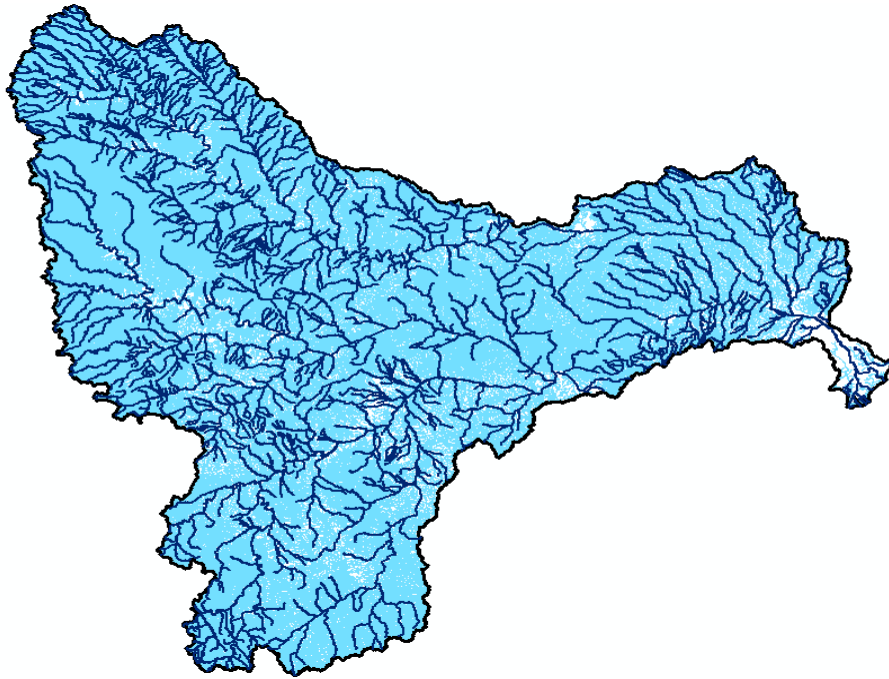




National River Conservation Directorate

Department of Water Resources,
River Development and Ganga Rejuvenation
Ministry of Jal Shakti
Government of India

Krishna River Basin Water Demand and Supply Report



March 2026



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National River Conservation Directorate (NRC D)

The National River Conservation Directorate, functioning under the Department of Water Resources, River Development & Ganga Rejuvenation, and Ministry of Jal Shakti providing financial assistance to the State Government for conservation of rivers under the Centrally Sponsored Schemes of 'National River Conservation Plan (NRCP)'. National River Conservation Plan to the State Governments/ local bodies to set up infrastructure for pollution abatement of rivers in identified polluted river stretches based on proposals received from the State Governments/ local bodies.

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The Centres for Krishna River Basin Management Studies (cKrishna) is a Brain Trust dedicated to River Science and River Basin Management. Established in 2024 by NIT Warangal and NITK Surathkal, under the supervision of cGanga at IIT Kanpur, the center serves as a knowledge wing of the National River Conservation Directorate (NRC D). cKrishna is committed to restoring and conserving the Krishna River and its resources through the collation of information and knowledge, research and development, planning, monitoring, education, advocacy, and stakeholder engagement.

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cGanga is a think tank formed under the aegis of NMCG, and one of its stated objectives is to make India a world leader in river and water science. The Centre is headquartered at IIT Kanpur and has representation from most leading science and technological institutes of the country. cGanga's mandate is to serve as think-tank in implementation and dynamic evolution of Ganga River Basin Management Plan (GRBMP) prepared by the Consortium of 7 IITs. In addition to this, it is also responsible for introducing new technologies, innovations, and solutions into India.

www.cganga.org

Acknowledgment

This report is a comprehensive outcome of the project jointly executed by NIT Warangal (Lead Institute) and NITK Surathkal (Fellow Institute) under the supervision of cGanga at IIT Kanpur. It was submitted to the National River Conservation Directorate (NRC D) in 2025. We gratefully acknowledge the individuals who provided information and photographs for this report.

Disclaimer

This report is a preliminary version prepared as part of the ongoing Condition Assessment and Management Plan (CAMP) project. The analyses, interpretations and data presented in the report are subject to further validation and revision. Certain datasets or assessments may contain provisional or incomplete information, which will be updated and refined in the final version of the report after comprehensive review and verification.

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PREFACE

In an era of unprecedented environmental change, understanding our rivers and their ecosystems has never been more critical. This report aims to provide a comprehensive overview of our rivers, highlighting their importance, current health, and the challenges they face. As we explore the various facets of river systems, we aim to equip readers with the knowledge necessary to appreciate and protect these vital waterways.

Throughout the following pages, you will find an in-depth analysis of the principles and practices that support healthy river ecosystems. Our team of experts has meticulously compiled data, case studies, and testimonials to illustrate the significant impact of rivers on both natural environments and human communities. By sharing these insights, we hope to inspire and empower our readers to engage in river conservation efforts.

This report is not merely a collection of statistics and theories; it is a call to action. We urge all stakeholders to recognize the value of our rivers and to take proactive steps to ensure their preservation. Whether you are an environmental professional, a policy maker, or simply someone who cares about our planet, this guide is designed to support you in your efforts to protect our rivers.

We extend our heartfelt gratitude to the numerous contributors who have generously shared their stories and expertise. Their invaluable input has enriched this report, making it a beacon of knowledge and a practical resource for all who read it. It is our hope that this report will serve as a catalyst for positive environmental action, fostering a culture of stewardship that benefits both current and future generations.

As you delve into this overview of our rivers, we invite you to embrace the opportunities and challenges that lie ahead. Together, we can ensure that our rivers continue to thrive and sustain life for generations to come.

Centers for Krishna River Basin Management Studies (cKrishna)

NIT Warangal and NITK, Surathkal

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1. Introduction

The Krishna River Basin is one of India's most significant inter-state river basins, supporting diverse socio-economic activities across the states of Karnataka, Telangana, Maharashtra, and Andhra Pradesh. With a vast geographical extent, varied agro-climatic conditions, and a rapidly growing population, the basin plays a crucial role in sustaining agriculture, domestic livelihoods, industrial development, and ecological systems. Over the decades, increasing water withdrawals driven by expanding irrigation, urbanization, industrialization, and changing consumption patterns have intensified pressure on the basin's finite water resources. Simultaneously, spatial and temporal variability in monsoon rainfall, recurrent droughts in semi-arid regions, groundwater depletion, and competing inter-sectoral and interstate demands have created complex challenges in achieving balanced and sustainable water management.

In this context, a comprehensive assessment of water demand and supply within the basin becomes essential for informed planning and resource allocation. This report examines sector-wise water demand—covering domestic, industrial, and agricultural requirements—alongside an evaluation of available water resources from surface and groundwater sources. It further analyzes the spatial distribution of demand and supply across districts and states, identifies existing demand-supply gaps, and highlights key issues and challenges affecting water security in the basin. The findings aim to support integrated basin-level planning, promote efficient water use, and contribute to sustainable management strategies for ensuring long-term water resilience in the Krishna River Basin.

2. Domestic Water Demand

The Krishna River Basin is one of the major inter-state river basins of India, extending across the states of Maharashtra, Karnataka, Telangana, and Andhra Pradesh, and supporting a large and rapidly growing population. Domestic water demand constitutes a critical component of the overall water demand in the basin, as it directly influences public health, urban growth, and socio-economic development. With increasing urbanization, population expansion, and changing living standards, the demand for potable water has shown a steady rise across both urban and rural regions of the basin.

For the present assessment, district-wise domestic water demand data have been compiled and extracted from the respective District Irrigation Plan (DIP) reports of all districts falling within the Krishna River Basin across the four states. The analysis is based on DIP reports published in 2015, which include baseline data for 2015 along with projected domestic water demand estimates for the year 2020. Accordingly, the present report has been prepared by utilizing this standardized dataset for the two reference years—2015 (base year) and 2020 (projected year)—as provided in the official DIP documents. The assessment

aims to understand current demand patterns and support integrated water resource planning for sustainable basin management.

Karnataka: The district-wise domestic water demand assessment for the Karnataka portion of the Krishna River Basin has been systematically derived based on secondary data compiled from the District Statistical Reports (DSR), District Irrigation Plans (DIP), and District at a Glance publications of the respective districts. Domestic water demand across all Karnataka districts in Krishna River Basin is primarily influenced by population size, growth rate, urbanization, lifestyle, socio-economic conditions, climate and standards of living, with urban areas generally requiring higher per capita water supply than rural areas. As per BIS (IS:1172-1993) norms, domestic water demand has been estimated using per capita requirements ranging from about 135 lpcd for small towns and economically weaker sections to 200 lpcd for cities with full flushing systems, with additional allowances for conveyance and distribution losses in some districts. Based on these norms and projected population growth for the period 2015–2020, Belagavi district shows the highest domestic water demand at about 1.78 BCM per year, reflecting its large and rapidly growing population, followed by Dakshina Kannada (≈ 0.36 BCM), Tumakuru (≈ 0.144 BCM), Ballari (≈ 0.146 BCM), Uttara Kannada (≈ 0.139 BCM) and Vijayapura (≈ 0.127 BCM). Medium levels of domestic water demand are observed in Kalaburagi (≈ 0.106 BCM), Dharwad (≈ 0.103 BCM), Davangere (≈ 0.103 BCM), Raichur (≈ 0.10 BCM), Bidar (≈ 0.094 BCM), Chitradurga (≈ 0.089 BCM) and Koppal (≈ 0.075 BCM). Districts with comparatively lower but steadily increasing demand include Shivamogga (≈ 0.068 BCM), Yadgir (≈ 0.069 BCM), Hassan (≈ 0.06 – 0.07 BCM), Haveri (≈ 0.064 BCM), Udupi (≈ 0.064 BCM), Chikkamagaluru (≈ 0.066 BCM), Gadag (≈ 0.057 BCM) and Bagalkot (moderate demand as per BIS norms). Overall, the combined district-wise assessment demonstrates that increasing population, migration towards urban centres and rising living standards are collectively driving higher domestic water demand across all districts, underlining the need for proactive water resource planning, expansion of supply infrastructure, efficient distribution systems and sustainable water management practices to ensure adequate and equitable domestic water supply in the future. The domestic water demand in districts of Karnataka state Krishna River basin portion is presented in below Table 1.

Table 1: Domestic Water Demand in districts of Karnataka.

Sl. No.	Districts	Population (2015)	Water Demand (2015), BCM	Projected Population (2020)	Projected Water Demand (2020), BCM
1	Bagalkot	19,98,873	0.09849	21,34,799	0.10519
2	Ballari	26,69,083	0.131519064	29,69,425	0.146318417
3	Belgaum	4779661	—	5420613	1.7808

4	Bidar	16,16,629	—	17,13,627	0.0938211
5	Chikkamagaluru	—	—	11,36,558	0.0664
6	Chitradurga	17,20,808	0.084793	18,01,665	0.088777
7	Dakshina Kannada	21,93,381	0.3374	23,49,100	0.3614
8	Davangere	20,12,149	0.099	20,99,687	0.103
9	Dharwad	19,54,997	0.096332478	20,99,839	0.10346955
10	Gadag	11,04,152	0.0544071	11,55,752	0.0569501
11	Hassan	18,02,746	0.04935	18,40,223	—
12	Haveri	16,66,497	—	17,55,845	0.06387
13	Kalburgi	26,91,684	—	30,69,764	0.1059
14	Koppal	14,59,417	0.0719128	15,28,912	0.0753371
15	Raichur	—	—	21,87,486	0.10778
16	Shivamogga	17,94,712	0.060178	19,25,703	0.06755
17	Tumkur	26,78,980	0.1320067	29,30,803	0.1444153
18	Uttara Kannada	14,37,169	0.131142	15,28,076	0.139437
19	Vijaypur	23,51,517	0.115871	25,69,251	0.1265998
20	Yadgiri	12,61,165	0.06214391	13,91,509	0.06856661

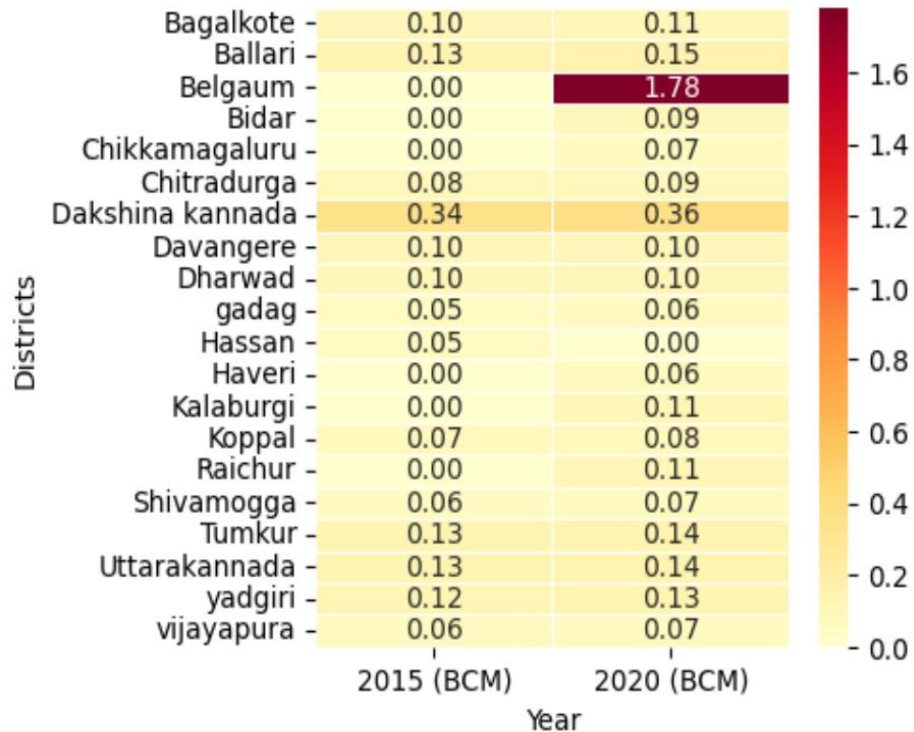


Figure 1: Graphical representation of Domestic Water Demand in Districts of Karnataka.

Telangana: Domestic water demand across districts of Telangana shows a consistent upward trend due to population growth, urbanization, and increasing per capita water supply norms under Mission Bhagirath and related state programs. In Warangal Rural, demand rises from 29.08 MCM (2015) to 30.25 MCM (2020); Yadadri Bhuvanagiri from 27.89 MCM to 29.57 MCM, with existing availability insufficient; Wanaparthy from 25.41 MCM to 26.44 MCM; Vikarabad from 36.72 MCM to 38.19 MCM; Suryapet from 41.435 MCM to 43.925 MCM; Siddipet from 34.45 MCM (2011) to 39.13 MCM (2021); Sangareddy from 58.97 MCM (2011) to 66.99 MCM (2021); Rangareddy from 95.54 MCM (2015) to 99.41 MCM (2020); Nalgonda from 60.986 MCM to 64.653 MCM, with a major supply deficit; Nagarkurnool from 37.56 MCM to 39.09 MCM; Medchal–Malkajgiri from 92.00 MCM to 95.74 MCM; Mahabubnagar from 66.65 MCM to 69.36 MCM; Mahabubabad from 30.92 MCM to 32.17 MCM; Khammam from 69.35 MCM to 76.18 MCM; Jogulamba Gadwal from 27.68 MCM to 28.81 MCM; Jangaon from 23.45 MCM to 24.40 MCM; and Bhadradi Kothagudem from 38.37 MCM to 40.23 MCM. Overall, all districts exhibit a steady increase in domestic water demand driven primarily by population growth and enhanced per capita supply standards. Several districts, particularly Yadadri and Nalgonda, face notable supply deficits, while highly urbanized districts such as Rangareddy, Medchal–Malkajgiri, and Khammam show comparatively higher demand levels. The domestic water demand in districts of Telangana state Krishna River basin portion is presented in below Table 2.

Table 2: Domestic Water Demand in districts of Telangana.

S. No	Districts	Population (2015)	Projected Population (2020)	Gross Water Demand (MCM) - 2015	Gross Water Demand (MCM) - 2020
1	Bhadradi Kothagudem	10,99,177	12,16,539	38.37	40.23
2	Jangaon	5,89,168	6,12,876	23.45	24.4
3	Jogulamba Gadwal	6,31,982	6,57,665	27.68	28.81
4	Khammam	16,17,756	17,91,785	69.35	76.18
5	Mahabubabad	8,05,718	8,38,141	30.92	32.17
6	Mahabubnagar	15,21,756	15,83,600	66.65	69.36
7	Medchal Malkajgiri	2520700	2623186	92	95.74
8	Nagarkurnool	8,57,620	8,92,474	37.56	39.09
9	Nalgonda	16,70,832	17,71,298	60.986	64.653
10	Rangareddy	25,25,491	26,28,141	95.54	99.41

11	Sangareddy	-	-	-	-
12	Siddipet	-	-	-	-
13	Suryapet	11,35,170	12,03,431	41.435	43.925
14	Vikarabad	9,72,769	10,12,307	36.72	38.19
15	Wanaparthy	5,80,086	6,03,661	25.41	26.44
16	Warangal	7,47,449	7,77,527	29.08	30.25
17	Yadadadri Bhuvanagiri	7,64,040	8,09,982	27.89	29.565

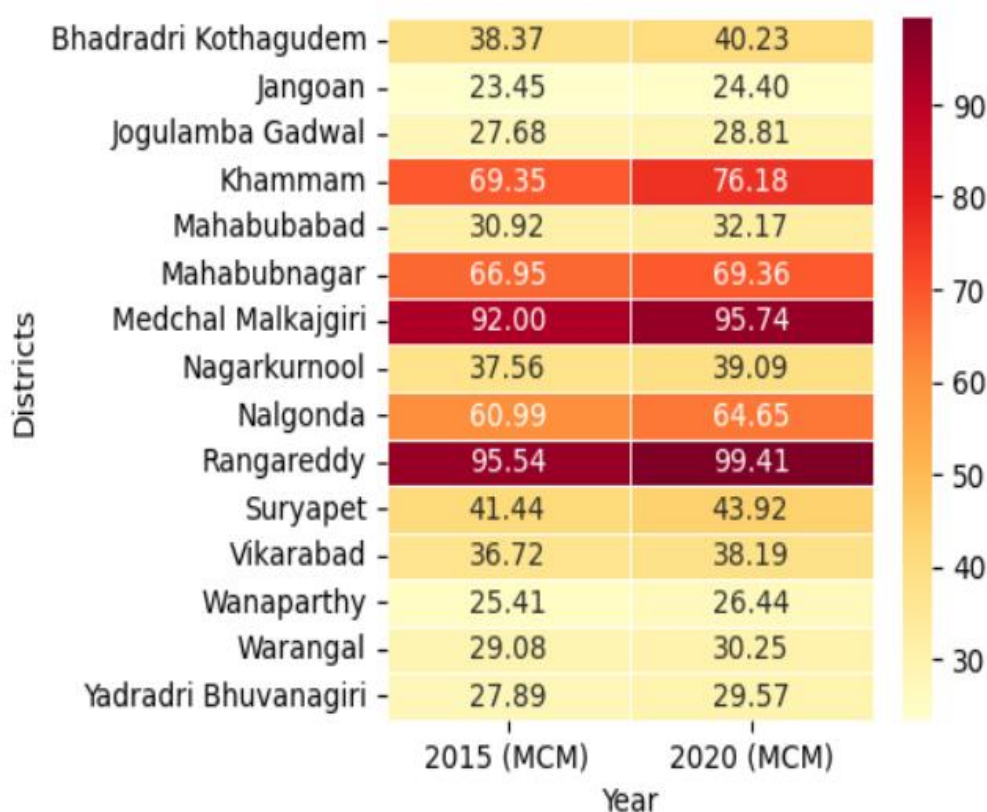


Figure 2: Graphical representation of Domestic Water Demand in Districts of Telangana.

