods primarily include a mix of canal irrigation, lift irrigation, and groundwater-based systems. The tahsils located in the relatively flat Deccan plains in the eastern and southern parts of the district, such as Shirur (+51,378 ha), Purandar (+15,846 ha), Baramati (+9,090 ha), and Indapur (+6,453 ha), showed major increases, likely due to feasible canal and well irrigation, improved infrastructure, or water resource management.

The tahsils in the western parts generally experienced a decline in net irrigated area, largely due to factors like hilly terrain, forested landscapes, heavy rainfall but low water storage capacity, and, in the case of Haveli (-14,449 ha), rapid urbanization and conversion of agricultural land for non-agricultural use. Other declining tahsils included Junnar (-2,162 ha), Bhor (-4,257 ha), Mawal (-1,774 ha), Mulshi (-1,535 ha), and Velhe (-1,301 ha).

Khed (-71 ha) and Daund (-1,950 ha) showed relatively stable or small reductions in the irrigated area. The analysis highlights that topography and urbanization are key factors influencing the distribution and change in the net irrigated area in Pune district

The empirical results suggest that, there is an urgent need improve irrigation facility in low irrigated area in west and northern part of study region. the rapid loss of irrigated land in Haveli due to urbanization necessitates stricter land-use planning and regulations to protect prime agricultural land from conversion, ensuring food security alongside urban development.

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Conflicts of interest
The authors declare that there are no conflicts of interest regarding the publication of this paper.

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