



An Analysis of Dams and Reservoirs in Pune District: Geographical Distribution, Functions, and Management Challenges

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Abstract

Pune District's water security is fundamentally dependent on a network of dams and reservoirs, which play a critical role in managing its dual climatic zones: the high-rainfall western region and the semi-arid eastern plains. This paper provides a comprehensive analysis of the major dams and reservoirs in the district, their geographical distribution, and their crucial functions in providing water for urban consumption, agriculture, and industrial use. The study also highlights the significant challenges associated with managing these resources, including conflicts over water allocation, the impact of rapid urbanization, and the effects of climate variability. The findings emphasize the need for integrated and sustainable water management strategies to ensure equitable and efficient use of this vital resource in one of India's fastest-growing metropolitan areas.

Keywords: Dams, Reservoirs, Pune District, Water Management, Water Scarcity, Agriculture.

Introduction:

Water is the cornerstone of development, and for Pune District, a region marked by a dramatic geographical and climatic divide, the management of water resources is a paramount concern. The district's prosperity, fueled by its growth as a major IT and industrial hub, is directly linked to the reliable supply of water from its dam and reservoir network. These structures are not merely for water storage but are complex socio-economic and political entities that govern the distribution of water to a diverse set of stakeholders, from millions of urban residents to thousands of farmers. This research paper examines the geographical and functional aspects of Pune's dams and reservoirs, exploring their role in the district's development and the challenges they face in an era of rapid change.

Objective:

To Analysis of Dams and Reservoirs in Pune District.

Database and Methodology:

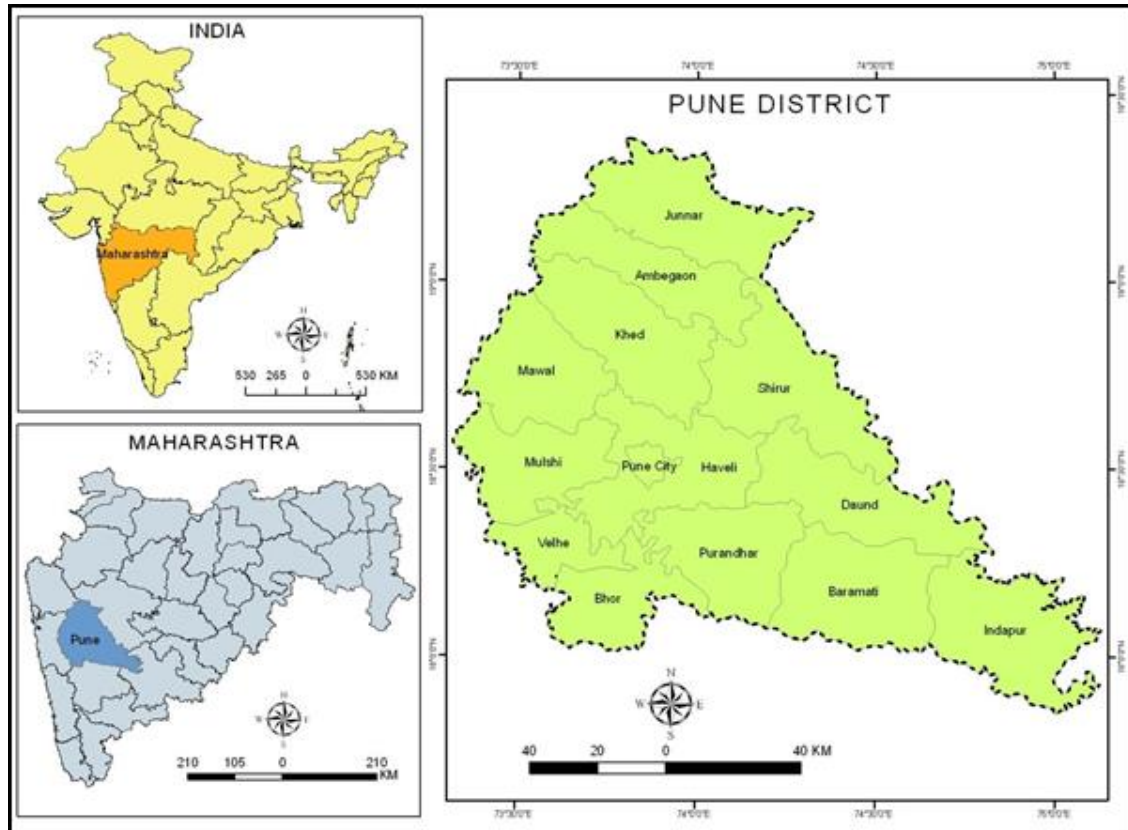
The present study generally depends on secondary data. Data Collected through the District Statistical Department, Census Handbook of Pune District, and Socio-Economic Review of Pune District.

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, Mawal, Mulshi, Purandar, Shirur, and Velha.