Andhra Pradesh: Rapid population growth and economic development across Anantapur, Krishna, Kurnool, Prakasam, and Guntur districts have significantly increased domestic water demand, while available water resources are under stress due to over-exploitation and pollution. Accurate estimation of water demand is therefore essential for effective planning and management of water supply systems. In Anantapur district, the population increased from 4,27,8676 in 2015 to 45,74,967 by 2020, raising domestic water demand from 210.83 MCM to 225.43 MCM per annum. Krishna district's population grew from

46,59,425 to 48,72,465 increasing demand from 229.59 MCM to 240.09 MCM per annum. Kurnool district recorded higher growth of 14.85%, with population rising from 42,94,239 to 46,55,402 and water demand increasing from 211.60 MCM to 229.39 MCM per annum. Prakasam district's population increased from 35,47,615 to 37,72,866 (11.05% growth), leading to demand growth from 174.81 MCM to 185.91 MCM per annum. Similarly, Guntur district, with a population of 87,46,014 in 2015 and a decadal growth rate of 9.5%, is projected to reach 92,26,286 by 2020. Based on 135 lpcd, its domestic water demand increases from 430.96 MCM in 2015 to 454.63 MCM per annum in 2020, resulting in an additional requirement of 23.67 MCM per annum. These trends collectively indicate a widening gap between water demand and available supply across all districts. The domestic water demand in districts of Andhra Pradesh state Krishna River basin portion is presented in below Table 3.

Table 3: Domestic Water Demand in districts of Andhra Pradesh.

SL.NO	Districts	Projected Population (2015)	Projected Population (2020)	Domestic Water Demand (MCM) - 2015	Projected Domestic Water Demand (MCM) 2020
1	Anantapur	42,78,676	45,74,967	210.83	225.43
2	Guntur	87,46,014	92,26,286	430.96	454.63
3	Krishna	46,59,425	48,72,465	229.59	240.09
4	Kurnool	42,94,239	46,55,402	211.6	229.39
5	Prakasam	35,47,615	37,72,866	174.81	185.91

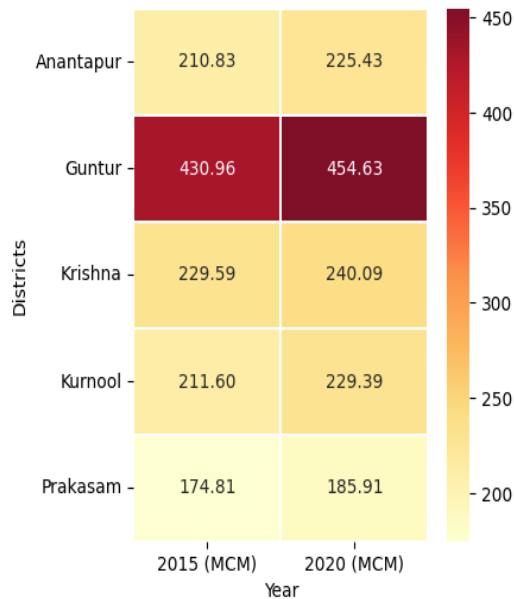


Figure 3: Graphical representation of Domestic Water Demand in Districts of Andhra Pradesh.

Maharashtra: The assessment of domestic water demand across Ahmednagar, Kolhapur, Osmanabad, Pune, Sangli, Satara, Solapur, Sindhudurg, and Beed districts clearly indicates a steady rise in water requirements due to population growth, urbanization, and socio-economic development. Population projections for 2020 show significant increases in domestic water demand, particularly in highly urbanized districts such as Pune, where demand is projected to reach about 0.7964 BCM, largely driven by rapid growth in Haveli block. Ahmednagar also records substantial demand at 0.1432 BCM, followed by Kolhapur at 0.083 BCM, Sangli at 0.15358 BCM, Solapur showing rising annual demand trends, Osmanabad at 0.0364 BCM, and Beed at approximately 0.044 BCM. Comparatively lower but steadily increasing demands are observed in Sindhudurg (0.0149 BCM), where tourism additionally influences seasonal water needs, and Satara, where moderate population growth contributes to incremental demand. Overall, the rising domestic water demand across all districts underscores the critical need for efficient water resource planning, improved distribution systems, reduction of losses, and adoption of sustainable water conservation and demand management practices to ensure reliable and adequate domestic water supply in the future. The domestic water demand in districts of Maharashtra state Krishna River basin portion is presented in below Table 4.

Table 4: Domestic Water Demand in districts of Maharashtra.

Sr. No.	Districts	Population 2015	Projected Population 2020	Gross Water Demand 2015 (BCM)	Gross Water Demand 2020 (BCM)
1	Ahamadnagar	49,12,873	52,99,907	0.1323914	0.14317
2	Beed	27,19,216	29,97,086	-	0.0437575
3	Kolhapur	40,63,612	42,784,23	-	0.0833942
4	Osmanabad	16,57,576	18,23,335	-	0.0364
5	Pune	1,04,79,610	1,30,98,006	0.61433	0.79635595
6	Sangli	29,43,346	31,45,560	-	0.15358
7	Satara	32,44,044	36,04,492	-	0.00024167
8	Sindhudurg	13,04,731	1,05,00,313	-	0.0149
9	Solapur	46,32,556	49,93,708	2.4125	2.8146

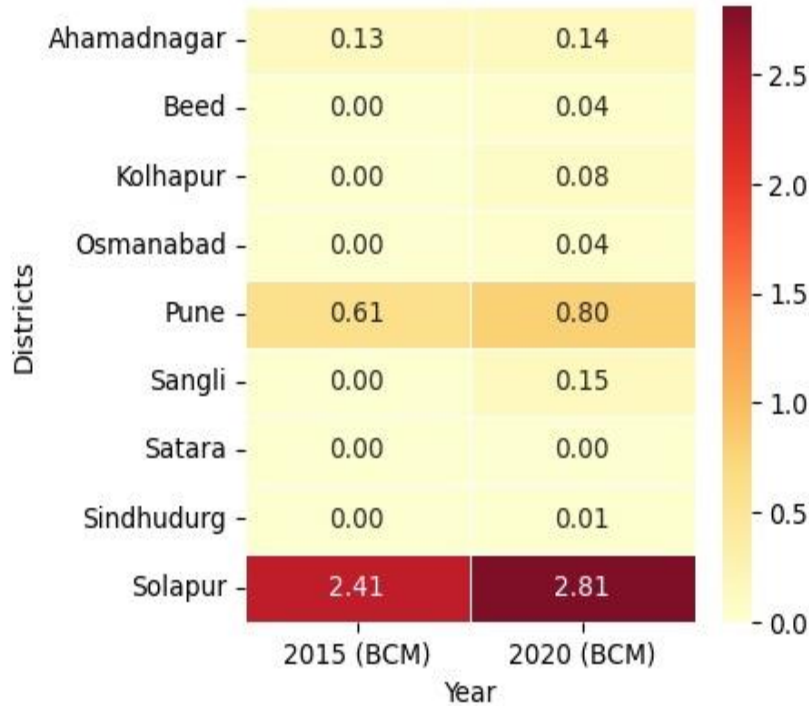


Figure 4: Graphical representation of Domestic Water Demand in Districts of Maharashtra.

3. Industrial Water Demand

Industrial water demand constitutes a substantial share of the overall water requirement within the Krishna River Basin, as water serves as an essential input across a wide spectrum of industrial activities including manufacturing, mineral processing, thermal power generation, cooling operations, construction, mining, metallurgy, textiles, food processing, and other agro-based industries. In addition to process water, significant quantities are required for washing, material handling, dust suppression, boiler feed, and auxiliary services within industrial premises.

With accelerating industrialization, the development of industrial corridors and estates, the expansion of MSMEs, and the growth of large-scale manufacturing and energy production units across urban and peri-urban centres, the demand for assured, high-quality, and uninterrupted water supply has increased markedly.

For the present assessment, district-wise industrial water demand data have been compiled from the respective District Irrigation Plan (DIP) reports of all districts within the Krishna River Basin. The analysis is based on DIP reports published in 2015, which provide baseline industrial water demand estimates for the year 2015 along with projected demand values for 2020. Accordingly, the current report has been prepared using this standardized dataset

for the two reference years—2015 (base year) and 2020 (projected year)—as documented in the official DIP reports.

Furthermore, economic diversification, technological advancement, and policy-driven industrial growth have intensified pressure on both surface and groundwater resources. Consequently, industrial water demand is emerging as a critical planning component within the Krishna River basin, necessitating efficient allocation, recycling and reuse strategies, and adoption of water-efficient technologies to ensure long-term sustainability and balanced sectoral distribution.

Karnataka: The overall analysis of industrial water demand across all districts indicates varying growth trends between 2015 (present stage) and the projected year 2020, with significant increases in a few districts and stable demand in others. Belagavi maintains a constant demand of 0.0382 BCM in both 2015 and 2020, while Bagalkote also remains unchanged at 0.0039 BCM. In contrast, Bidar shows a substantial rise from 0.376252 BCM to 0.513 BCM, requiring an additional 0.3525 BCM beyond its existing 0.1605 BCM potential. Chitradurga increases from 0.00200664 BCM to 0.0100332 BCM, mainly driven by small-scale industries. Dakshina Kannada grows from 0.0605 BCM to 0.1110 BCM, needing an additional 0.0431 BCM over its existing 0.0679 BCM supply. Davanagere records a marginal increase from 0.00134117 BCM to 0.0013849 BCM, while Haveri nearly doubles from 0.00595 BCM to 0.0119 BCM, creating a significant additional requirement. Kalaburagi rises from 0.0342 BCM to 0.0433 BCM, and Raichur increases from 0.06430 BCM to 0.08202 BCM. Shivamogga remains almost stable, changing slightly from 0.0260278 BCM to 0.0260299 BCM. Tumakuru shows moderate growth from 0.03968 BCM to 0.04418 BCM. Among other districts, Uttara Kannada increases from 0.0037595 BCM to 0.00563925 BCM, Gadag from 0.01234715 BCM to 0.012567975 BCM, Vijayapura (Bijapur) from 0.004144 BCM to 0.005684 BCM, and Yadgir records one of the sharpest proportional increases from 0.001168 BCM to 0.010293 BCM. Koppal remains constant at 0.0116 BCM, and Ballari also remains unchanged at 0.00004961 BCM. Dharwad reaches 0.084 BCM by 2020, while Hassan has an allocated industrial supply of 0.00829 BCM from Hemavathi reservoir. Overall, by 2020, districts such as Bidar, Dakshina Kannada, Raichur, Tumakuru, Kalaburagi, Dharwad, and Yadgir show notable increases in industrial water demand, while Belagavi, Bagalkote, Koppal, Ballari, and Shivamogga remain largely stable. The data clearly indicates that industrial growth is uneven across districts, with certain regions requiring significant additional water potential creation to meet projected 2020 demands. The industrial water demand in districts of Karnataka state Krishna River basin portion is presented in below Table 5.

Table 5: Industrial Water Demand in Districts of Karnataka.

KARNATAKA					
Sl.No	Districts	Water Demand in 2015 (BCM)	Water Demand in 2020 (BCM)	Existing water Potential (BCM)	Water Potential to be Created
1	Bagalkote	0.011145	0.011145	0.011145	0
2	Belagaum	0.0382	0.0382	0.0382	0
3	Bellary	0.00004961	0.00004961	-	-
4	Bidar	0.376252	0.513	0.1605	0.3525
5	Bijapur	0.001036	0.001624	-	-
6	Chikkamagaluru	-	-	-	-
7	Chitradurga	0.00200664	0.0100332	0.0011985	0.002444
8	Dakshina Kannada	0.0605	0.111	0.0679	0.0431
9	Dharwad	0.084	0.084	-	-
10	Davangere	0.0013417	0.0013849	0.0013417	0.000437
11	Gadag	0.01234715	0.012567975	-	-
12	Haveri	0.00595	0.0119	0.0068	0.0143
13	Kalaburgi	0.0342	0.0433	-	0.0091
14	Koppal	0.0116	0.0116	-	-
15	Raichur	0.0643	0.08202	0.0643	0.0188
16	Shivamogga	0.0260278	0.0260299	0.0260293	1.1E-06
17	Tumakur	0.039681567	0.044182097	0.0002808	0.000135
18	Uttarakannada	0.0037595	0.00563925	0.0037595	0.00188
19	Hassan	0.00859	-	-	-
20	Yadgiri	0.001168	0.010293	-	-
21	Vijayanagara	-	-	-	-

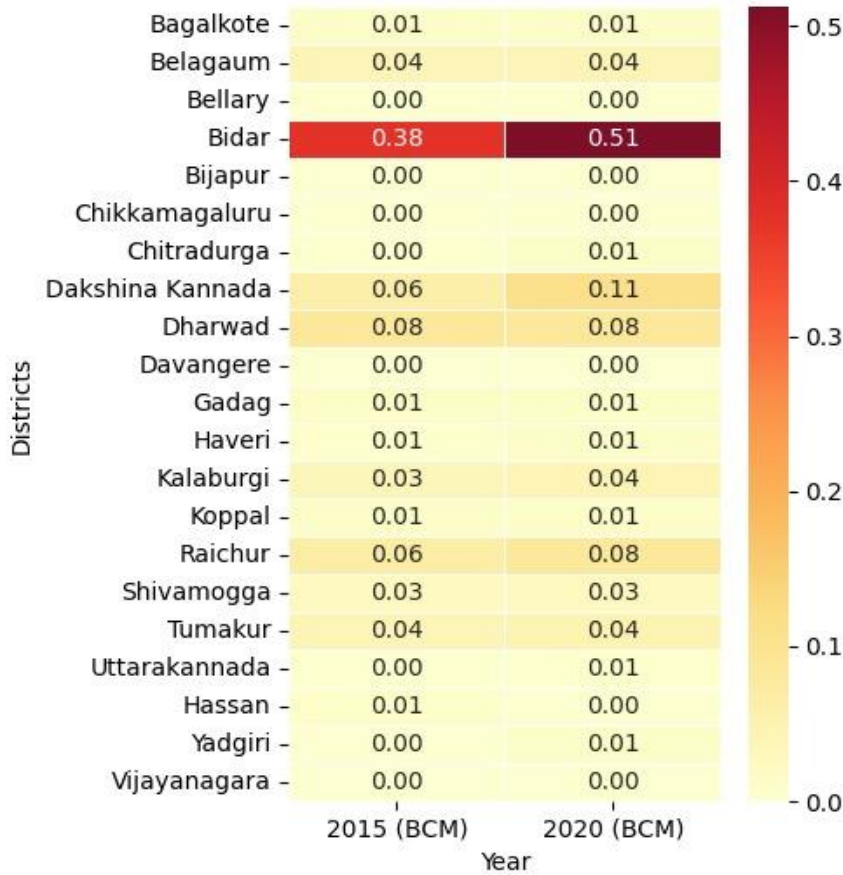


Figure 5: Graphical representation of Industrial Water Demand in Districts of Karnataka.

Telangana: The overall industrial water demand assessment for Telangana districts indicates a significant rise in requirements between 2011/2015 and 2020. In Malkajgiri, demand increases from 241.54 MCM to 304.96 MCM by 2020, with an existing potential of 219.59 MCM, creating a deficit of 85.39 MCM. Rangareddy shows growth from 100.80 MCM to 123.89 MCM by 2020, against an available 91.75 MCM, requiring an additional 32.11 MCM. Substantial increases are also observed in Warangal, where demand rises from 64.37 MCM in 2015 to 120.81 MCM in 2020, and in Jangaon, which grows sharply from 43.11 MCM to 115.89 MCM by 2020. Bhadradri Kothagudem records one of the steepest increases, from 19.76 MCM in 2015 to 183.16 MCM in 2020, reflecting rapid industrial expansion. Moderate growth is seen in Mahabubabad (from 65.37 MCM in 2015 to 98.07 MCM in 2020) and Nalagonda (from 78.110 MCM to 94.512 MCM). Vikarabad rises from 15.75 MCM to 19.34 MCM by 2020, requiring 5.03 MCM additional capacity. Smaller districts such as Wanaparthy and Nagarkurnool remain constant at 0.003 MCM between 2015 and 2020, showing minimal growth. Overall, the analysis highlights that by 2020, most major industrial districts face widening gaps between projected demand and existing water potential, necessitating substantial augmentation, improved allocation, and sustainable water management

strategies to support continued industrial development. The industrial water demand in districts of Telangana state Krishna River basin portion is presented in below Table 6.

Table 6: Industrial Water Demand in Districts of Telangana.

TELANGANA					
Sl.No	Districts	Water Demand in 2015 (MCM)	Water Demand 2020 (MCM)	Existing Water Potential (MCM)	Water Potential to be Created (MCM)
1	Vikarabad	15.75	19.34	14.32	5.03
2	Mehabubaba	-	98.07	-	-
3	Malkajgiri	241.54	304.96	219.59	85.39
4	Suryapet	5.748	6.955	5.748	7.651
5	Siddipet	-	-	-	-
6	Sangareddy	-	-	-	-
7	Rangareddy	100.8	123.89	91.75	32.11
8	Nalagonda	78.11	94.512	78.11	103.965
9	Khammam	190.73	-	-	-
10	Warangal	64.37	120.81	-	-
11	YadadriBhuvanagiri	30.906	37.397	30.906	41.137
12	Wanaparthi	0.031	0.039	0.031	0.008
13	Nagarkurnool	0.003	0.003	0.004	0.0004
14	Mahabubnagar	1.092	1.336	0.222	1.114
15	Jogulamba Gadwal	0.008	0.01	0.009	0.0017
16	Jangoan	43.11	115.89	-	-
17	Hanumakonda	25.32	27.32	-	-
18	BhadradriKothagudem	19.76	183.16	-	-

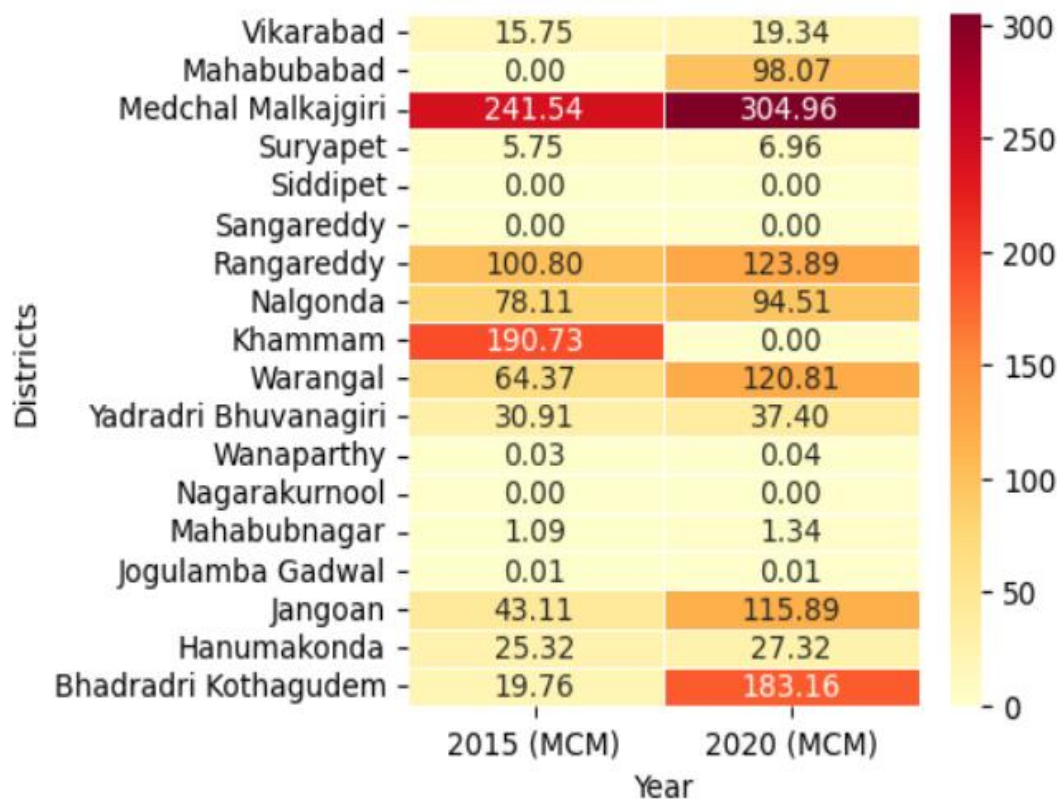


Figure 6: Graphical representation of Industrial Water Demand in Districts of Telangana.

