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RESEARCH ARTICLE

Spatial Variations of Water Requirement in Haveri District

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Abstract

Water is one of the most crucial and essential natural resources for sustaining life. In the coming decades it is likely become critically scarce due to rapid increase in population, increase in its demands for agriculture, industries, commercial development and expanding economy of the country. The use of various measures to reduce the demand or water use likely to conserve the existing limited water supply through the practices which require less water and reduces the wastage and misuse of water. Irrigation is perhaps the most important input in the agriculture production process and plays a key role. The other key inputs namely, seed and fertilizer cease to realize their full benefit unless combined with irrigation. Also, in an economy where the supply of land is highly inelastic and the net sown area growth has leveled off, the future growth of agriculture is heavily dependent on intensive cultivation of the existing land. Irrigation greatly facilitates this by enabling farmers to grow multiple crops on the same plot of land across different agricultural seasons. As four rivers Varada, Dharma, Kumudwati and Tungabhadra flow in the district, comprehensive projects can be taken up to tap the irrigation potential. One major irrigation project i.e. Upper Tunga Project (UTP) is coming up in the district which will help to bring an additional of 73239 ha area under irrigation distributed in Ranebennur (30,530ha), Haveri (27908ha), Hangal (2158 ha) and Hirekerur (9468 ha) and Byadagi (3175 ha.), So far 22724 ha area in Ranebennur taluka and 9468 ha in Hirekerur taluka has been brought under irrigation. Under Dharma project an area of 5426 ha has been brought under canal irrigation in Hangal taluka. Malaprabha right canal bank project is being implemented in Savanur and Shiggaon talukas which will cover an additional area19600 ha under irrigation.

Keywords: Domestic Water Demand; Crop Water Demand; Kharif; Upper Tunga Project (UTP); Gross Water Demand; BCM - Billion Cubic Meters

1 Introduction

Although water is a copious and renewable natural resource covering two thirds of the planet, a very minute proportion of this is effectively available for human use. Two third of it is locked up in glaciers and permanent snow cover, remaining one third is distributed regionally with wide disparities. Water has multifunctional roles. Water is considered as the most significant resource for life as it is linked to the well-being of human societies that need it for industrial activities, agriculture, drinking, hygiene, and recreation. Water is always an important

element in Hindu mythology, and it has been enjoying the most respectable and unique status in India. Religious structures are always placed near water bodies. The rivers in India are considered Goddesses and most of Hindu rituals move around water for the religious ceremonies be it birth, marriage, death. Historically, towns and cities have flourished on the banks of water bodies, and these have played an important role in their growth and development. India's water bodies are extraordinarily diverse – ranging from lakes and ponds to marshes, mangroves, backwaters, and lagoons. Water is used for energy extraction, conversion, power generation and transport. At the global level and on an annual basis, enough freshwater is available to meet such demand, but spatial and temporal variations of water demand and availability are large, leading to water scarcity in several parts of the world during specific times of the year.

2 Study Area

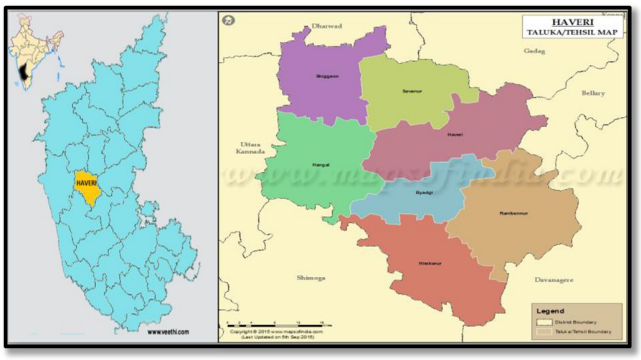

Fig. 1. Location of Haveri District

Haveri district is situated in the western part of the central Karnataka state. The district encompasses an area 485156 hectares laying between the latitudinal parallels of 14° 19" North and 15° 09" North and the longitudes of 75° 01" East to 75° 50" East. In its shape the district may be regarded as roughly resembling an inverted square shape as per Peter Hagget's method shape index. Its greatest length from north to south is about 111 kms and its great growth from east to west is about 87 km. The district is bounded on the North by the districts of Dharwad and Gadag; on the south by the district of Davanagere and Shimoga and the west by the district of North Kanara. All these districts which surround Haveri belong to Karnataka state itself. Varada river act as the central part of the district and it flows west to east direction about 128 kms on the north-east and south, the Tungabhadra River flows in between Haveri-Gadag, Shimoga, Davanagere and Bellary districts.

