



Review Of Irrigation Practices And Sustainability In Pune District

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DOI- 10.5281/zenodo.17198655

Abstract:

This paper analyzes the irrigation sources and agricultural land use patterns in the Pune district based on official statistical data. The research reveals a high dependency on underground water for irrigation, a significant practice of multiple cropping, and notable variations in irrigation methods across different tehsils. The findings underscore the need for sustainable water management strategies to mitigate the risks associated with groundwater depletion and to enhance the resilience of the agricultural sector in the region.

Keywords: Pune district, Irrigation sources, Agriculture.

Introduction:

Agriculture in Pune district, a key economic activity, is heavily reliant on irrigation due to the region's semi-arid climate. Understanding the sources and distribution of irrigation is crucial for developing effective water resource management policies. This study uses a tabular dataset to examine the area under surface and underground water irrigation, net and gross irrigated areas, and gross cropped areas for 14 tehsils in the district. The analysis aims to identify regional disparities, assess the level of irrigation intensity, and highlight potential challenges related to water use.

Objective:

To Study of Sources of Irrigation in Pune District.

Database and Methodology:

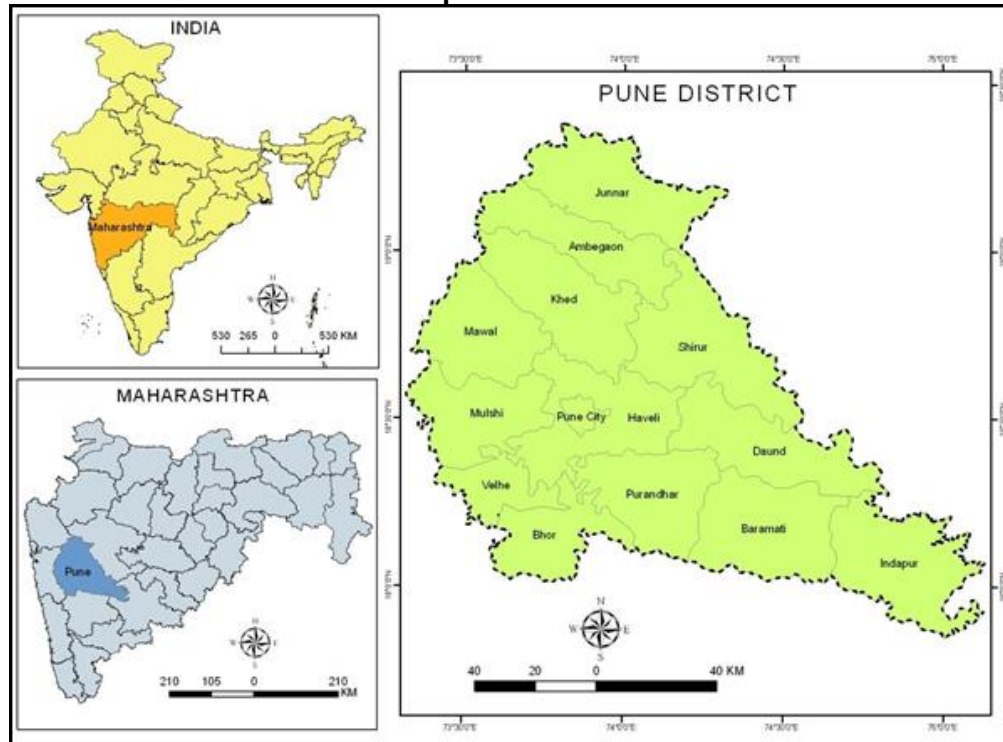
The study is based on a quantitative analysis of the provided dataset, which details irrigation statistics for each tehsil of Pune district. Key metrics such as the ratio of irrigated to cropped area, the proportion

of surface vs. underground water use, and the difference between net and gross irrigated areas were calculated and compared across tehsils to identify patterns and trends.

Study Area:

Pune district lies between 17° 54' N and 19° 24' N latitudes and between 73° 19' E and 75°10' E Longitudes. Pune district occupies an area of 15,642 km², which is 5.10 percent of the total geographical area of the state. Out of 15021 sq. km. area falls under rural, and 621 km² falls under urban area. The landscape of Pune district is spread triangularly in western Maharashtra at the foothills of the Sahyadri range and is divided into three parts: Ghatmatha, Maval, and Desh. Pune district is bounded by Ahmadnagar district in the northeast, Pune district in the southeast, Satara district in the south, Raigad district in the west, and Thane district in the northwest.

Location Map of Pune District



According to the 2011 India Census, Pune district had a total population of 94.29 lakhs, a share of 8.39 percent of the total population of Maharashtra. Of the total population for the 2011 census, 60.99 percent live in urban areas of the district, and 39.01 percent of the population lives in rural village areas. Pune district has 2 municipal corporations, 3 boards, and 14 tahsils, namely Ambegaon, Baramati, Bhore, Daund, Haveli, Pune city, Indapur, Junnar, Khed, Maval, Mulshi, Purandhar, Shirur, and Velha.