Maharashtra: The overall industrial water demand assessment for districts of Maharashtra—including Solapur, Osmanabad, Ahmednagar, Sindhudurg, Satara, Pune, Sangli, Beed, and Kolhapur—shows a sharp increase in water requirements by the year 2020. Satara has one of the highest demands, rising from 1.521 BCM at present to 2.345 BCM by 2020, with an additional 0.759 BCM needed. Solapur also records very high usage, where 3,741 industries require about 1.47920 BCM, supported by an existing capacity of 2.77350 BCM, with 7.0107 BCM planned for future creation. In Pune, demand increases from 0.0753 BCM to 0.1215 BCM by 2020, requiring about 0.046173 BCM of additional water. Moderate growth is seen in Ahmednagar, where demand rises from 0.12666 BCM to 0.13933 BCM by 2020, needing 0.01267 BCM more. Beed shows a doubling trend from 0.0047377 BCM to 0.0097377 BCM, with nearly 0.005 BCM additional requirement. Smaller but rapidly increasing needs occur in Sindhudurg, where demand grows from 0.000508454 BCM to 0.002758174 BCM by 2020, and in Osmanabad, from 0.00032833 BCM to 0.00057984 BCM, both facing severe shortages due to very low existing potential. In contrast, Sangli has relatively adequate availability, with demand increasing slightly from 0.005515 BCM to 0.006248 BCM by 2020, supported by 0.00946445 BCM of existing resources. Kolhapur shows localized industrial clusters with varying future requirements, such as Shirol rising to

about 0.0177 BCM by 2020. Overall, the analysis indicates that by 2020, most districts will experience a widening gap between industrial water demand and available supply, making augmentation, recycling, and efficient water management essential for sustainable industrial growth. The industrial water demand in districts of Maharashtra state Krishna River basin portion is presented in below Table 7.

Table 7: Industrial Water Demand in Districts of Maharashtra.

MAHARASTRA					
Sl. No.	Districts	Water Demand in 2015 (BCM)	Water Demand in 2020 (BCM)	Existing Water Potential (BCM)	Water Potential to be Created (BCM)
1	Pune	0.0753	0.1215	0.07529	0.04617
2	Beed	0.0047377	0.0097377	0.0047377	0.005
3	sangli	0.005515	0.006248	0.00946445	0.00022
4	Satara	1.52124579	2.3452795	1.58595999	0.75931951
5	Sindhudurga	0.00050845	0.00275817	0.000508454	0.00224972
6	Solapur	0.0251	0.0288	0.0251	0.0037
7	Osmanabad	0.00032833	0.00057984	0.00000056	0.00057928
8	Ahmednagar	0.12666	0.13933	0.12666	0.01267
9	Kohlapur	-	-	-	-

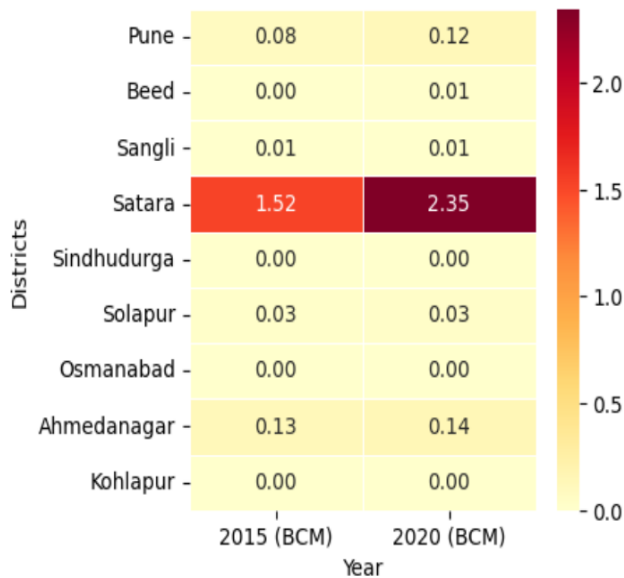


Figure 7: Graphical representation of Industrial Water Demand in Districts of Maharashtra.

Andhra Pradesh: The industrial water demand in the districts of Krishna River Basin of Andhra Pradesh shows a substantial increase between the present period and the year 2020, driven by rapid industrial expansion in select regions. Prakasam records the highest demand, rising from 374.63 MCM to 526.97 MCM by 2020, mainly due to growth in Kandukur. Ananthapur also shows a major increase from 130.26 MCM to 312.62 MCM, largely influenced by future requirements in Penukonda. Similarly, Kurnool experiences a sharp rise from 158.57 MCM to 300.44 MCM by 2020, requiring an additional 141.87 MCM of water potential to support industrial growth. In contrast, Krishna district maintains a constant demand of 167.35 MCM in both the years of 2016-2017 and 2020, indicating stable industrial activity with adequate existing supply. Lower but steady growth is observed in Guntur, where demand increases slightly from 0.13 MCM to 0.16 MCM by 2020, requiring only 0.03 MCM of additional water. Overall, the data indicates that by 2020, industrial water demand in Andhra Pradesh is highly uneven across districts, with a few high-growth areas driving most of the increase. Strategic planning, infrastructure development, and efficient water management will be essential to address the significant future requirements while ensuring sustainable industrial development. The industrial water demand in districts of Andhra Pradesh state Krishna River basin portion is presented in below Table 8.

Table 8: Industrial Water Demand in Districts of Andhra Pradesh.

ANDHRAPRADESH				
Sl.No	Districts	Water Demand in 2015 (MCM)	Water Demand 2020 (MCM)	Water Potential to be Created (MCM)
1	Anantapur	130.26	312.62	182.36
2	Kurnool	158.57	300.44	141.87
3	Guntur	0.13	0.16	0.03
4	Krishna	167.35	167.35	-
5	Prakasam	374.63	526.97	-

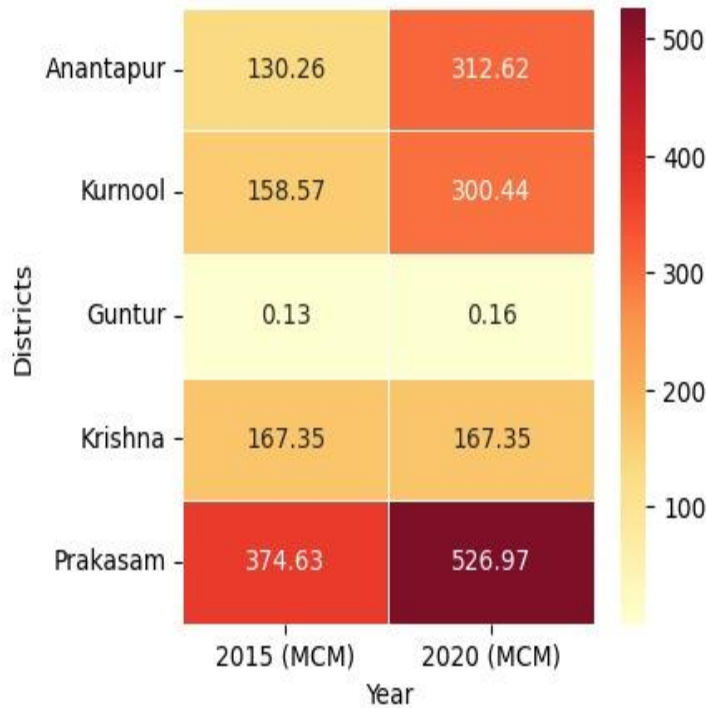


Figure 8: Graphical representation of Industrial Water Demand in Districts of Andhra Pradesh.

4. Agricultural Water Demand

Agricultural water demand constitutes the largest share of total water use within the Krishna River Basin, as agriculture remains the dominant livelihood activity and a primary contributor to regional food security and the rural economy. Water is an indispensable input for crop production, supporting land preparation, germination, plant growth, nutrient uptake, and yield formation across a wide range of crops including paddy, sugarcane, cotton, maize, pulses, oilseeds, and horticultural crops cultivated under diverse agro-climatic conditions of the basin. In addition to field irrigation, water is also required for allied agricultural activities such as livestock rearing, dairy operations, aquaculture, and on-farm processing.

With increasing population pressure, changing dietary patterns, expansion of irrigated areas, and a gradual shift toward water-intensive and high-value commercial crops, the demand for reliable and timely irrigation supply has grown substantially. The development of major, medium, and minor irrigation projects, groundwater abstraction through borewells and open wells, and the adoption of lift irrigation schemes have further intensified agricultural water withdrawals in several sub-basins. Seasonal variability of monsoon rainfall, recurring drought conditions in semi-arid regions, and declining groundwater levels

have also increased dependence on assured irrigation to stabilize crop yields and reduce production risks.

For the present assessment, district-wise agricultural water demand data have been compiled from the respective District Irrigation Plan (DIP) reports of all districts within the Krishna River Basin. The analysis is based on DIP reports published in 2016-2017 which provide baseline agricultural water demand. Accordingly, the current report has been prepared using this standardized dataset for the year 2016-2017.

Karnataka: The agricultural water demand in districts of Karnataka state of Krishna River Basin portion indicates the significant dependence of the state’s agriculture sector on water resources. The demand distribution is highly uneven among districts, reflecting differences in irrigation coverage, cropping patterns, and agro-climatic conditions. Districts such as Kalaburagi (6.778 BCM), Davanagere (5.44 BCM), Koppal (1.769 BCM), Ballari (2.275 BCM), Bagalkote (4.704 BCM), and Shivamogga (3.978 BCM) account for a major share of the total demand, indicating extensive irrigated agriculture and cultivation of water-intensive crops in these regions. Moderate water demand is observed in districts like Hassan (2.979 BCM), Gadag (2.585 BCM), Hassan (2.979), Uttar Kannada (1.877 BCM), Tumakuru (2.38 BCM), Haveri (2.939 BCM), Bidar (2.099) and Chikkamagaluru (2.819). In contrast, districts such as Chitradurga (1.005 BCM), and Dharwad (1.012 BCM) contribute a comparatively minor share to the total agricultural water demand. Meanwhile, no proper data was available for districts like Belagavi, Vijayapura, Dakshina Kannada, yadgir and Raichur in the given dataset, which may indicate data limitations rather than the absence of agricultural activity. Overall, the analysis highlights clear regional disparities in water use and underscores the need for efficient irrigation practices, crop diversification, and sustainable water resource management to ensure long-term agricultural sustainability in Karnataka. The agricultural water demand in districts of Karnataka state Krishna River basin portion is presented in below Table 9.

Table 9: Agricultural Water Demand in Districts of Karnataka.

Sl. No.	District	Total Agricultural Water Demand (BCM)
1	Bagalkote	4.704
2	Ballari	2.275
3	Belgaum	-
4	Bidar	2.099
5	Vijayapura	-
6	Chikkamagaluru	2.819
7	Chitradurga	1.005

8	Dakshina Kannada	-
9	Davanagere	5.44
10	Dharwad	1.012
11	Gadag	2.585
12	Hassan	2.979
13	Haveri	2.939
14	Kalaburagi	6.778
15	Koppal	1.769
16	Raichur	-
17	Shivamogga	3.978
18	Tumakuru	2.38
19	Uttar Kannada	1.877
20	Yadgiri	-

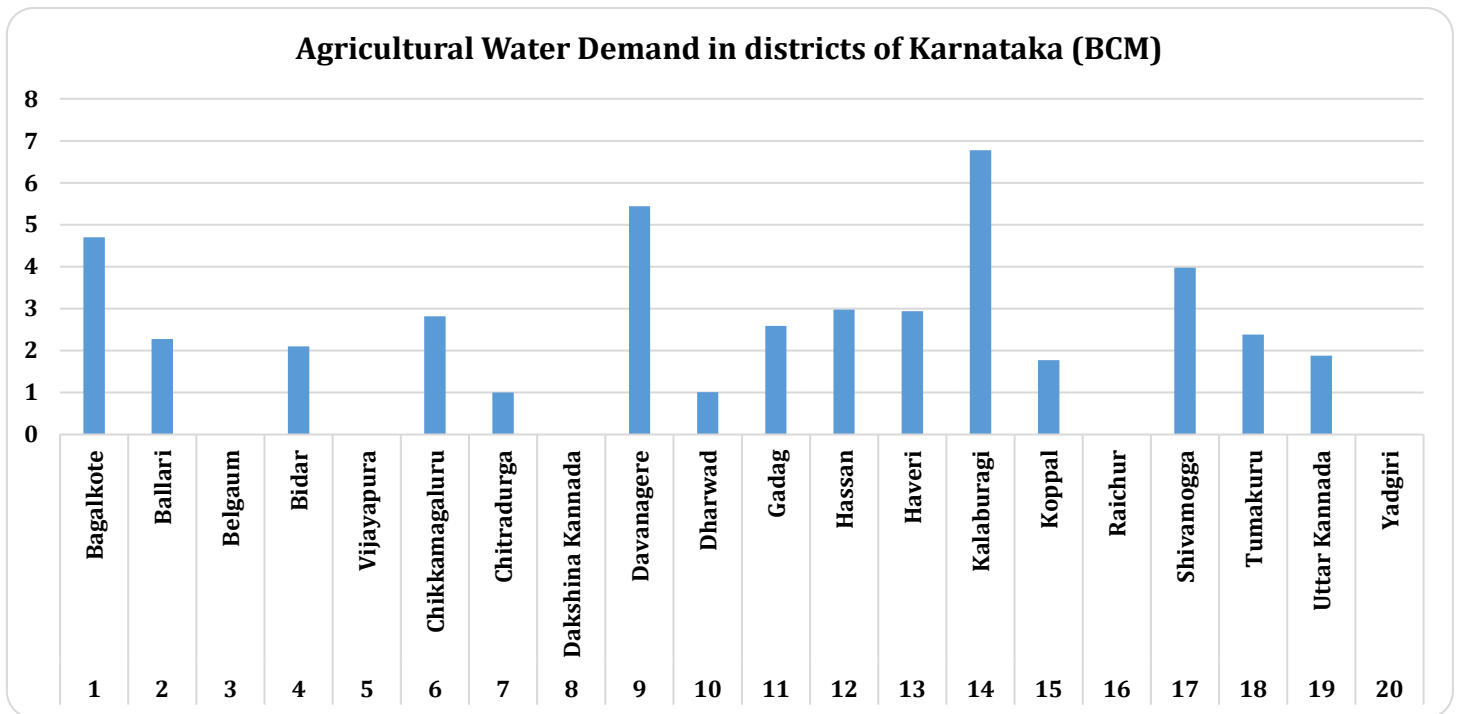


Figure 9: Graphical representation of Agricultural Water Demand in Districts of Karnataka

Telangana: The agricultural water demand of Telangana state shows noticeable variation across districts, reflecting differences in irrigation coverage and cropping intensity. The highest demand is recorded in Nalgonda (0.55832 BCM), followed by Sangareddy (0.47706 BCM), Suryapet (0.4464 BCM), Nagarkurnool (0.42155 BCM), Siddipet (0.38791 BCM), and Mahabubnagar (0.3846 BCM), indicating relatively higher agricultural water requirements in these areas. Moderate demand is observed in Yadadri Bhuvanagiri (0.3236 BCM),

Mahabubabad (0.31749 BCM), Jangaon (0.27243 BCM), Khammam (0.25978 BCM), and Vikarabad (0.25856 BCM), while lower and minor shares are contributed by Jogulamba Gadwal (0.23623 BCM), Wanaparthy (0.21572 BCM), Warangal (0.19307 BCM), Ranga Reddy (0.18273 BCM), Bhadradri Kothagudem (0.10516 BCM), and Medchal–Malkajgiri (0.04485 BCM). Overall, the total demand of 5.08546 BCM according to the District Irrigation Plans of the year 2016-2017 highlights inter-district disparities in agricultural water use and underscores the importance of efficient irrigation practices and sustainable water resource management in Telangana. The agricultural water demand in districts of Telangana state Krishna River basin portion is presented in below Table 10.

Table 10: Agricultural Water Demand in Districts of Telangana.