Geographical Distribution of Dams:

The dams in Pune District are strategically located in the **Western Ghats**, where the topography and high monsoon rainfall provide ideal conditions for water harvesting. The primary river basins that host these dams are the **Bhima, Mula, Mutha, and Pavana**. This geographical concentration of water resources in the west creates a natural imbalance, with water being stored in the high-rainfall tehsils of Mulshi, Mawal, and Velhe, and then distributed eastward to the drier, agriculturally-intensive regions like Indapur, Daund, and Baramati, as well as the urban centers of Pune and Pimpri-Chinchwad.

Table

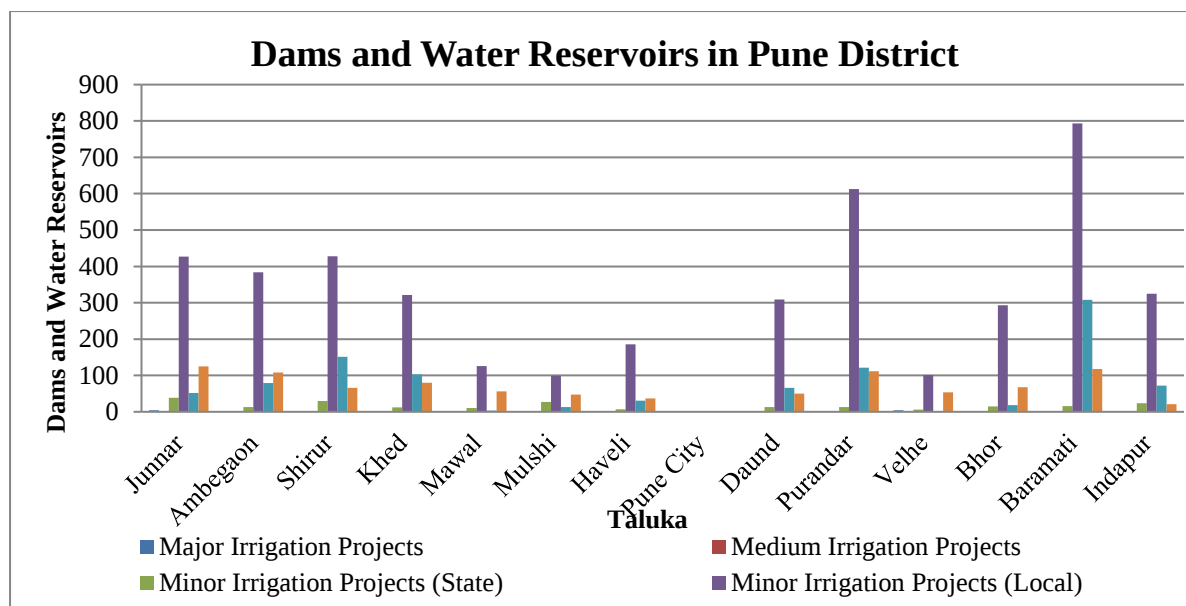
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Dams and Water Reservoirs in Pune District

Sr. No.	Tehsil	Major Irrigation Projects	Medium Irrigation Projects	Minor Irrigation Projects (State)	Minor Irrigation Projects (Local)	Tanks	Kolhapur Type Weirs
1	Junnar	4	1	39	427	52	125
2	Ambegaon	1	0	13	384	79	108
3	Shirur	0	0	30	428	151	66
4	Khed	2	1	12	321	103	80
5	Mawal	2	2	10	126	3	56
6	Mulshi	2	1	27	99	13	47
7	Haveli	2	0	7	186	31	37
8	Pune City	0	0	0	0	0	0
9	Daund	0	0	13	309	66	50
10	Purandar	0	2	13	613	121	112
11	Velhe	4	0	6	101	2	54
12	Bhor	2	0	15	293	18	68
13	Baramati	0	0	16	793	308	118
14	Indapur	0	1	24	325	72	21
Total Pune District		19	8	235	4405	1019	942

Source: 1. Socio-Economic Review and District Statistical Abstract, Pune District 2018, 2019.

Based on the table, Pune District's water infrastructure is a complex network of different types of irrigation projects and reservoirs, distributed unevenly across its tehsils. The district has a total of 19 Major Irrigation Projects, 8 Medium Irrigation Projects, 235 Minor Irrigation Projects (State), 4,405 Minor Irrigation Projects (Local), 1,019 Tanks, and 942 Kolhapur-type weirs.