3 Methodology

The study was used descriptive and analytical research methods to analyze the taken objective. To understand the role of water requirements towards beneficiary's lives style, it has used secondary data source too used by water departments on the same issue. The government statistical reports, websites, journals, and books have referred for the better perception about the scheme performance towards beneficiaries' socio-economic conditions.

3.1 Objectives

- To know concept of water demand.
- To know the assessment of water requirements in the district.
- To know the distribution of water requirement.
- To Know the water conservation practices.

3.2 Domestic Water Demand

Table 1. Domestic Water Demand

Blocks	Population in 2015	Projected Population in 2020	Gross Water Demand (BCM)
Shiggaon	196331	206857	0.00752
Savanur	168648	177690	0.00646
Hangal	270580	285087	0.01037
Haveri	292617	308305	0.01121
Byadagi	147050	154934	0.00564
Hirekerur	239886	252747	0.00919
Ranebennur	351385	370224	0.01347
TOTAL	**1666497**	**1755845**	**0.06387**

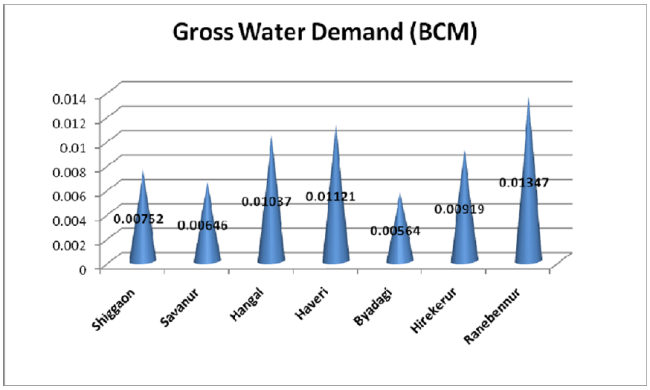

Fig. 2. Gross water demand

Groundwater is the major source of drinking water in the rural areas of the district. Total population of the

district during the year 2015 is 15,98,058 and projected population by 2020 is 1755845 and gross water demand of the district is 0.06387 BCM. Water is supplied to cities i.e. Ranebennur, Byadgi and Haveri by Tungabhadra and Varada rivers (Table 1, Figure 2).

3.3 Crop Water Demand

Haveri district covers seven taluks. On the basis of crops grown in the district, the crop water demand has been calculated. To bring entire area under irrigation, the water demand for agriculture crops is 2.51 BCM whereas for horticulture crops water demand is 0.427 BCM.

Considering total kharif area that varies from 3,60,000 ha to 3,80,000 ha, the total water required for the crops is 2.938 BCM. At present existing water availability considering both surface and ground water is 0.8511 BCM. In order to bring all cropped area under irrigation, 2.088 BCM water potential is to be created (Table 2).

3.4 Livestock water demand

Total number of livestock present in the district is 16,12,422. At present water demand is 0.01946 BCM and by 2020 this demand increases to 0.021406 BCM (Table 3).

3.5 Industrial Water Demand

Haveri is of growing importance with potential growth. The district comprises of world-famous chilly market at Byadagi and is a major export hub for Byadagi chilly. A 120 acre Spice Park is proposed to further spice up the affairs in the district. There is a need to boost industrial development in Haveri district. Karnataka Chamber of Commerce and Industry explained, "Lack of basic infrastructure such as potable water and electricity supply has discouraged investments in the region." 1 Mega and 9 Large and medium industries with aggregated investment INR 9.45 billion and 11428small-scale industries with aggregated investment INR 3.2873 billion from the industrial landscape that is well supported by 6 Industrial Estates in the district.

The spice advantage of the region is well harnessed as the State Government strategically proposed a 120-acre Spice Park to further enhance the scope of spice cultivation in the district. An agro-food sector project with an investment of INR 1 billion is also approved; this apart from an Agri-Investment region which will comprise of Agriculture SEZ, Agri-Engineering, Agri-Research units, Primary Processing Centers etc. are to add an impetus for potent growth opportunity in the sector. The presence of large players like Grasim Industries Ltd, Kumarpattanam, Ranebennur and Harihar Poly fibers are well complimented by other services Farmers' Co-operative Spinning Mill Ltd involved in cotton yarn adds momentum to the textiles sector in the region. At present water demand is 0.00595 BCM and by 2020 this demand increases to 0.0119 BCM. Water potential to be created is 0.0143 BCM (Table 4).