Sl. No.	District	Agricultural Water Demand (BCM)
1	Vikarabad	0.25856
2	Medchal–Malkajgiri	0.04485
3	Mahabubabad	0.31749
4	Warangal	0.19307
5	Nalgonda	0.55832
6	Ranga Reddy	0.18273
7	Khammam	0.25978
8	Suryapet	0.4464
9	Jogulamba Gadwal	0.23623
10	Yadadri Bhuvanagiri	0.3236
11	Mahabubnagar	0.3846
12	Wanaparthy	0.21572
13	Siddipet	0.38791
14	Sangareddy	0.47706
15	Nagarkurnool	0.42155
16	Jangaon	0.27243
17	Bhadradri Kothagudem	0.10516

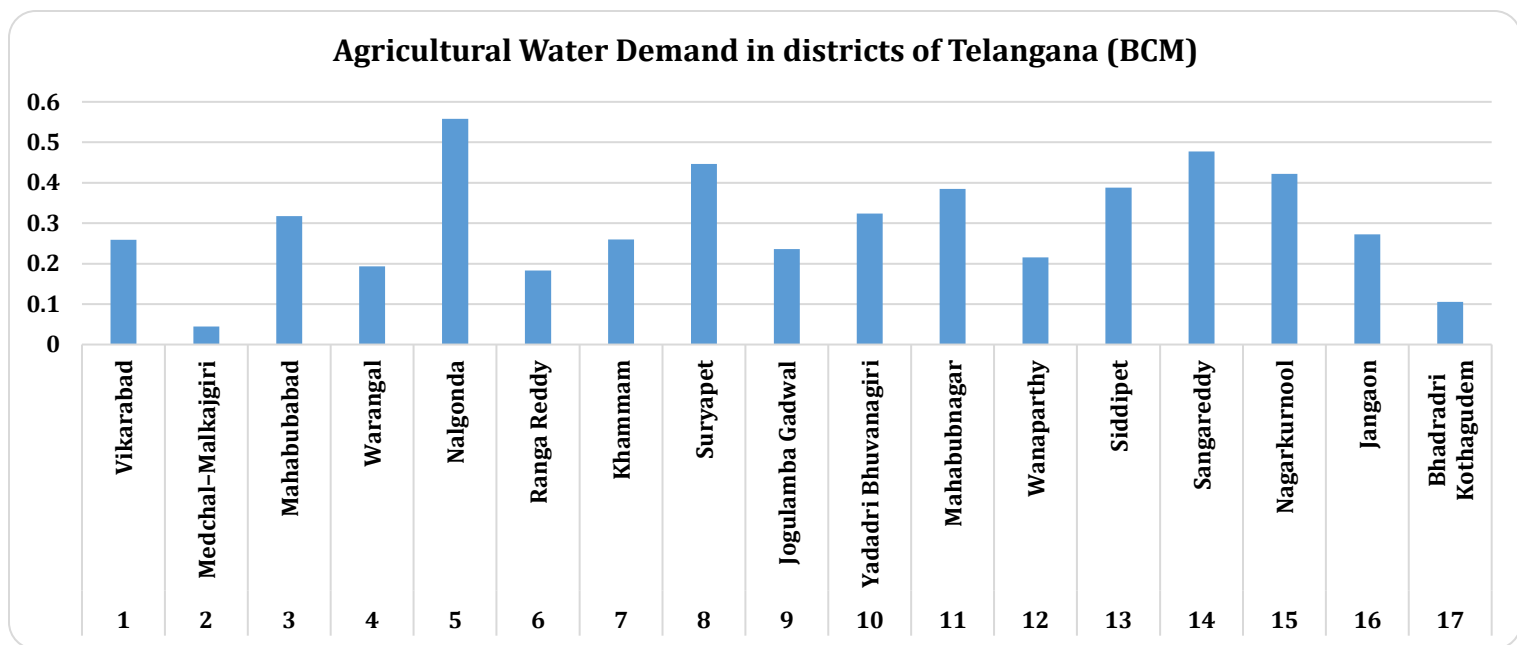


Figure 10: Graphical representation of Agricultural Water Demand in Districts of Telangana

Andhra Pradesh: The agricultural water demand in the districts of Andhra Pradesh indicates a considerable dependence on irrigation for crop production. Among these districts, Guntur records the highest demand at (3.6679 BCM), followed by Krishna with (2.1555 BCM), reflecting intensive irrigated agriculture in these regions. Kurnool shows a moderate demand of (1.3053 BCM), while comparatively lower demand is observed in Prakasam at (0.9453 BCM) and Anantapur at (0.8612 BCM), contributing a smaller share to the total. The total agricultural water demand distributed across the districts of Andhra Pradesh amounts to 8.9352 BCM. The agricultural water demand in districts of Andhra Pradesh state Krishna River basin portion is presented in below Table 11.

Table 11: Agricultural Water Demand in Districts of Andhra Pradesh.

Sl. No.	District	Total Agri. Water Demand (BCM)
1	Anantapur	0.8612
2	Guntur	3.6679
3	Krishna	2.1555
4	Kurnool	1.3053
5	Prakasam	0.9453

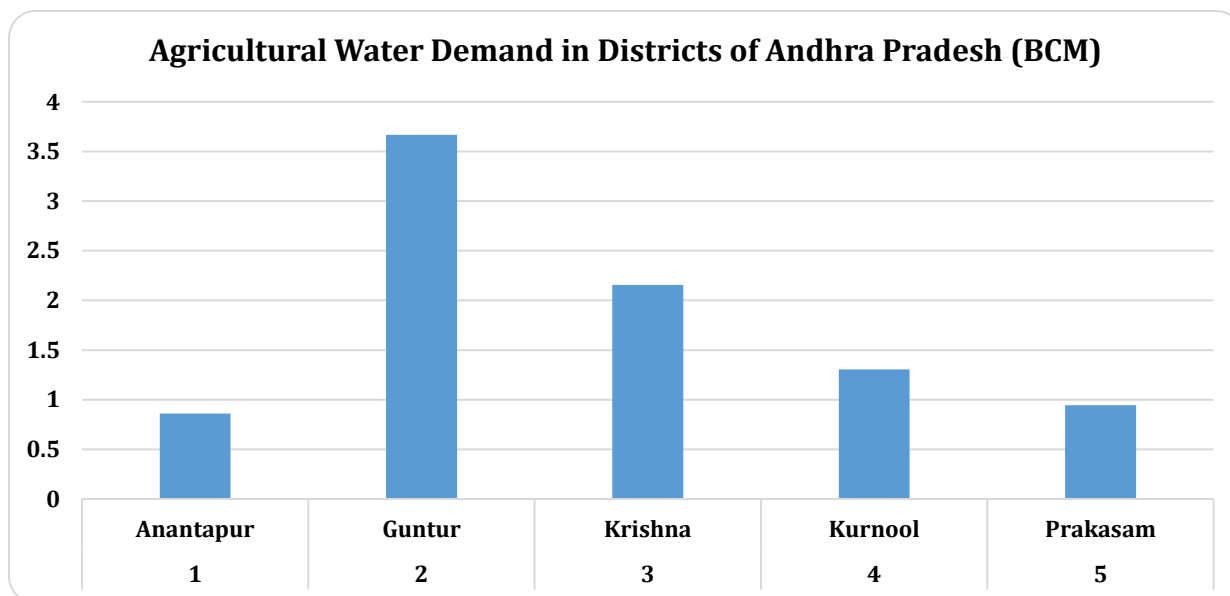


Figure 11: Graphical representation of Agricultural Water Demand in Districts of Andhra Pradesh

Maharashtra: The agricultural water demand in Maharashtra state across the districts of Krishna River basin indicates substantial reliance on water resources for agriculture, with clear inter-district variation. The highest demand is recorded in Kolhapur (4.96 BCM), followed by Solapur (4.54 BCM), Sangli (4.21 BCM), Pune (3.88 BCM), Satara (3.67 BCM), and Ahmednagar (3.42 BCM), showing relatively high irrigation intensity in these areas. Moderate demand is observed in Beed (2.85 BCM) and Osmanabad (2.73 BCM), while Sindhudurg records the lowest demand at 1.12 BCM, contributing a minor share to the total. Overall, the aggregate demand of 31.38 BCM of agricultural water demand highlights regional disparities in water use and underscores the importance of efficient irrigation practices and sustainable water management strategies in Maharashtra. The agricultural water demand in districts of Maharashtra state Krishna River basin portion is presented in below Table 12.

Table 12: Agricultural Water Demand in Districts of Maharashtra.

Sl. No.	District	Total Agricultural Water Demand (BCM)
1	Ahmednagar	3.42
2	Beed	2.85
3	Kolhapur	4.96

4	Osmanabad	2.73
5	Pune	3.88
6	Sangli	4.21
7	Satara	3.67
8	Sindhudurg	1.12
9	Solapur	4.54

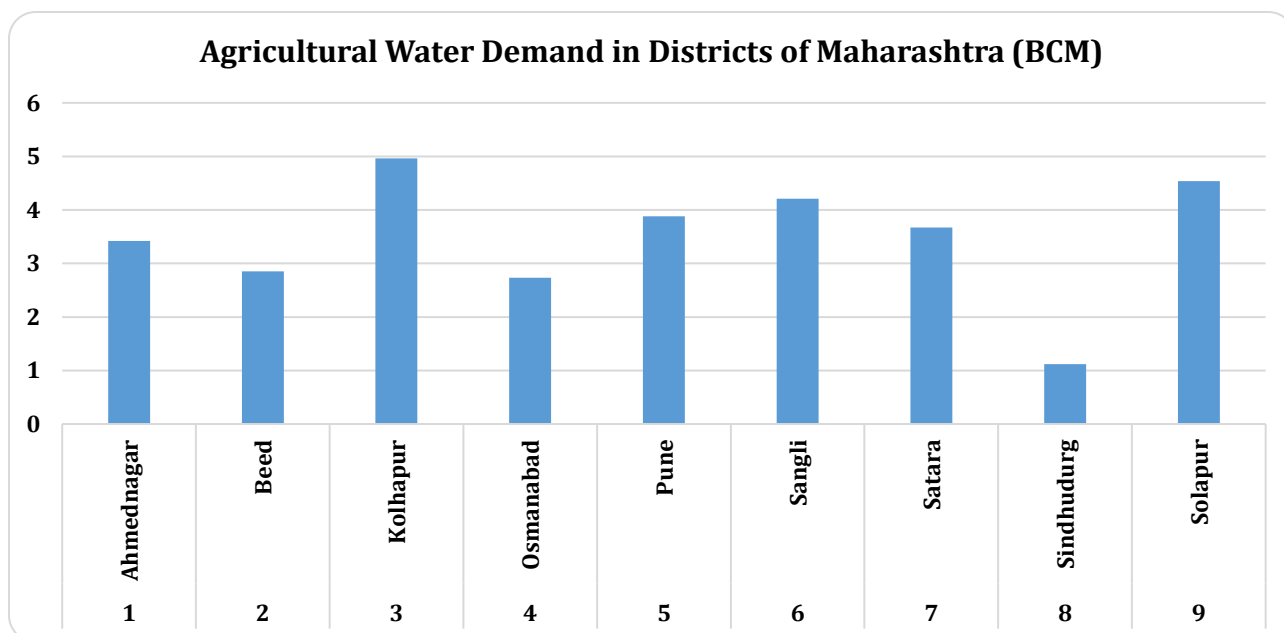


Figure 12: Graphical representation of Agricultural Water Demand in Districts of Maharashtra

5. Sources of Water Supply

In the Krishna River Basin, water supply is derived primarily from two major sources: surface water and groundwater, both of which are vital for meeting agricultural, domestic, industrial, and ecological requirements. Surface water includes river flows, reservoirs, tanks, lakes, and canal systems that store and distribute monsoon runoff across command areas, forming the backbone of large-scale irrigation and urban water supply schemes. However, its availability is highly seasonal and dependent on rainfall variability. Groundwater, stored in weathered, fractured, and alluvial aquifers, is accessed through borewells and open wells and serves as a crucial supplementary source, particularly in regions beyond canal reach and during dry periods. While groundwater offers relatively dependable supply, excessive abstraction and inadequate recharge have led to declining water tables in several parts of

the Krishna River basin. Together, these sources form an interconnected hydrological system that requires integrated and sustainable management to ensure long-term water security.

5.1 Surface Water:

Surface water constitutes the primary and traditionally developed source of water supply in the Krishna River Basin, encompassing water stored or flowing in rivers, reservoirs, lakes, tanks, and canal systems. The main stem of the Krishna River and its numerous tributaries generate substantial seasonal flows, particularly during the southwest monsoon, forming the backbone of irrigation and multipurpose water resource development. Major and medium reservoirs store monsoon runoff to support irrigation, hydropower generation, flood moderation, and drinking water supply, while traditional tank systems and minor irrigation structures such as check dams continue to play a vital role in semi-arid and drought-prone regions. Extensive canal networks further facilitate the distribution of stored water to agricultural command areas and settlements.

- **Rivers:** In the The Krishna River, referred to as Krishnaveni is among the longest rivers in the Deccan plateau and is the third-longest river in India, following the Ganges and Godavari. The Krishna River is a major river in India, starting in the Western Ghats close to Mahabaleshwar in Maharashtra. Flowing eastward through the Indian states of Maharashtra and Karnataka, Telangana and Andhra Pradesh ultimately flow into the Bay of Bengal. Extending about 1,400 kilometers, the Krishna River has a catchment area spanning approximately 258,948 square kilometers and signifies the drainage area of Krishna River Basin (KRB) encompassing four states in India and spatial differences in elevation of the KRB. The river drains a vast and topographically diverse basin divided into seven sub-basins: Upper Krishna, Middle Krishna, Lower Krishna, Upper Bhima, Lower Bhima, Upper Tungabhadra, and Lower Tungabhadra. The river system is sustained by 13 major tributaries, among which the Bhima, Tungabhadra, Ghataprabha, Malaprabha, Musi, Munneru, Panchganga, and Dudhganga are prominent. The Bhima River originates in the Bhimashankar hills of Maharashtra and joins the Krishna near Raichur in Karnataka, while the Tungabhadra rises in the Western Ghats near Chikmagalur and merges with the Krishna near Kurnool. The Ghataprabha and Malaprabha rivers originate in the Western Ghats of Karnataka and join the Krishna at Raibag and Kudalasangama, respectively. The Musi River, rising in the Ananthagiri Hills of Telangana, flows through Hyderabad before meeting the Krishna near Vadapally, whereas the Munneru River from Khammam district joins near Muktyala. In Maharashtra, the Panchganga and Dudhganga rivers, both originating in the Western Ghats, merge with the Krishna near Narsobawadi after traversing agriculturally significant regions. Collectively, these tributaries contribute substantially to the hydrology, irrigation potential, and overall water resource dynamics of the Krishna River Basin.

- Lakes:** Lakes within the Krishna River Basin include both natural and man-made water bodies that play a crucial role in regional water supply, irrigation, flood moderation, hydropower generation, and urban drinking water provision. **Kolleru Lake**, located between the Krishna and Godavari deltas, originated as a brackish lagoon formed due to mid-Holocene marine transgression and now functions as a natural flood buffer, groundwater recharge zone, and livelihood source through fisheries and agriculture, though it faces pressures from aquaculture expansion and pollution. **Shivsagar Lake**, primarily the reservoir formed by the Koyna Dam, serves as a major hydropower and irrigation source, significantly contributing to Maharashtra's water and energy balance. **Nagarjuna Sagar Lake**, created by the Nagarjuna Sagar Dam across the Krishna River, is one of the largest masonry dam reservoirs in the world and supports irrigation for nearly ten lakh acres along with hydroelectric power generation, though it faces challenges of fluctuating inflows and interstate water allocation issues. **Himayat Sagar and Osman Sagar**, constructed in the early 20th century to supply drinking water and control floods in Hyderabad, remain historically significant but are increasingly stressed due to siltation, pollution, and urban expansion. Additionally, **Ayyanakere Lake**, a historic irrigation tank built and later renovated during the Hoysala period, continues to support agricultural activities through its canal network, demonstrating the long-standing tradition of water resource management in the basin. Collectively, these lakes highlight the diverse origins and multifunctional importance of lentic water bodies in sustaining the hydrological and socio-economic systems of the Krishna Basin.
- Canals:** The canal systems of the Krishna River Basin form the backbone of its irrigation infrastructure, distributing stored river water across vast command areas in Karnataka, Telangana, Andhra Pradesh, and Maharashtra. The **Narayanpur Left Bank Canal (NLBC)**, constructed under the Upper Krishna Project, irrigates nearly 4.5 lakh hectares in drought-prone North Karnataka with a designed carrying capacity of about 10,000 cusecs, aiming to enhance water use efficiency and equitable distribution. The **Krishna Delta Canal system**, originating from the Prakasam Barrage, is a historic irrigation network developed in the 19th century that supports intensive agriculture in the fertile Krishna and Guntur districts through major canals such as the Eluru Canal, North Krishna Canal, High Level Canal, and South Bank Canal. The **Tungabhadra Canal system**, regulated by the Tungabhadra Board and fed by the Tungabhadra Dam, serves extensive areas of Karnataka through the Left Bank Canal and the Rayalaseema region of Andhra Pradesh via the Right Bank Low-Level and High-Level Canals, supporting irrigation and hydropower generation. The **Bhima Canal System**, including lift irrigation projects in Karnataka and linkages to Maharashtra's Ujjani Dam, utilizes Bhima River waters to irrigate drought-affected regions and provide drinking water and energy support. Similarly, the **Nagarjuna Sagar Canal system**, originating from the Nagarjuna Sagar Dam, comprises the Right Main (Jawahar) Canal and Left Main (Lalbahadur) Canal, collectively irrigating over 10 lakh

acres across Telangana and Andhra Pradesh through an extensive network of branches and distributaries. Together, these canal systems represent large-scale engineered interventions that regulate and convey Krishna waters, playing a decisive role in agricultural productivity, regional water security, and interstate water management within the basin.

- **Surface Water Availability in Krishna River basin:** Surface water availability in the Krishna River Basin has been systematically assessed at the district level across all four basin states—Karnataka, Telangana, Maharashtra, and Andhra Pradesh—using data extracted from district irrigation plans. For Karnataka, surface water availability information was obtained from the District Irrigation Plans 2016, for Maharashtra from the District Irrigation Plans 2017, for Andhra Pradesh from the District Irrigation Plans 2017, and for Telangana from the District Irrigation Plans 2020. These plans provide comprehensive, district-wise estimates of surface water resources derived from river flows, reservoir storage, tanks, and canal supplies within each administrative unit of the basin. By compiling and harmonizing these plan-based estimates, a detailed spatial understanding of surface water availability across the basin has been established, reflecting variations in water yield due to climatic, topographic, and hydrological differences among districts and states.

Karnataka: In the Karnataka portion of the Krishna River Basin, district-wise surface water availability exhibits considerable spatial variation, as derived from the District Irrigation Plans (2016). Among the districts, Uttara Kannada (12.79221 BCM) and Shivamogga (5.74299891 BCM) record comparatively higher surface water availability, followed by Belagavi (3.13 BCM), Yadgir (3.13 BCM), Bagalkote (2.31729 BCM), Vijayapura (2.579 BCM), and Kalaburagi (1.926551 BCM). Moderate availability is observed in Tumakuru (1.29697 BCM), Hassan (1.004 BCM), and Davanagere (0.882 BCM), while relatively lower values are reported for Ballari (0.85727 BCM), Koppal (0.4538 BCM), Haveri (0.34 BCM), Bidar (0.313256 BCM), Dakshina Kannada (0.2323 BCM), Chikkamagaluru (0.1828 BCM), Dharwad (0.11872 BCM), and Chitradurga (0.1055335 BCM). In certain districts such as Gadag, Raichur, and Vijayanagara, specific surface water availability figures were not reported in the compiled dataset. The surface water availability information of districts of Karnataka state is represented in the table 13 below.