Major Irrigation Projects:

These are large-scale projects, typically involving dams and extensive canal systems, designed to irrigate vast areas and supply water to urban and industrial centers. The table shows they are concentrated in tehsils with significant river systems and higher rainfall, such as Junnar and Velhe (4 projects), and Khed, Mawal, Mulshi, and Haveli (2 projects each). These projects are crucial for the district's overall water security. Khadakwasla Dam: Located on the Mutha River, this is arguably the most critical dam for the city of Pune. It serves as a downstream reservoir for the upstream Panshet and Varasgaon dams and is the primary source of drinking water for the Pune Municipal Corporation (PMC) area. Panshet and Varasgaon Dams: These dams, situated on the Ambi and Mose rivers respectively, are the main feeder dams for Khadakwasla. They are vital for ensuring a consistent water supply to the city, with a combined storage capacity that is crucial for managing seasonal water availability. Pavana Dam: Located on the Pavana River in Mawal taluka, this dam is the lifeline for the industrial and residential areas of Pimpri-Chinchwad Municipal Corporation (PCMC). Its water is essential for the automobile and IT industries in the region. Mulshi Dam: One of the largest dams in the district, Mulshi Dam is located on the Mula River. While it primarily serves as a hydroelectric project, its water is also crucial for irrigation and contributes to the overall river system. Ghod and Dimbhe Dams: These dams are located in the northern part of the district and are essential for providing irrigation to the surrounding agricultural areas, helping to support the district's farm-based economy.

Medium Irrigation Projects:

These projects are smaller than major ones but still cover a substantial command area. They are distributed in tehsils like Mawal, Purandar (2 projects each), Junnar, Indapur, Khed, and Mulshi (1 project each). These projects help in providing water to a more localized but still significant agricultural land.

Minor Irrigation Projects: (State)

These are relatively smaller projects managed by the state government, often involving check dams or small reservoirs. They are more widely distributed across the district, with tehsils like Junnar (39), Shirur

(30), Mulshi (27), Indapur (24), and Baramati (16) having a high number, indicating a widespread, state-supported effort to conserve water at a local level.

Minor Irrigation Projects: (Local)

This category represents the most numerous type of water conservation structure, with a total of 4,405 across the district. These are likely small-scale initiatives and local community projects like check dams and village tanks, demonstrating the extensive grassroots efforts in water management. Baramati (793 projects) and Purandar (613 projects) have a particularly high number, suggesting a strong focus on local-level water harvesting in these drier, agricultural regions.

Tanks:

Tanks are traditional water storage structures, often fed by streams or rainfall, used for irrigation and domestic purposes. The highest number of tanks is found in Baramati (308), followed by Shirur (151) and Purandar (121). This highlights their importance as a traditional and decentralized water resource, especially in the eastern tehsils.

Kolhapur Type Weirs:

These are simple, low-height barrages built across rivers to raise the water level for irrigation, particularly during the monsoon. They are numerous in the district, with a total of 942. Junnar has the highest number of weirs (125), followed by Baramati (118), Purandar (112) and Ambegaon (108), showing their widespread use in river-fed agricultural areas to divert water for farming.

Role of Dams and Reservoirs in Water Management:

Dams and reservoirs in Pune District play a crucial, multi-faceted role in regional water management, serving various sectors to support the district's economy and population. Their primary function is to store water from the high-rainfall monsoon season to ensure a year-round supply for the rapidly expanding urban areas of Pune and Pimpri-Chinchwad (PCMC). This is particularly critical for the Khadakwasla-Panshet-Varasgaon dam system, which is the main source of drinking water for the city. Beyond urban supply, these dams are the cornerstone of the agricultural economy, especially in the drier, eastern tehsils. Water is released through extensive canal networks to irrigate vast farmlands, supporting the cultivation of crops like sugarcane, jowar, and bajra. This water is also a key input for the district's industrial growth, with significant portions allocated to industrial clusters in the PCMC, Chakan, and Ranjangaon areas, which are major manufacturing and IT hubs. Additionally, the dams serve a dual purpose of flood control during the monsoon season by holding back excess water and are used for hydroelectric power generation, contributing to the district's energy security.

Dam and Reservoir Management :

Dam and reservoir management in Pune District faces several complex challenges, primarily due to the competing demands of various sectors and the impacts of environmental factors. The most significant issue is water allocation conflicts, as the rapidly increasing demand from urban and industrial areas often clashes with the needs of the agricultural sector, leading to disputes, especially during periods of low rainfall. This is further complicated by the immense urbanization pressure around dams, where unregulated construction and improper waste disposal degrade water quality and harm the health of these

vital reservoirs. Over time, siltation and capacity loss reduce the storage effectiveness of the dams, compromising their long-term functionality. Lastly, climate change poses a serious threat, with shifting rainfall patterns, including more intense but shorter monsoons and longer dry spells, making it difficult to predict water availability and manage reservoir levels, thus increasing the risks of both floods and droughts.

Conclusion:

The dams and reservoirs of Pune District are indispensable for its economic and social well-being. Their strategic location in the western part of the district allows for the collection and distribution of water to sustain a diverse regional economy. However, the system is under immense strain from urbanization, climate change, and conflicting demands from different sectors. A sustainable future for the district hinges on adopting an integrated water management plan that promotes equitable allocation, invests in conservation, and utilizes modern technology to enhance efficiency. This requires cooperation among urban planners, agricultural communities, and industrial stakeholders to ensure that this vital resource is managed for the benefit of all.

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