Sources of Irrigation:

Irrigation fundamentally means the watering of land to make it ready for agricultural purposes. An irrigation system is the provision of water via artificial canals and channels to growing Crops and Plants in a field. Water is vital for the growth of plants. There can be no plants or crops if they do not have access to water in some form. It is, consequently, crucial to supply water to crops and plants, periodically and as per their requirement. So irrigation is the intermittent and proper supply of water to plants. The water for this irrigation comes from various sources such as surface water sources, major irrigation projects, medium irrigation projects, minor irrigation projects, ponds, rivers, k.t.dams, reservoirs, and underground water sources, dug wells, and Tube wells, etc.

Surface Water Irrigation:

The water for this irrigation comes from various sources such as rivers, dams, reservoirs, major irrigation projects, medium irrigation projects, minor irrigation projects, k. t. Dams and rainfall are called surface water irrigation water resources.

Underground Water Irrigation:

Underground water is the water found underground in the cracks and spaces in soil, sand, and rocks. It is stored in and moves slowly over geologic formations of soil, sand, and rocks called aquifers. Underground water is the water that exists underground in saturated zones beneath the land surface. The upper surface of the saturated zone is called the water table. Contrariwise to popular belief, underground water does not form underground rivers. It fills the holes and fractures in underground materials such as sand, gravel, and rocks, much in the same way that water fills a sponge. If underground water flows naturally out of rock materials or if it can be removed by pumping, the rock materials are called aquifers.

Gross Irrigation:

The water for this irrigation comes from various sources, such as surface or underground is called total irrigation.

The provided table gives a comprehensive overview of irrigation sources and agricultural land use across various tehsils (sub-districts) of Pune, Maharashtra. The data, presented in hectares, highlights the distribution of surface water irrigation and underground water irrigation, as well as key agricultural metrics like net irrigated area, gross irrigated area, and gross cropped area. The analysis of the table reveals several significant patterns and facts about irrigation in the Pune district.

Sources of Irrigation in Pune District Area in Hectares

Sr. No.	Tehsil	Surface Water Irrigation	Under Ground Water Irrigation	Net Irrigated Area	Gross Irrigated Area	Gross Cropped Area
1	Junnar	14999	16479	31478	40419	94100
2	Ambegaon	6175	8459	14634	17867	93004
3	Shirur	8819	11656	20475	23733	156748
4	Khed	8160	9845	18005	26754	93000
5	Mawal	1164	2314	3478	3746	23596
6	Mulshi	783	2216	2999	3123	16035
7	Haveli	9430	14482	23912	25370	94429
8	Pune City	0	5	5	5	25
9	Daund	18246	24419	42665	49150	69672
10	Purandar	5883	7152	13035	14577	75509
11	Velhe	726	1145	1871	1997	14300
12	Bhor	3822	2748	6570	6976	38742
13	Baramati	23379	18154	41533	51395	178107
14	Indapur	22772	26469	49241	54883	133551
Total Pune District		124358	145543	269901	319995	1080794

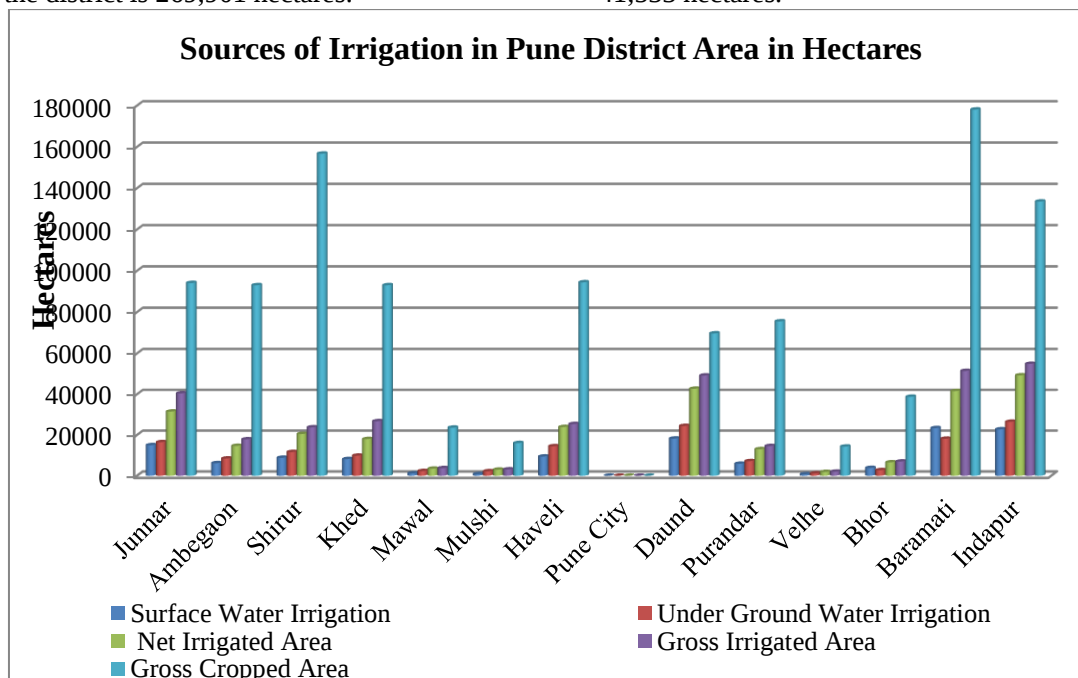
Source:

1. Socio-Economic Review and District Statistical Abstract. Pune District. 2022,2023.
2. District booklet showing the progress and current status of all irrigation schemes of Pune district 2022,2023.

Dominance of Underground Water Irrigation: The total figures for Pune District show that underground water irrigation (145,543 hectares) is more prevalent than surface water irrigation (124,358 hectares). This suggests a heavy reliance on borewells and wells for agricultural purposes, which could have implications for groundwater depletion and sustainability. The total net irrigated area for the district is 269,901 hectares.

Tehsil-Specific Trends:

High Irrigation Areas: Tehsils like Indapur and Baramati stand out with the highest net and gross irrigated areas, indicating a high intensity of agricultural activity. Baramati, for example, has the largest gross irrigated area at 51,395 hectares. Similarly, Indapur has the highest net irrigated area at 49,241 hectares, followed closely by Baramati at 41,533 hectares.



Primary Source Variation: While underground water is the dominant source overall, some tehsils show a different trend. For instance, Bhorel relies more on surface water (3,822 hectares) than underground water (2,748 hectares), which may be due to the presence of rivers or dams in the region.

Low Irrigation Areas: Tehsils like Pune City and Velhe have the lowest irrigated areas, reflecting their urbanized or hilly terrain, which is less conducive to extensive agriculture. Pune City, being a highly urbanized area, has a minimal irrigated area of just 5 hectares.

Discrepancy Between Net and Gross Irrigated Area: The gross irrigated area (319,995 hectares) is significantly higher than the net irrigated area (269,901 hectares). The gross irrigated area includes the area irrigated more than once in a year, which highlights the practice of multiple cropping. This is particularly evident in tehsils like Junnar, where the gross irrigated area (40,419 ha) is much larger than the net irrigated area (31,478 ha).

Cropping Intensity: The gross cropped area (1,080,794 hectares) is the total area where crops are grown, regardless of irrigation. A comparison of the gross irrigated area to the gross cropped area reveals the extent of irrigation coverage. For the entire district, about 29.6% of the gross cropped area is irrigated (319,995 / 1,080,794). This indicates that a significant portion of agriculture in the Pune district remains rain-fed.

Results and Discussion:

The total irrigated area in Pune district is 269,901 hectares, with underground water accounting for a larger share. This points to a potential over-extraction of groundwater, a common issue in many parts of India. Tehsils like Indapur and Baramati, which are known for cash crops like sugarcane, show the highest irrigation figures, suggesting intensive water use. Conversely, tehsils like Velhe, which have a high forest cover and hilly topography, show minimal irrigation activity. The significant difference between the gross and net irrigated areas indicates a high cropping intensity. Farmers are likely taking multiple crops a year from the same piece of land, a practice that boosts agricultural output but also increases the demand for water. This practice, while economically beneficial, places additional pressure on existing water resources. The overall irrigation coverage of just under 30% of the total cropped area suggests a vast scope for improvement in irrigation infrastructure to reduce the dependence on rain-fed agriculture.

Database and Methodology:

The study is based on a quantitative analysis of the provided dataset, which was collected from primary and secondary sources. Use the Socio-Economic Abstract and the District Census Manual in Pune District. Details irrigation statistics for each tehsil of Pune district. Key metrics, such as the ratio of

irrigated to cropped area, the proportion of surface to underground water use, and the difference between net and gross irrigated areas, were calculated and compared across tehsils to identify patterns and trends.

Conclusion:

The irrigation landscape of Pune district is characterized by a strong reliance on groundwater, a high degree of multiple cropping in certain areas, and significant regional variations. The data suggests that while agriculture is intensive in some parts of the district, a large portion of the cropped area remains without irrigation. To ensure the long-term sustainability of agriculture, policymakers should focus on promoting water-efficient irrigation techniques (like drip and sprinkler systems), regulating groundwater extraction, and expanding surface water storage and distribution networks.

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