Table 13: Surface water availability in Districts of Karnataka

Sl.No	Districts	Existing Surface Water Availability (BCM)
1	Bagalkote	2.31729
2	Belagaum	3.13
3	Bellary	0.85727
4	Bidar	0.313256
5	Bijapur	2.579
6	Chikkamagaluru	0.1828
7	Chitradurga	0.1055335
8	Dakshina Kannada	0.2323
9	Dharwad	0.11872
10	Davangere	0.882
11	Gadag	-
12	Haveri	0.34
13	Kalaburgi	1.926551
14	Koppal	0.4538
15	Raichur	-
16	Shivamogga	5.74299891
17	Tumakur	1.29697
18	Uttarakannada	12.79221
19	Hassan	1.004
20	Yadgiri	3.13
21	Vijayanagara	-

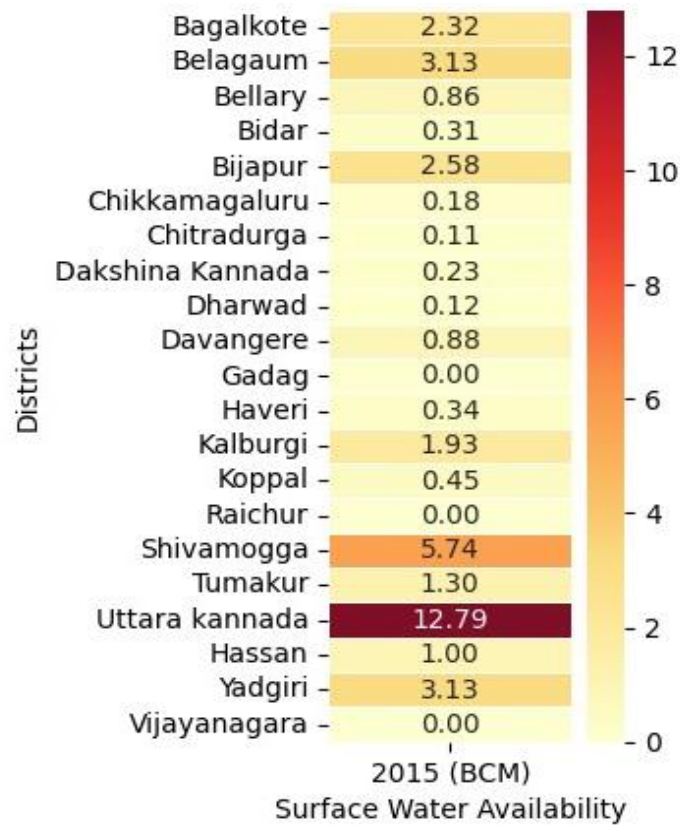


Figure 13: Graphical representation of Surface water availability in districts of Karnataka

Telangana: In the Telangana portion of the Krishna River Basin, district-wise existing surface water availability, as compiled from the District Irrigation Plans (2020), exhibits considerable variation. Nalgonda records one of the highest surface water availabilities (1220.09 BCM), followed by Mahabubabad (943.18 BCM), Warangal (877.38 BCM), Suryapet (729.6 BCM), and Bhadradri Kothagudem (662.78 BCM). Significant availability is also observed in Wanaparthy (486.74 BCM), Jangaon (431.14 BCM), Jogulamba Gadwal (411.44 BCM), Rangareddy (323.02 BCM), and Mahabubnagar (281.12 BCM). Khammam shows a substantial value (2326.83 BCM) as per the compiled dataset, while moderate to lower availability is reported in Nagarkurnool (273.07 BCM), Vikarabad (239.12 BCM), Medchal Malkajgiri (102.4 BCM), and Yadadri Bhuvanagiri (77.45 BCM). In Siddipet and Sangareddy districts, specific surface water availability details were not indicated. These spatial differences reflect variations in reservoir storage, canal networks, river reach, and hydrological conditions across Telangana’s share of the basin. The surface water availability information of districts of Telangana state is represented in the table 14 below.

Table 14: Surface water availability in Districts of Telangana.

Sl.No	Districts	Existing Water Availability (BCM)
1	Vikarabad	239.12
2	Jogulamba Gadwal	411.44
3	Rangareddy	323.02
4	Nalgonda	1220.09
5	Suryapet	729.6
6	Badradri Kothagudem	662.78
7	Kammam	2326.83
8	Yadadri Bhavanagiri	77.45
9	Warangal	877.38
10	Warnaparathi	486.74
11	Siddipet	-
12	Sangareddy	-
13	Nagar Kurnool	273.07
14	Medchal Malkajgiri	102.4
15	Mahabubnagar	281.12
16	Mahabubabad	943.18
17	Jangaon	431.14

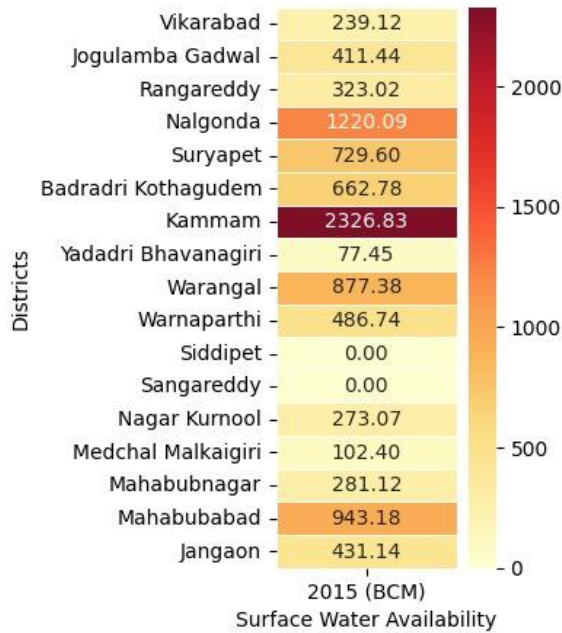


Figure 14: Graphical representation of Surface water availability in districts of Telangana

Maharashtra: In the Maharashtra portion of the Krishna River Basin, district-wise surface water availability, as derived from the District Irrigation Plans (2017), shows marked variation among districts. Solapur records the highest surface water availability (20.6592 BCM), followed by Pune (3.943085 BCM), Ahmadnagar (2.883979 BCM), Kolhapur (2.2234 BCM), and Sangli (1.2859 BCM). Moderate availability is observed in Sindhudurg (0.9534 BCM) and Dharashiv (0.57 BCM), while relatively lower values are reported in Satara (0.165857 BCM) and Beed (0.022999 BCM). This spatial variation reflects differences in river basin coverage, reservoir storage, canal infrastructure, and rainfall distribution within Maharashtra’s share of the Krishna Basin. The surface water availability information of districts of Maharashtra state is represented in the table 15 below.

Table 15: Surface water availability in Districts of Maharashtra.

Sl.No	Districts	Surface Water (BCM)
1	Satara	0.165857
2	Sangli	1.2859
3	Solapur	20.6592
4	Kolapur	2.2234
5	Sindhudurg	0.9534
6	Dharashiv	0.57
7	Beed	0.022999
8	Ahmadnagar	2.883979
9	Pune	3.943085

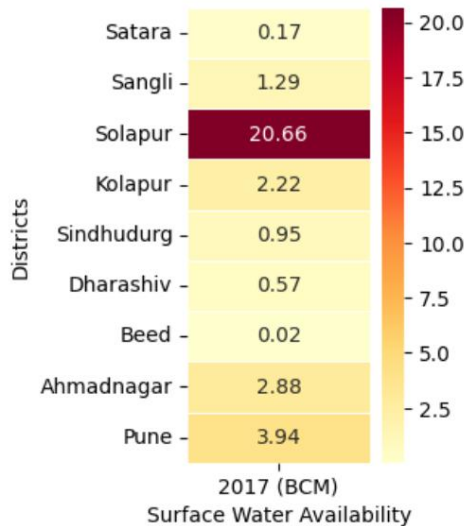


Figure 15: Graphical representation of Surface water availability in districts of Maharashtra

Andhra Pradesh: In the Andhra Pradesh portion of the Krishna River Basin, district-wise surface water availability, as derived from the District Irrigation Plans (2017), shows moderate variation among the basin districts. Kurnool records the highest availability (1754.01 MCM), followed by Anantapur (1519.32 MCM), Prakasam (1323.58 MCM), Guntur (1304.71 MCM), and Krishna (1292.73 MCM). These variations reflect differences in river reach, reservoir storage, canal command areas, and hydrological contributions within each district. The distribution highlights the significant role of major irrigation infrastructure and Krishna River allocations in supporting agricultural and regional water requirements across Andhra Pradesh’s share of the basin. The surface water availability information of districts of Andhra Pradesh state is represented in the table 16 below.

Table 16: Surface water availability in Districts of Andhra Pradesh.

Sl.No	Districts	Surface Water Availability (MCM)
1	Krishna	1,292.73
2	Guntur	1,304.71
3	Prakasam	1323.58
4	Kurnool	1754.01
5	Ananthpur	1519.32

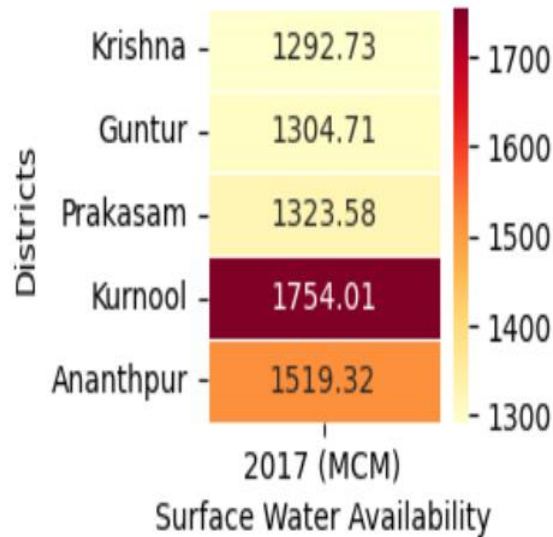


Figure 16: Graphical representation of Surface water availability in districts of Andhra Pradesh

5.2 Ground Water:

Groundwater constitutes a critical and widely utilized source of water supply in the Krishna River Basin, particularly in regions where surface water access is limited or unreliable. It is stored within weathered, fractured, and alluvial aquifers underlying the basin and is accessed through open wells, borewells, and tube wells for agricultural, domestic, and industrial purposes. Groundwater plays a vital role in supporting irrigation during non-monsoon periods, stabilizing crop production in drought-prone and semi-arid areas, and ensuring drinking water security for rural and peri-urban communities. In many districts, the rapid expansion of borewell irrigation has significantly increased dependence on subsurface resources, especially in hard rock terrains where storage is limited. Although groundwater provides relatively dependable supply compared to seasonal surface flows, its sustainability is closely linked to monsoon recharge, land use practices, and extraction intensity. Declining water tables, over-exploitation in certain blocks, and variability in recharge patterns underscore the need for conjunctive use planning, artificial recharge measures, and improved groundwater management to ensure long-term water security within the basin.

- **Ground Water Availability in Krishna River basin:** Groundwater availability in the Krishna River Basin has likewise been systematically assessed at the district level across all four basin states—Karnataka, Telangana, Maharashtra, and Andhra Pradesh—using data compiled from their respective District Irrigation Plans. For Karnataka, groundwater availability information was obtained from the District Irrigation Plans 2016; for Maharashtra, from the District Irrigation Plans 2017; for Andhra Pradesh, from the District Irrigation Plans 2017; and for Telangana, from the District Irrigation Plans 2020. These documents provide district-wise estimates of groundwater resources based on aquifer recharge, extraction levels, stage of groundwater development, and dynamic groundwater assessments within each administrative unit of the basin. By consolidating and harmonizing these state-level datasets, a comprehensive spatial assessment of groundwater availability across the basin has been developed, highlighting variations influenced by geological formations, rainfall recharge patterns, land use characteristics, and intensity of groundwater abstraction across districts and states.

Karnataka: As per DIP 2016 reports the Karnataka portion of the Krishna River Basin exhibits considerable variation in groundwater availability across different districts due to differences in rainfall, hydrogeological conditions, recharge potential, and groundwater utilization. Based on the available data, districts such as Tumakuru (0.84061 BCM), Chikkamagaluru (0.8102 BCM), Hassan (0.7359 BCM), Kalaburagi (0.632994 BCM), and Vijayapura (0.546103 BCM) show relatively higher groundwater availability. Moderate availability is observed in Ballari (0.53161 BCM), Chitradurga (0.50364 BCM), Koppal (0.53711 BCM), and Haveri (0.53 BCM). Lower groundwater availability is recorded in

districts such as Dakshina Kannada (0.19979 BCM), Uttara Kannada (0.18351 BCM), Dharwad (0.21738 BCM), and Shivamogga (0.2529225 BCM). However, groundwater availability data is not available for certain districts including Belagavi, Davanagere, Gadag, Raichur, Yadgir, and Vijayanagara, which indicates gaps in data reporting or monitoring. These variations highlight the importance of strengthening groundwater assessment and data management systems for effective water resource planning within the basin. The ground water availability information of districts of Karnataka state is represented in the table 17 below.

Table 17: Ground Water availability in Districts of Karnataka.

Sl.No	Districts	Existing Ground Water Availability (BCM)
1	Bagalkote	0.39567
2	Belagaum	-
3	Bellary	0.53161
4	Bidar	0.29354
5	Bijapur	0.5466103
6	Chikkamagaluru	0.8102
7	Chitradurga	0.50364
8	Dakshina Kannada	0.19979
9	Dharwad	0.21738
10	Davangere	-
11	Gadag	-
12	Haveri	0.53
13	Kalaburgi	0.632994
14	Koppal	0.53711
15	Raichur	-
16	Shivamogga	0.2529225
17	Tumakur	0.84061
18	Uttarakannada	0.18351
19	Hassan	0.7359
20	Yadgiri	-
21	Vijayanagara	-

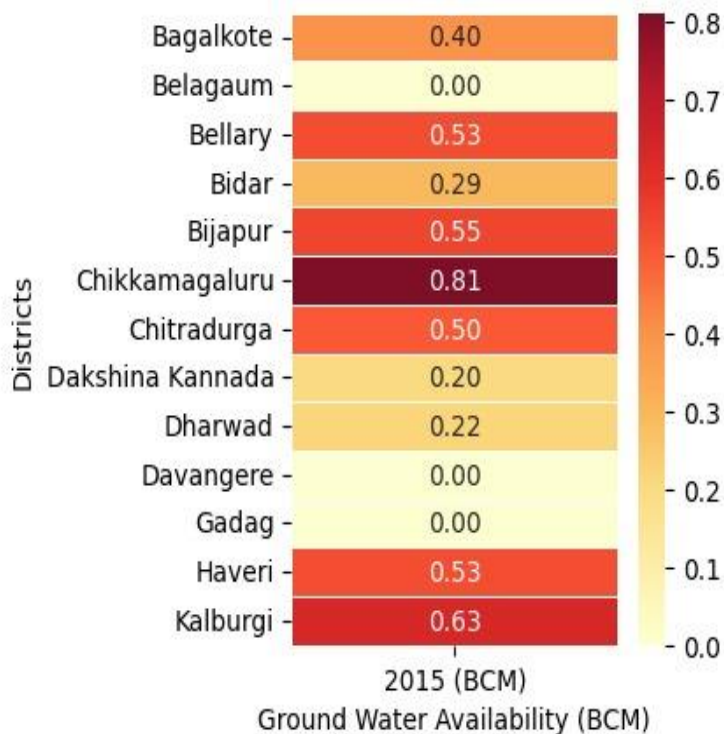


Figure 17: Graphical representation of Ground water availability in districts of Karnataka

Telangana: The Telangana portion of the Krishna River Basin shows significant spatial variation in groundwater availability across its districts, based on the available data, districts such as Nalgonda (932 BCM) and Suryapet (580.9 BCM) exhibit comparatively higher groundwater availability within the basin. Other districts including Sangareddy (531.46 BCM), Nagarkurnool (482.91 BCM), Siddipet (471.59 BCM), and Mahabubnagar (473.06 BCM) also show substantial groundwater resources. Moderate groundwater availability is observed in districts such as Rangareddy (379.88 BCM), Kamareddy (355.9 BCM), Yadadri Bhuvanagiri (362.38 BCM), Warangal (322.7 BCM), and Vikarabad (330.69 BCM). Relatively lower groundwater availability is reported in districts including Jogulamba Gadwal (187.88 BCM), Wanaparthy (172 BCM), Mahabubabad (287.39 BCM), Jangaon (282.5 BCM), and Bhadradi Kothagudem (228.63 BCM), while Medchal–Malkajgiri (77.54 BCM) records the lowest groundwater availability among the listed districts. These variations highlight the uneven distribution of groundwater resources across the Telangana region of the basin and emphasize the need for sustainable groundwater management and efficient utilization strategies. The ground water availability information of districts of Telangana state is represented in the table 18 below.

Table 18: Ground Water availability in Districts of Telangana.

Sl.No	Districts	Existing Ground Water Availability (BCM)
1	Vikarabad	330.69
2	Jogulamba Gadwal	187.88
3	Rangareddy	379.88
4	Nalgonda	932
5	Suryapet	580.9
6	Badradri Kothagudem	228.63
7	Kammam	355.9
8	Yadadri Bhavanagiri	362.38
9	Warangal	322.7
10	Warnaparathi	172
11	Siddipet	471.59
12	Sangareddy	531.46
13	Nagar Kurnool	482.91
14	Medchal Malkajgiri	77.54
15	Mahabubnagar	473.06
16	Mahabubabad	287.39
17	Jangaon	282.5

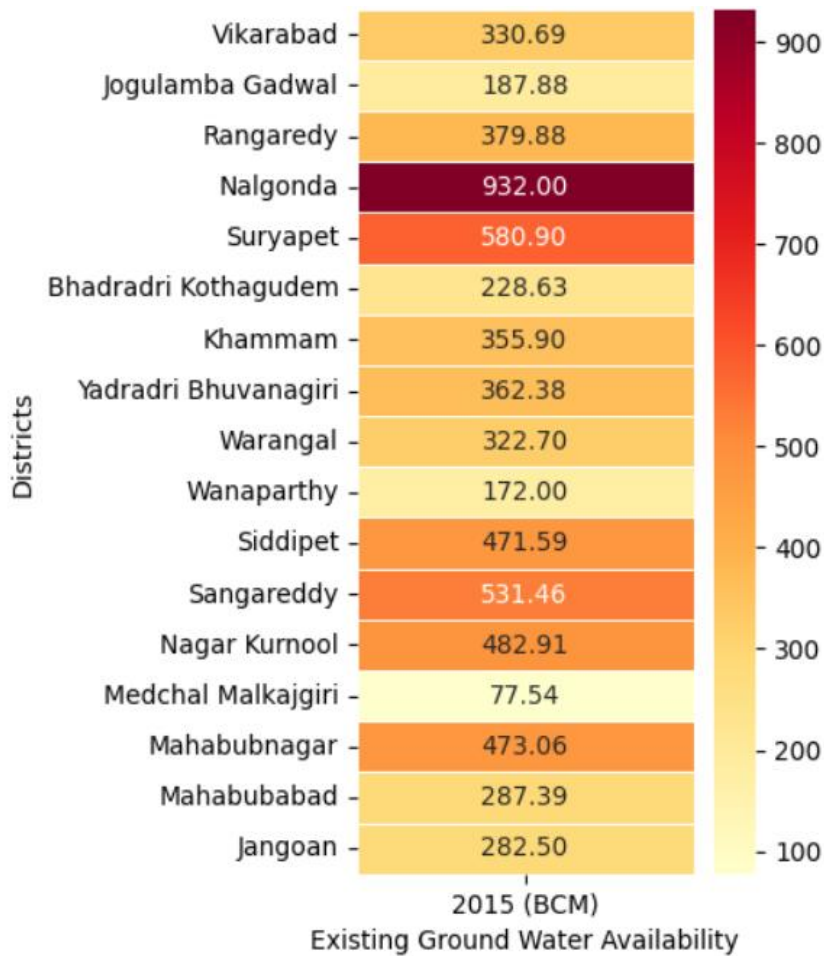


Figure 18: Graphical representation of Ground water availability in districts of Telangana

Maharashtra: The Maharashtra portion of the Krishna River Basin also exhibits variation in groundwater availability across its districts. Based on the available data, Solapur (30.9889 BCM) shows significantly higher groundwater availability compared to other districts within the basin. Moderate groundwater availability is observed in districts such as Beed (1.420413 BCM), Sangli (0.893 BCM), and Satara (0.704653 BCM). Districts including Kolhapur (0.50099 BCM) and Sindhudurg (0.2761 BCM) exhibit relatively moderate to lower groundwater availability. Lower groundwater availability is recorded in Dharashiv (0.221 BCM) and Ahmadnagar (0.181688 BCM), while Pune (0.014 BCM) shows the least groundwater availability among the listed districts. These variations reflect the influence of climatic conditions, geological formations, and groundwater extraction levels across the Maharashtra region of the Krishna River Basin, emphasizing the importance of region-specific groundwater management strategies.

The ground water availability information of districts of Maharashtra state is represented in the table 19 below

Table 19: Ground Water availability in Districts of Maharashtra

Sl.No	Districts	Ground Water (BCM)
1	Satara	0.704653000
2	Sangli	0.893
3	Solapur	30.9889
4	Kolapur	0.50099
5	Sindhudurg	0.2761
6	Dharashiv	0.221
7	Beed	1.420413
8	Ahmadnagar	0.181688
9	Pune	0.014

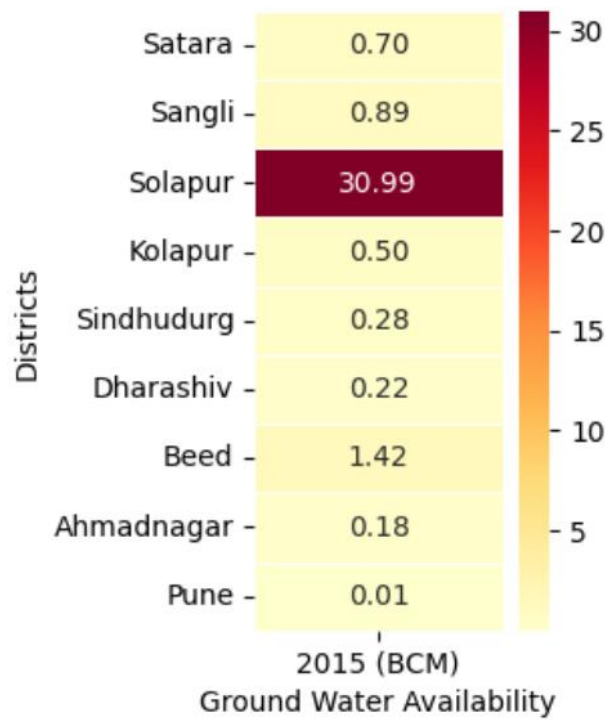


Figure 19: Graphical representation of Ground water availability in districts of Maharashtra

Andhra Pradesh: The Andhra Pradesh portion of the Krishna River Basin demonstrates notable variation in groundwater availability across its districts, Anantapur (1527.18 MCM) exhibits the highest groundwater availability among the districts within the basin. Other districts such as Krishna (691.64 MCM) and Prakasam (438.6 MCM) also show considerable groundwater resources. Moderate groundwater availability is observed in Guntur (349.67 MCM) and Kurnool (324.2 MCM) districts. These variations highlight the spatial differences in groundwater resources within the Andhra Pradesh region of the Krishna River Basin. The ground water availability information of districts of Andhra Pradesh state is represented in the table 20 below.

Table 20: Ground Water availability in Districts of Andhra Pradesh

Sl.No	Districts	Existing Ground Water Availability (MCM)
1	Krishna	691.64
2	Guntur	349.67
3	Prakasam	438.6
4	Kurnool	324.2
5	Ananthpur	1527.18



Figure 20: Graphical representation of Ground water availability in districts of Andhra Pradesh

6. Spatial Distribution of Demand and Supply

The spatial distribution of water demand and supply within the Krishna River Basin reflects pronounced regional variations driven by population density, cropping patterns, industrial concentration, hydrological characteristics, and infrastructure development. Water demand is unevenly distributed, with agriculturally intensive command areas, rapidly urbanizing districts, and industrial clusters exerting higher pressure on available resources. Correspondingly, water supply systems are structured around a network of major and medium reservoirs, barrages, tanks, and groundwater extraction structures that regulate and store water across sub-basins. The distribution mechanism further includes extensive canal systems, lift irrigation schemes, pumping stations, transmission mains, and distribution pipelines that convey water from source points to end users. In urban and peri-urban areas, Water Treatment Plants (WTPs) play a crucial role in processing raw surface and groundwater to potable standards before supply through municipal networks. The spatial alignment—or mismatch—between water availability, storage infrastructure, pumping capacity, and treatment facilities significantly influences regional demand–supply balance, highlighting the need for integrated planning that considers both physical water resources and supporting infrastructure across the basin.

6.1 Storage Infrastructures:

Storage infrastructure forms the backbone of water resource management within the Krishna River Basin, enabling the regulation, conservation, and distribution of water to meet diverse sectoral demands. These structures are designed to capture and store monsoon runoff and river flows for use during dry periods, thereby ensuring temporal balancing between water availability and demand. The basin hosts a network of major reservoirs, medium irrigation projects, barrages, anicuts, and traditional tank systems that collectively contribute to surface water storage. Large multipurpose reservoirs play a critical role in irrigation supply, hydropower generation, flood moderation, and domestic and industrial water supply.

- **Status of Storage Infrastructures in district of Karnataka:** The storage infrastructure across several districts of Karnataka varies significantly according to the District Statistical Reports (DSR) of different years. In Bagalkot (2016–17), the district has 722 tanks/ponds/lakes, 15,168 wells, 9,967 river and canal systems, 830 springs, 4,044 other sources, and 10 dams. Belagavi (2017–18) records 4,048 tanks/ponds/lakes, 138,790 wells, 23,999 river and canal systems, 4,048 springs, 10,023 other sources, and 27 dams. In Bellari (2020–21), there are 451 tanks/ponds/lakes, 1,566 wells, 530 river and canal systems, 314 springs, 334 other sources, and 9 dams. Bidar (2022–23) has 863 tanks/ponds/lakes, 40,887 wells, 415 river and canal systems, 991 springs, 3,327 other sources, and 10 dams. For Chitradurga (2018–19), the district has 1,071 tanks/ponds/lakes, 5,319 wells, 464 river and canal systems, 285 springs, 2,427 other sources, and 10 dams. Dakshina Kannada (2022–23) records 14,335 tanks/ponds/lakes, 188,997 wells, 3,781 river and canal systems, 4,133 springs, and 6,244 other sources,

though dams data is not reported. In Davangere (2018), there are 533 tanks/ponds/lakes, 6,029 wells, 4,511 river and canal systems, 574 springs, 2,461 other sources, and 4 dams. Dharwad (2019–20) has 31,151 tanks/ponds/lakes, 3,406 wells, 727 river and canal systems, no recorded springs, 1,683 other sources, and 2 dams. Gadag (2018–19) records 16,585 tanks/ponds/lakes, 5,652 wells, 1,314 river and canal systems, 241 springs, 1,884 other sources, and 2 dams. In Haveri (2019–20), the district has 925 tanks/ponds/lakes, 3,403 wells, 1,652 river and canal systems, 33 springs, 3,634 other sources, and 4 dams. Koppal (2023–24) records 2,831 tanks/ponds/lakes, 6,905 wells, 1,031 river and canal systems, 105 springs, 1,058 other sources, and 3 dams. In Shivamogga (2023–24), there are 5,939 tanks/ponds/lakes, 8,417 wells, 2,807 river and canal systems, 5,410 springs, 3,539 other sources, and 15 dams. Tumakuru (2016–17) records 509 tanks/ponds/lakes, 10,882 wells, 381 river and canal systems, 318 springs, 6,682 other sources, and 26 dams. Udupi (2023–24) has 2,151 tanks/ponds/lakes, 186,037 wells, 1,214 river and canal systems, 480 springs, 2,961 other sources, and 1 dam. Uttar Kannada (2023–24) records 5,387 tanks/ponds/lakes, 195,886 wells, 4,251 river and canal systems, 6,133 springs, 3,115 other sources, and 14 dams. In Vijayapur (Bijapur) (2020–21), there are 572 tanks/ponds/lakes, 53,717 wells, 2,248 river and canal systems, 327 springs, 1,839 other sources, and 25 dams. Finally, Yadgir (2014–15) records 1,434 tanks/ponds/lakes, 24,106 wells, 3,414 river and canal systems, 868 springs, 2,040 other sources, and 3 dams. No storage infrastructure data was recorded in the DSR reports of districts like Chikamagalur, Gulbarga (Kalaburgi), Hassan and Raichur.

- Status of Storage Infrastructures in district of Telangana:** The storage infrastructure across several districts of Telangana shows varying levels of data availability according to the District Census Handbook, District Factbook, and District TRAC Reports. Hyderabad has limited available information, with only 1 dam/reservoir reported and no data for tanks, wells, river or canal systems, springs, or other sources. Khammam (2011) records 889 tanks/ponds/lakes, 4,467 river and canal systems, 1,327 springs, 9,819 other sources, and 3 dams/reservoirs. In Mahabubnagar (2016), there are 774 tanks/ponds/lakes, 2,595 river and canal systems, 1,908 springs, 11,889 other sources, and 1 dam/reservoir. Medak also has limited information, with only 3 dams/reservoirs reported and no other source categories available. Nalgonda (2017) records 258 tanks/ponds/lakes, 33,692 wells, 1,096 river and canal systems, 763 springs, 78,943 other sources, and 8 dams/reservoirs, while Ranga Reddy has 2,486 tanks/ponds/lakes, 6,314 wells, 394 river and canal systems, 1,851 springs, and 6 dams/reservoirs. In Warangal (2011), the district records 698 tanks/ponds/lakes, 507 river and canal systems, 1,117 springs, 40,479 other sources, and 4 dams/reservoirs. Several newly formed districts have only limited information available. Mahabubabad has data only for 3 dams, Jangaon (2016) records 11 dams/reservoirs, and Bhadrachalam (2016) records 6 dams/reservoirs without detailed data for other sources. Some districts report only tanks/ponds/lakes and dams/reservoirs. Sangareddy (2016) records 2,113 tanks/ponds/lakes and 4 dams/reservoirs, Siddipet (2016) has 3,278 tanks/ponds/lakes and 7 dams/reservoirs, Wanaparthy (2016) records 1,535 tanks/ponds/lakes and 7 dams/reservoirs, Nagarkurnool (2016) has 2,022 tanks/ponds/lakes and 7 dams/reservoirs, Jogulamba Gadwal (2016) records 784

tanks/ponds/lakes and 6 dams/reservoirs, Suryapet (2016) has 1,254 tanks/ponds/lakes and 1 dam/reservoir, and Yadadri Bhuvanagiri (2016) records 1,082 tanks/ponds/lakes and 7 dams/reservoirs. Other districts report only tanks or limited information. Vikarabad (2016) records 1,151 tanks/ponds/lakes, while Medchal-Malkajgiri records 500 tanks/ponds/lakes. No storage infrastructure data is recorded for Mulugu and Narayanpet in the available reports.

- **Status of Storage Infrastructures in district of Maharashtra:** The storage infrastructure in several districts of Maharashtra, as reported in the District Census Handbook (2011), shows considerable variation in the availability of water storage sources. Thane district records 9,424 tanks/ponds/lakes, 8,846 river and canal systems, 5,420 springs, 13,807 other sources, and 67 dams. Solapur has 5,263 tanks/ponds/lakes, 7,892 river and canal systems, 879 springs, 10,562 other sources, and 76 dams. In Sindhudurg, there are 1,206 tanks/ponds/lakes, 677 river and canal systems, 4,621 springs, 705 other sources, and 43 dams. Satara records 1,207 tanks/ponds/lakes, 1,780 river and canal systems, 8,291 springs, 3,989 other sources, and 70 dams. Sangli has 2,240 tanks/ponds/lakes, 81,242 wells, 2,577 river and canal systems, 606 springs, 6,357 other sources, and 89 dams/reservoirs. In Ratnagiri, the district records 98 wells, 1,407 river and canal systems, and 70 dams/reservoirs, while Raigad has 120 wells, 1,686 river and canal systems, and 63 dams/reservoirs. Pune district has limited available data, with only 95 dams and 120 wells were reported and no comprehensive data for other storage source categories. Osmanabad records 259 tanks/ponds/lakes, 719 wells, 202 river and canal systems, 575 springs, and 140 dams. Latur has 3,949 tanks/ponds/lakes, 647 river and canal systems, 368 springs, 3,949 other sources, and 148 dams. In Kolhapur, there are 279 tanks/ponds/lakes, 1,150 wells, 668 river and canal systems, 282 springs, and 89 other sources. Beed records 2,818 tanks/ponds/lakes, 3,311 river and canal systems, 698 springs, 7,332 other sources, and 127 dams. Finally, Ahmednagar has 5,641 tanks/ponds/lakes, 6,091 river and canal systems, 2,801 springs, 18,379 other sources, and 36 dams according to the 2011 District Census Handbook.
- **Status of Storage Infrastructures in district of Andhra Pradesh:** The storage infrastructure data for districts of Andhra Pradesh, as reported in the Census Handbook 2011, shows variations in the availability of different water storage sources. Anantapur has no recorded storage infrastructure data in the available report. Guntur records 5,833 tanks/ponds/lakes, 4,238 river and canal systems, 1,299 springs, and 35,872 other sources. Krishna has 6,592 tanks/ponds/lakes, 1,097 river and canal systems, 1,490 springs, and 17,143 other sources. In Kurnoo, the district records 3,297 tanks/ponds/lakes, 6,352 river and canal systems, 5,694 springs, and 5,342 other sources. Prakasam has 6,529 tanks/ponds/lakes, 2,055 river and canal systems, 3,379 springs, and 24,112 other sources according to the Census Handbook.

The details of Storage infrastructures (Lakes, Tanks and ponds) in districts of all four states of Krishna River Basin is shown in the Figure 21 below.

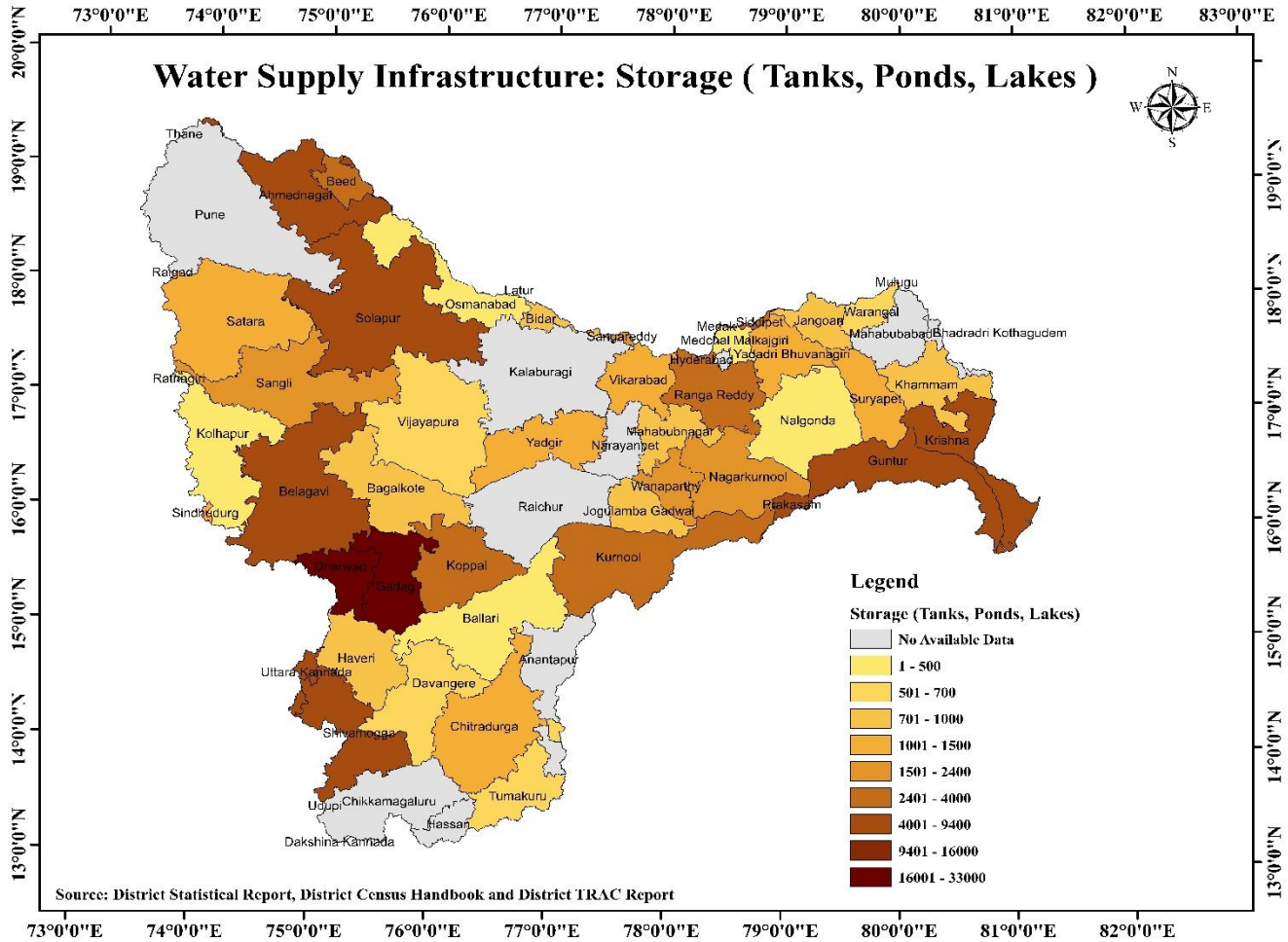


Figure 21: Map of Storage Infrastructures in Krishna River Basin

6.2 Details of Pumping:

Pumping infrastructure plays a vital role in the conveyance and distribution of water within the Krishna River Basin, particularly in regions where gravitational flow alone is insufficient to meet demand. These systems are designed to lift and transfer water from rivers, reservoirs, canals, and groundwater sources to higher elevations and distant command areas. The basin includes a wide network of pumping stations associated with lift irrigation schemes, urban water supply systems, and industrial water transfer networks. Pumping facilities are commonly integrated with intake structures, pipelines, and canal systems to ensure efficient movement of water from storage sources to treatment plants, distribution networks, and agricultural fields. In many areas, especially where topographic variations are

significant, pumping systems are essential for maintaining reliable water supply for irrigation, domestic, and industrial purposes. The capacity, spatial distribution, and operational efficiency of pumping infrastructure significantly influence the accessibility and reliability of water supply across different parts of the basin.

- **Status of Pumping Infrastructures in district of Karnataka:** The pump or lift station infrastructure across the districts of Karnataka, as recorded by IWRIS, shows varying levels of availability. Bagalkot has 10 pumps, while Belagavi records the highest with 25 pumps. Bellari has 4 pumps and Bidar has 1. Gadag records 11 pumps/, while Gulbarga (Kalaburagi) has 4. Hassan reports 8 pumps and Haveri has 4. Raichur records 3 pumps and Shivamogga has 1. Vijayapur (Bijapur) reports 7 pumps, and Yadgir records 5 pumps according to the IWRIS database. Several districts report no pump infrastructure, including Chikkamagalur, Chitradurga, Dakshina Kannada, Davangere, Dharwad, Koppal, Tumakuru, Udupi, and Uttar Kannada.
- **Status of Pumping Infrastructure in districts of Telangana:** The pump or lift station infrastructure across the districts of Telangana, as recorded by IWRIS, indicates varying levels of pumping facilities. Khammam and Mahabubnagar each have 1 pump. Nalgonda records the highest number with 23 pumps. Warangal Rural has 2 pumps and Warangal Urban has 1. Mahabubabad records 1 pump, while Jangaon has 3. Bhadradi Kothagudem has 1 pump. Siddipet records 2 pumps, Wanaparthy has 3, and Nagarkurnool records 5. Jogulamba Gadwal has 4 pumps, while Suryapet records 11. Mulugu and Narayanpet each have 3 pumps according to the IWRIS database. Districts like Hyderabad, Medak, Ranga Reddy, Sangareddy, Yadadri Bhuvanagiri, Vikarabad, and Medchal Malkajgiri report no pumps or lift stations.
- **Status of Pumping Infrastructure in districts of Maharashtra:** The lift pump or pumping station infrastructure in districts of Maharashtra, shows variation in the distribution of pumping facilities. Solapur has 14 lift pumps, while Satara records 20 and Sangli has the highest with 27. Pune district records 13 lift pumps. Osmanabad has 7 pumping stations, Ahmednagar records 5, and both Latur and Beed have 1 lift pump each according to the IWRIS database. The districts like Thane, Sindhudurg, Ratnagiri, Raigad, and Kolhapur report no lift pumps.
- **Status of Pumping Infrastructure in districts of Andhra Pradesh:** The pump or lift station infrastructure in selected districts of Andhra Pradesh, shows differences in the availability of pumping facilities. Anantapur has 21 pumps, while Kurnool records the highest with 40 pumps. Prakasam has 3 pumps. In contrast, Guntur and Krishna report no pumps or lift stations according to the IWRIS database.

6.3 Details of Supply network:

The water supply network within the Krishna River Basin constitutes an extensive system designed to convey stored and treated water from source points to end users across urban, peri-urban, and rural areas. This network typically includes transmission mains, distribution pipelines, canals, branch channels, service reservoirs, and distribution chambers that ensure the systematic movement and allocation of water. In irrigation command areas, canal networks and distributaries form the primary supply channels, delivering water from reservoirs and barrages to agricultural fields. In urban and municipal systems, treated water from Water Treatment Plants (WTPs) is conveyed through trunk mains to overhead tanks and ground-level service reservoirs before being distributed through a network of pipelines. The final stage of this system includes public standposts, household service connections, and taps, which represent the terminal points of water delivery to consumers. The efficiency and coverage of this supply network, including the accessibility of taps and service connections, directly influence the reliability, equity, and effectiveness of water distribution across different regions of the basin.

- **Status of Supply network in districts of Karnataka:** The water supply network infrastructure across the districts of Karnataka, as recorded in the District Statistical Reports (DSR), shows significant variation in the number of taps, handpumps, and borewells. Bagalkot records 229,040 taps, 26,761 handpumps, and 74,577 borewells, while Belagavi has 520,561 taps, 75,756 handpumps, and 186,596 borewells. Bellari reports 38,200 taps, 7,009 handpumps, and 736 borewells, and Bidar records 162,208 taps, 24,123 handpumps, and 53,877 borewells. Chitradurga records 234,051 taps, 23,669 handpumps, and 89,607 borewells, while Dakshina Kannada has 193,130 taps, 3,210 handpumps, and 36,190 borewells. Davangere reports 285,933 taps, 17,104 handpumps, and 93,397 borewells, and Dharwad records 282,623 taps, 9,682 handpumps, and 40,987 borewells. Further, Gadag has 159,238 taps, 11,436 handpumps, and 18,404 borewells. Haveri records 248,372 taps, 8,755 handpumps, and 62,844 borewells, while Koppal has 190,534 taps, 17,727 handpumps, and 40,774 borewells. Shivamogga records 265,650 taps, 2,766 handpumps, and 37,020 borewells. Tumakuru has one of the highest counts with 425,365 taps, 40,220 handpumps, and 152,032 borewells. Udupi records 47,072 taps, 2,961 handpumps, and 10,249 borewells, while Uttar Kannada has 89,505 taps, 9,573 handpumps, and 13,824 borewells. Vijayapur (Bijapur) records 197,575 taps, 92,880 handpumps, and 50,691 borewells, and Yadgir reports 95,111 taps, 50,495 handpumps, and 24,591 borewells according to the District Statistical Reports. No supply network data was recorded in the districts like Chickmagalur, Gulbarga (Kalaburgi), Hassan and Haveri.
- **Status of Supply network in districts of Telangana:** The water supply network infrastructure across the districts of Telangana is primarily sourced from the District Census Handbook (2011). Among the districts with available data, Khammam (2011) records 149,331 handpumps and 61,127 borewells. Nalgonda (2017) has a large supply network with 598,439 taps, 95,616 handpumps, and 66,625 borewells. Ranga Reddy reports 49,439 borewells. Warangal Rural records 103,893 handpumps and 70,325

borewells, while Mahabubabad (2011) has 107,143 handpumps and 58,931 borewells according to the District Census Handbook. many newly formed districts do not have recorded supply data. Hyderabad, Mahabubnagar, Medak, Warangal Urban, Jangaon, Bhadradi Kothagudem, Sangareddy, Siddipet, Wanaparthy, Nagarkurnool, Jogulamba Gadwal, Suryapet, Yadadri Bhuvanagiri, Vikarabad, Medchal Malkajgiri, Mulugu, and Narayanpet have no supply network data recorded in the available Census Handbook sources.

- **Status of Supply network in districts of Maharashtra:** The water supply network infrastructure in districts of Maharashtra, as reported in the District Census Handbook shows varying availability of taps, handpumps, and borewells. Thane records 857,166 taps, 125,108 handpumps, and 90,875 borewells. Solapur has 123,047 handpumps and 69,961 borewells, while Sindhudurg records 1,636 handpumps and 5,910 borewells. Satara has 45,968 handpumps and 43,779 borewells. Sangli reports 40,190 taps. Some districts have limited or no recorded data for supply networks; Ratnagiri, Raigad, and Pune have no supply network data available in the Census Handbook. Osmanabad records 644 taps, 677 handpumps, and 575 borewells, while Latur has 53,931 handpumps and 78,205 borewells. Kolhapur records 1,143 taps, 762 handpumps, and 459 borewells. Beed reports 122,676 handpumps and 65,540 borewells, and Ahmednagar records 65,407 handpumps and 76,924 borewells according to the District Census Handbook.
- **Status of Supply network in districts of Andhra Pradesh:** The water supply network infrastructure in selected districts of Andhra Pradesh, based on the **Census Handbook 2011** shows varying availability of handpumps and borewells. **Anantapur** has no supply network data recorded in the Census Handbook. Among the districts with available data, **Guntur** records 355,296 handpumps and 73,453 borewells. **Krishna** reports 161,701 handpumps and 43,371 borewells. **Kurnool** has 100,250 handpumps and 38,696 borewells, while **Prakasam** records 166,016 handpumps and 78,693 borewells according to the Census Handbook 2011.

The details of Supply network (Taps, Handpumps and Tubewells) in districts of all four states of Krishna River Basin is shown in the Figure 22 below

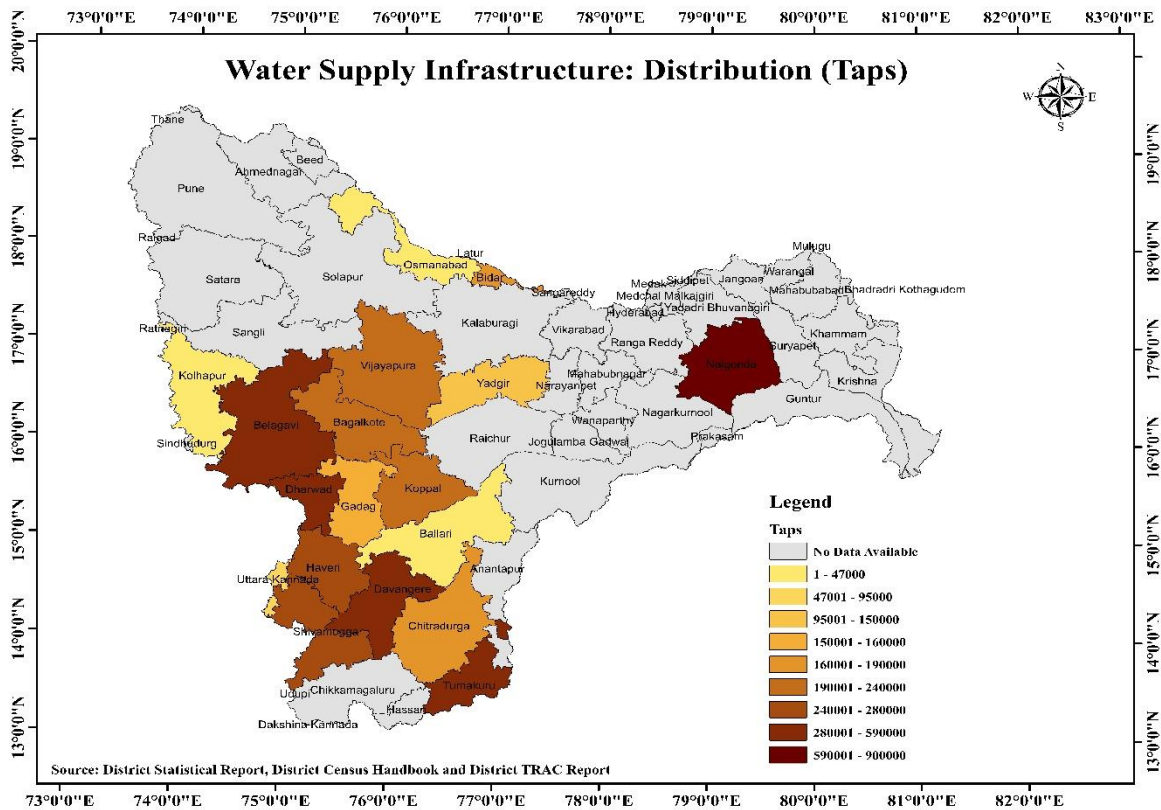


Figure 22: Map of Supply networks (Taps) in Krishna River Basin

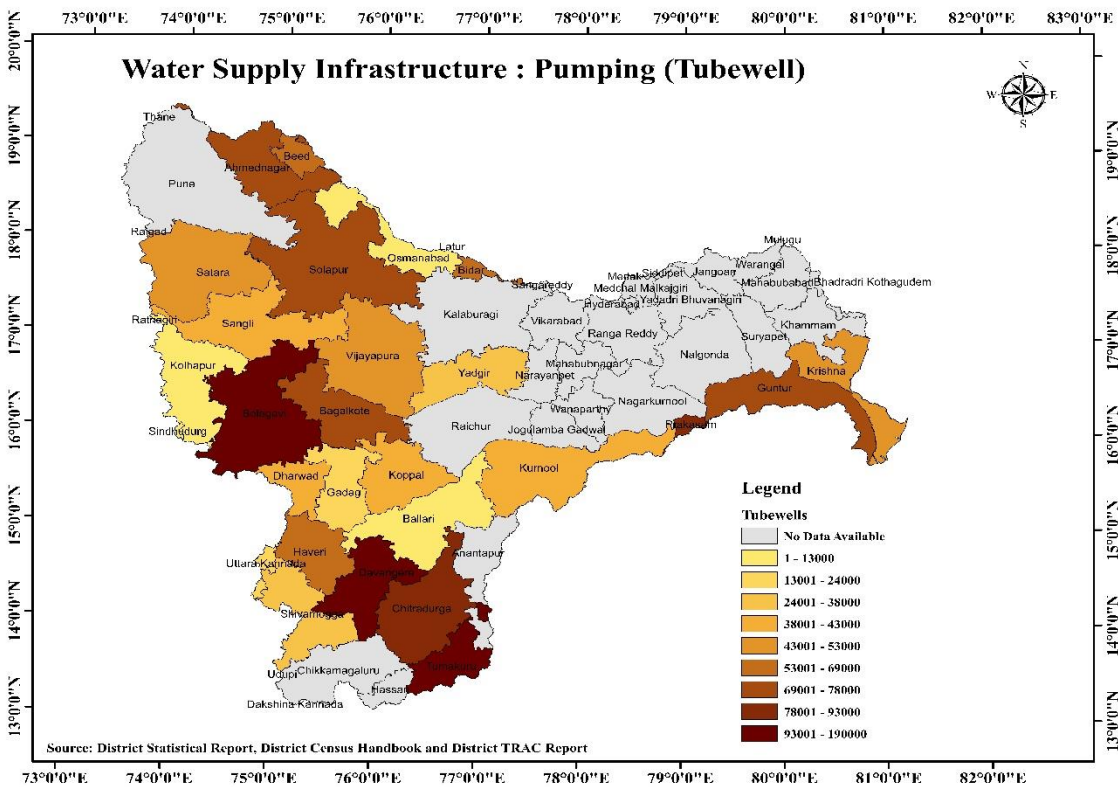


Figure 23: Map of Supply networks (tubewells) in Krishna River Basin

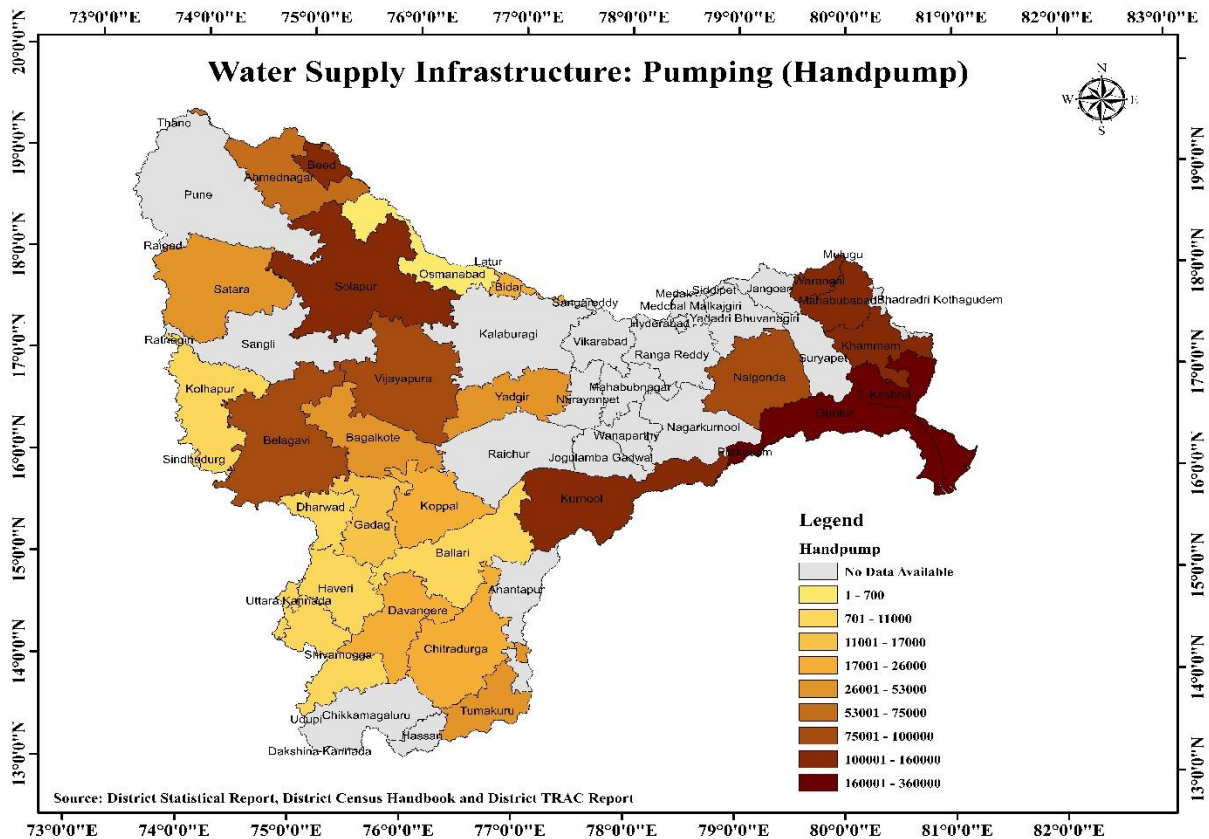


Figure 24: Map of Supply networks (Handpumps) in Krishna River Basin

6.4 Details of Water Treatment Plants

Water Treatment Plants (WTPs) play a crucial role in ensuring safe and reliable water supply for domestic and urban needs across the Krishna River Basin. Based on the compiled data, a total of 120 WTPs are distributed across the basin states, reflecting the varying levels of infrastructure development. Karnataka accounts for the highest number with 53 WTPs, followed by Maharashtra with 50 WTPs, while Telangana and Andhra Pradesh have 10 and 7 WTPs, respectively. This distribution indicates a relatively stronger treatment infrastructure in Karnataka and Maharashtra, whereas Telangana and Andhra Pradesh have comparatively fewer facilities. The presence of these plants is essential for treating surface sources to meet drinking water standards; however, disparities in their distribution highlight the need for strengthening water treatment capacity in underserved regions to ensure equitable access to safe water supply across the basin. The water treatment plants in Krishna River Basin is shown in the Figure 25 below

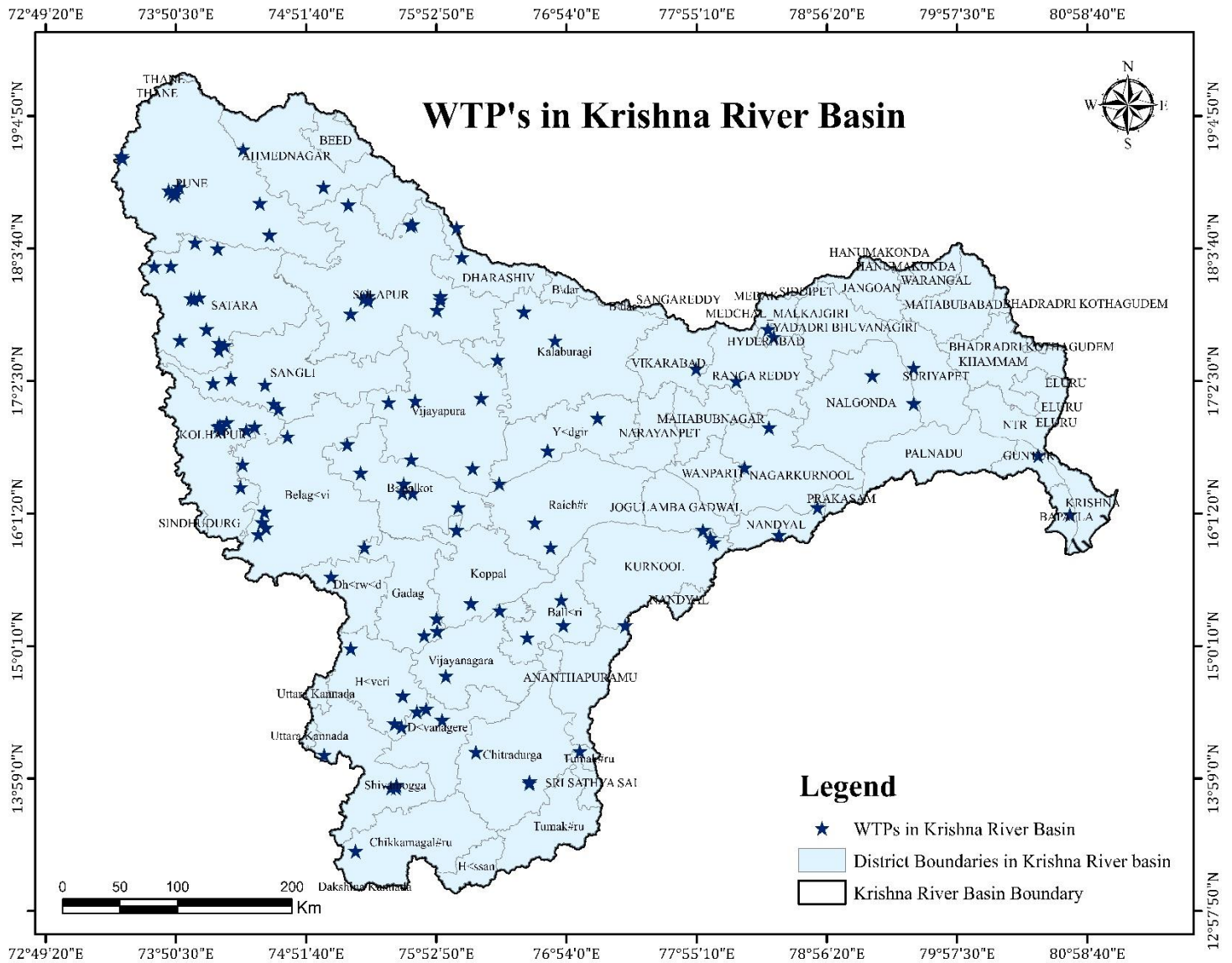


Figure 25: Water Treatment Plants in Krishna River Basin

7. Demand – Supply Gap Analysis

Demand–Supply Gap Analysis is a critical component in assessing the sustainability of water resources within the Krishna River Basin. With increasing pressures from irrigation expansion, urbanization, industrial growth, and ecological flow requirements, the basin faces growing imbalances between available water resources and sectoral demands. Variability in monsoon rainfall, upstream storage regulation, and inter-state allocations further influence annual water availability. A systematic evaluation of demand versus dependable supply helps identify deficit regions, seasonal stress periods, and long-term sustainability concerns. Such analysis provides the foundation for informed policy decisions, efficient water allocation, and adaptive basin management strategies.

The data used for this assessment have been compiled from the District Irrigation Plans (DIPs) of all districts across the basin states, ensuring a comprehensive and ground-level representation of water demand and availability. In this study, the demand–supply gap is calculated using the expression: **Demand–Supply Gap = Total Water Demand – Total Water Availability**. This analysis helps identify deficit districts, seasonal stress conditions, and priority areas requiring resource optimization and policy intervention.

Karnataka: The Demand–Supply Gap Analysis for the Karnataka portion of the Krishna River Basin covers 22 districts spread across the northern, central, and southern regions of the state. Of these, 20 districts have quantifiable data, while Belagavi could not be fully assessed due to non-availability of demand data (water availability estimated at 3.13 BCM), and Vijayanagara district has been excluded from the quantitative assessment due to non-availability of its District Irrigation Plan (DIP) at the time of this study. Among the 20 assessed districts, the combined total water demand stands at approximately 91.12 Billion Cubic Meters (BCM), while total water availability amounts to approximately 65.76 BCM, yielding a net deficit of around 25.77 BCM. The analysis reveals a pronounced regional contrast: most northern and north-eastern districts face severe to critical water stress, while a few coastal and high-rainfall districts in the Western Ghats region — namely Udupi (surplus: 15.955 BCM), Yadgir (surplus: 1.86 BCM), and Hassan (surplus: 0.23 BCM) — record water surpluses. Raichur records the highest deficit at 6.55 BCM, followed by Kalaburagi (6.37 BCM), Davangere (4.108 BCM), Chikkamagaluru (3.41 BCM), and Shivamogga (3.08 BCM). This spatial disparity underscores the structural imbalance in water resource distribution across Karnataka's Krishna Basin, driven primarily by high irrigation demand for water-intensive crops, semi-arid climatic conditions in northern districts, and over-extraction of groundwater in several taluks. The Demand – Supply gap in districts of Karnataka state has been showed in table 21 below.

Table 21: Demand – Supply Gap in districts of Karnataka

Sl.no	District	Total Water Demand (BCM)	Total Water Availability (BCM)	Demand-Supply Gap (BCM)
1	Bagalkote	4.83	2.71	2.12
2	Ballari	2.43	1.39	1.04
3	Bidar	2.95	0.6	2.35
4	Chikkamagaluru	6.32	2.91	3.41
5	Chitradurga	1.22	0.609	0.611
6	Dakshina Kannada	0.487	0.432	0.055
7	Davangere	5.55	1.442	4.108
8	Dharwad	1.316	0.341	0.975
9	Gadag	2.92	0.466	2.454
10	Hassan	1.5	1.73	-0.23
11	Haveri	3.03	0.87	2.16
12	Kalaburagi	8.92	2.55	6.37
13	Koppal	4.02	0.99	3.03
14	Raichur	10.9	4.35	6.55
15	Shivamogga	9.07	5.99	3.08
16	Tumakuru	2.61	2.13	0.48
17	Udupi	0.745	16.7	-15.955
18	Uttara Kannada	14.5	12.97	1.53
19	Vijayapura	3.57	3.12	0.45
20	Yadgir	1.6	3.46	-1.86
21	Belgavi	3.13	-	-

Telangana: The Demand-Supply Gap Analysis for the Krishna River Basin districts of Telangana provide a comprehensive assessment of water resources across 18 districts. The combined total water demand across these districts stands at approximately 31,148 MCM, while total available water supply amounts to only 17,235 MCM, resulting in an overall net basin deficit of nearly 13,913 MCM. This means that approximately 45% of aggregate water demand across the Krishna Basin remains unmet — the highest unmet percentage among all the basin states covered in this analysis. Of the 18 districts analysed, 16 face water deficits of varying severity, while only 2 districts — Khammam (surplus: 373.79 MCM) and Sangareddy (surplus: 168.93 MCM) — record a water surplus, highlighting a pronounced spatial imbalance in water availability across the basin. The district with the highest deficit is Suryapet (2,143.51 MCM), followed by Nagarkurnool (1,696.30 MCM), Bhuvanagiri (1,582.20 MCM), Mahabubnagar (1,563.29 MCM), and Nalgonda (1,551.04 MCM). Additionally, data for Hyderabad (Metropolitan City) under Rangareddy, Hanumakonda under Warangal (Urban), and Narayanpet under Mahabubnagar could not be assessed due

to non-availability of DIP data at the time of this analysis. The overall pattern indicates that irrigation demand — particularly for paddy, cotton, and sugarcane — remains the dominant contributor to total water requirements, with the large deficits in southern and central districts emphasising the urgent need for integrated water resource planning. The Demand – Supply gap in districts of Telangana state has been showed in table 22 below.

Table 22: Demand – Supply Gap in districts of Telangana.

Sl.no	District	Total Water Demand (MCM)	Total Water Availability (MCM)	Demand–Supply Gap (MCM)
1	Vikarabad	880.56	569.81	310.75
2	bhuvanagiri	2022.03	439.83	1582.2
3	jogulamba Gadhwal	1978.76	599.33	1379.43
4	Khammam	2308.94	2682.73	-373.79
5	Nalagonda	3703.13	2152.09	1551.04
6	Rangareddy	848.04	702.9	145.14
7	siddipet	1027.51	244.9	782.61
8	suryapet	3454.01	1310.5	2143.51
9	warangal (Urban)	626.58	415.26	211.32
10	mahabubnagar	2317.47	754.18	1563.29
11	wanaparthy	1990.08	658.74	1331.34
12	sangareddy	1098.43	1267.36	-168.93
13	Nagarkurnool	2452.28	755.98	1696.3
14	medchal malkajgiri	518.91	179.94	338.97
15	mahabubabad	1344.34	1230.57	113.77
16	jangoan	1491.69	713.64	778.05
17	bhadradi	1397.57	891.41	506.16

Maharashtra: The Demand–Supply Gap Analysis for the Maharashtra portion of the Krishna River Basin covers nine districts: Sindhudurg, Kolhapur, Satara, Pune, Osmanabad, Beed, Solapur, Sangli, and Ahmednagar. The combined total water demand across these districts stands at approximately 375.95 Billion Cubic Meters (BCM), while total water availability amounts to only about 67.91 BCM, resulting in a staggering net deficit of approximately 308.04 BCM. This means that more than 80% of the aggregate water demand across the assessed Krishna Basin districts remains unmet — the most severe demand–supply

imbalance among all Krishna Basin states covered in this analysis. Notably, all nine assessed districts are operating under deficit conditions; not a single district records a water surplus. The extreme magnitude of the overall deficit is driven disproportionately by two districts — Solapur (deficit: 146.85 BCM) and Beed (deficit: 123.77 BCM) — which together account for nearly 88% of the total basin shortfall, reflecting deep structural water stress in Maharashtra's eastern and south-eastern Krishna Basin region. The remaining districts — Ahmednagar (23.66 BCM), Satara (4.57 BCM), Pune (3.72 BCM), Kolhapur (2.60 BCM), Sangli (1.52 BCM), Osmanabad (1.16 BCM), and Sindhudurg (0.18 BCM) — all record deficits of varying severity, driven by high irrigation demand for sugarcane and other water-intensive crops, rapid urbanization, and groundwater over-extraction across the Marathwada and western basin regions. The Demand – Supply gap in districts of Maharashtra state has been showed in table 23 below.

Table 23: Demand – Supply Gap in districts of Maharashtra

Slno	District	Total Water Demand (BCM)	Total Water Availability (BCM)	Demand–Supply Gap (BCM)
1	sindudurg	1.41	1.23	0.18
2	kholapur	5.32	2.72	2.60
3	satara	5.44	0.87	4.57
4	pune	7.68	3.96	3.72
5	osmanabad	1.95	0.79	1.16
6	beed	125.22	1.44	123.77
7	solapur	198.50	51.65	146.85
8	sangli	3.70	2.18	1.52
9	ahmadnagar	26.73	3.07	23.66

Andhra Pradesh: The Demand–Supply Gap Analysis for the Krishna River Basin districts of Andhra Pradesh cover 10 districts in total Krishna River basin. Of these, 5 districts — Guntur, Prakasam, Krishna, Anantapur, and Kurnool — have been fully assessed based on available District Irrigation Plan (DIP) data. The remaining 5 districts — Bapatla, Palnadu, Nandyal, Sri Sathya Sai, and NTR — could not be assessed due to non-availability of their respective DIPs at the time of this study and are therefore excluded from the quantitative analysis. Among the 5 assessed districts, the combined total water demand stands at approximately 23,014.71 Million Cubic Meters (MCM), while the total available water supply amounts to only 16,581.28 MCM, resulting in an overall net deficit of 6,432.13 MCM. This means nearly 28% of the aggregate water demand across the assessed Krishna Basin districts remains

unmet, underscoring the growing pressure on water infrastructure driven by expanding agricultural activity, population growth, industrial usage, and increasing domestic water requirements. Anantapur records the most critical water stress with a deficit of 3,404.10 MCM, while Krishna district stands as the only surplus zone with 222.69 MCM. The inclusion of the five districts currently lacking DIP data in future assessments may materially alter the overall basin deficit picture. The Demand – Supply gap in districts of Andhra Pradesh state has been showed in table 24 below.

Table 24: Demand – Supply Gap in districts of Andhra Pradesh

Sl.no	District	Total Water Demand (MCM)	Total Water Availability (MCM)	Demand–Supply Gap (MCM)
1	Guntur	5705.14	4508.3	1196.84
2	Prakasam	3830.4	2965.6	864.8
3	Krishna	3945.91	4168.6	-222.69
4	Ananthapur	5386.1	1982	3404.1
5	kurnool	4147.16	2956.78	1190.38

8. Issues and Challenges

The assessment of water demand and supply in the Krishna River Basin reveals a range of critical issues and challenges that affect the efficient and sustainable management of water resources across the basin states. These challenges arise from a combination of hydrological variability, increasing sectoral demands, infrastructural limitations, and institutional complexities. Variations in water availability across regions, coupled with growing pressures from agriculture, urbanization, and industry, have led to imbalances in resource distribution. Additionally, factors such as data limitations, inefficient water use practices, and climate variability further intensify water stress conditions. Understanding these issues at the state and district level is essential for identifying region-specific concerns and formulating targeted management strategies.

Karnataka: The Karnataka portion of the Krishna River Basin faces several significant issues and challenges affecting water resource management and sustainability. A major concern is the substantial demand–supply gap observed across multiple districts, leading to severe water stress in regions such as Raichur, Kalaburagi, Davangere, and Koppal. The dominance of agriculture, accounting for nearly 75–80% of total water demand, coupled with the prevalence of water-intensive crops like sugarcane and paddy in semi-arid areas, has

intensified pressure on available resources and contributed to groundwater depletion. Over-extraction of groundwater has resulted in declining water tables in districts like Kalaburagi, Bidar, Ballari, and Gadag.

In addition, inefficiencies in canal systems and transmission losses reduce the effective utilization of surface water in command areas, while the degradation of traditional tank systems limits local storage and recharge potential. Spatial disparities in water availability are also evident, with some districts experiencing surplus conditions while others face acute deficits. Climatic variability, particularly erratic monsoon patterns, further exacerbates reservoir instability and seasonal shortages. Rapid urbanization in cities such as Hubballi–Dharwad and Kalaburagi, along with increasing industrial and mining demands in regions like Ballari, adds to the competition for limited water resources. Moreover, limited reservoir storage capacity in certain districts restricts the ability to capture and utilize peak monsoon flows, highlighting the need for improved infrastructure and integrated water management strategies.

Telangana: The Telangana portion of the Krishna River Basin faces significant water stress due to rising demand, uneven availability, and climatic variability. District-level assessments indicate moderate to high demand–supply deficits in regions such as Nalgonda, Mahabubnagar, Nagarkurnool, and Suryapet, while districts like Khammam and Bhadradi Kothagudem show relatively better availability. Agriculture dominates water use (around 70–80%), with water-intensive crops like paddy increasing seasonal demand, further aggravated by inefficient canal systems and distribution losses. Groundwater over-extraction, declining recharge, and quality issues such as fluoride contamination intensify water scarcity. Additionally, erratic monsoon patterns and rising temperatures affect reservoir storage and overall water availability, while rapid urbanization in areas like Ranga Reddy and Medchal–Malkajgiri increases domestic and industrial demand, leading to growing competition among sectors.

Maharashtra: The Maharashtra portion of the Krishna River Basin faces significant water-related challenges due to persistent demand–supply imbalances across key districts such as Solapur, Beed, Ahmednagar, Pune, and Satara. The region is characterized by semi-arid conditions and highly variable monsoon rainfall, leading to frequent droughts that reduce reservoir storage and groundwater recharge. Overdependence on borewells and tube wells, particularly in Beed, Ahmednagar, and Osmanabad, has caused continuous groundwater depletion and long-term aquifer stress. Additionally, uneven spatial distribution of rainfall—with higher precipitation in western districts like Satara and Kolhapur and lower rainfall in districts such as Solapur and Beed—creates regional disparities and challenges in ensuring equitable water allocation and sustainable resource management.

Andhra Pradesh: The Andhra Pradesh portion of the Krishna River Basin experiences diverse water-related challenges across its districts due to varying hydro-climatic and socio-economic conditions. Guntur district faces a significant demand–supply deficit driven by intensive irrigation under the Krishna delta system, cultivation of water-intensive crops, and canal transmission losses, further aggravated during weak monsoon years and increasing urban demand. Prakasam, being drought-prone, relies heavily on groundwater and minor irrigation tanks, many of which have reduced capacity due to siltation. Krishna district, although relatively better in water availability, faces issues such as salinity intrusion in coastal areas, flood–drought cycles, and dependence on upstream releases. Anantapur experiences severe structural deficits due to its semi-arid climate, low rainfall, high evapotranspiration, and over-extraction of groundwater, with limited surface irrigation support. Kurnool district also faces considerable stress due to irrigation expansion, rainfall variability, and dependence on both canal and groundwater resources, highlighting the need for integrated and region-specific water management strategies.

9. Conclusions

9.1. Data Gaps and Uncertainties

The assessment of water demand and supply in the Krishna River Basin is subject to several data gaps and uncertainties that influence the accuracy and completeness of the analysis. In some districts, key documents such as District Irrigation Plans (DIPs), District Environment Plans (DEPs), and district statistical reports were not readily available or were incomplete, limiting the availability of consistent information across the basin. In certain cases, specific datasets related to water availability, sector-wise demand, and infrastructure details were not reported in any official documents, resulting in unavoidable information gaps.

Additional uncertainties arise due to variations in the year of publication, data collection methods, and estimation approaches adopted in different district-level reports across the basin states. Some districts also lack updated information on groundwater resources, irrigation coverage, and water supply infrastructure, which can affect the precision of demand–supply estimates. Furthermore, hydrological variability caused by fluctuating monsoon rainfall, seasonal river flows, and groundwater recharge introduces inherent uncertainty in water availability assessments. These limitations highlight the need for standardized data collection frameworks, regular updating of district-level reports, and improved data sharing mechanisms to strengthen basin-scale water resource planning.

9.2 Role of Stakeholders

The sustainable management of water resources in the Krishna River Basin requires coordinated efforts from stakeholders across all four basin states, namely Karnataka, Maharashtra, Telangana, and Andhra Pradesh. State-level departments such as the Water Resources Departments, Irrigation Departments, Groundwater Authorities, and Urban and

Rural Water Supply agencies are responsible for planning, development, regulation, and management of water resources within their respective jurisdictions. These agencies oversee reservoir operations, canal irrigation systems, groundwater regulation, and water supply infrastructure to ensure adequate distribution of water for domestic, agricultural, and industrial uses. Coordination among these states is particularly important due to the inter-state nature of the Krishna River Basin, where water allocation and sharing require cooperative planning and adherence to established agreements and institutional frameworks.

At the local level, Urban Local Bodies and Panchayati Raj Institutions play a key role in the implementation and management of water supply systems, sanitation services, and local water conservation initiatives. Major water users such as farmers, industries, and households also constitute important stakeholders, as their water use practices significantly influence overall water demand and resource sustainability. Adoption of efficient irrigation methods, water-saving technologies, and pollution control measures by these users is essential to reduce pressure on available water resources. In addition, research institutions, academic organizations, and non-governmental organizations contribute through data generation, scientific analysis, capacity building, and awareness programs that support evidence-based planning and policy-making. Therefore, collaborative engagement of stakeholders across all four states is crucial to ensure equitable distribution, sustainable utilization, and long-term management of water resources in the Krishna River Basin.

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