3.6 Total water demand of the district for various sectors

Overall, the district water demand for various purposes is 3.01 BCM. Demand for the domestic purpose is 0.0512 BCM, total water demand for crop purpose is 2.9386 BCM, total water demand for livestock purpose is 0.0195 and total water demand for industrial purpose is 0.0059 BCM (Table 5, Figure 3).

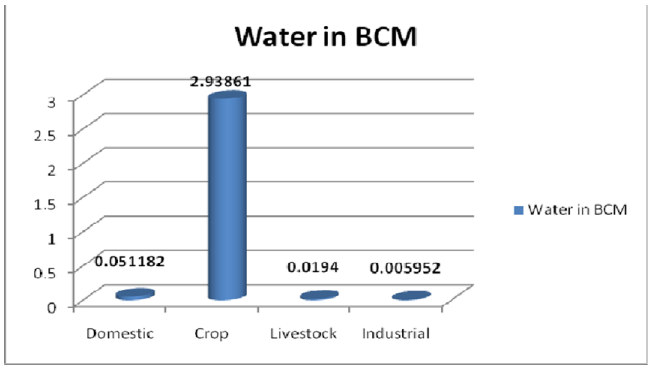

Fig. 3. Total Water Demand of the District for Various Sectors

3.7 Water budget

A water budget reflects the relationship between input and output of water through a region. Thus, we have a direct comparison of supply of water and the natural demand for water. The following data provides current water gap and projected water gap for the year 2020. Total existing water availability of the district for surface water is 0.337 BCM and for ground water is 0.532. Total existing water availability of the district is 0.869 BCM.

Water requirement of the whole district has been calculated considering the sources of water. Water demand of the district is 3.015 BCM and this water demand increases to 3.039 by 2020. At present, water gap of the district is 2.146 BCM and projected water gap of the year 2020 is 2.170BCM. In the district 265 tanks of area more than 40 ha exist and the actual holding capacity of these tanks is 0.0825 BCM. But due to silting of tanks water holding capacity has been reduced to 80% of the actual capacity. To collect runoff water during rainy season efficiently, there is a need to increase the holding capacity of the tanks. With the implementation of District Irrigation Plan, additional 0.4481 BCM capacity will be created, and 90788 ha additional area will be brought under irrigation (Table 6).

Table 2. Crop Water Requirement

Block	Crops	Area sown (ha)	Irrigated area (ha)	Crop water demand (mm)	Water potential require d (BCM)	Existing Water potential (BCM)	Water potential to be created (BCM)
Shiggaon	Maize, Paddy, Cotton, Rabi Jowar, Groundnut	46205	1642	450-1000	0.416	0.040	0.377
Savanur	Cotton, Maize, Rabi Jowar, Groundnut	51444	3548	400-750	0.373	0.044	0.329
Hangal	Paddy,Maize,Cotton, Soyabean, Pulses	56371	24427	450-1100	0.526	0.262	0.264
Haveri	Maize,Cotton,Rabi Jowar,Ground nut,Soyabean	66952	13051	400-750	0.429	0.102	0.327
Byadagi	Maize,Cotton,Rabi Jowar,Paddy	35329	4230	400-1000	0.220	0.092	0.128
Hirekerur	Maize, Cotton, Pulses, Rabi, Jowar.	66137	7621	400-750	0.447	0.141	0.307
Ranebennur	Maize, Cotton, Rabi jowar, Paddy, Pulses, Ground nut	61642	16360	400-1000	0.526	0.170	0.355
TOTAL		**384080**	**70879**	**400-750**	**2.939**	**0.851**	**2.088**

Table 3. Livestock Water Demand

Block	Total number of livestock	Present water demand (BCM)	Water demand in 2020 (BCM)	Existing Water potential (BCM)	Water potential to be created (BCM)
Shiggaon	114439	0.0023	0.0025	0.0016	0.0009
Savanur	165491	0.0020	0.0022	0.0002	0.0020
Hangal	208624	0.0033	0.0036	0.0003	0.0033
Haveri	199214	0.0027	0.0030	0.0002	0.0027
Byadagi	116483	0.0018	0.0020	0.0001	0.0018
Hirekerur	215473	0.0040	0.0044	0.0004	0.0040
Ranebennur	637119	0.0031	0.0034	0.0003	0.0031
TOTAL	**1656843**	**0.0194**	**0.0214**	**0.0033**	**0.0180**

Table 4. Industrial Water Demand

Block	Name of the industry	Water demand (BCM)	Water demand in 2020 (BCM)	Existing Water potential (BCM)	Water potential to Be created (BCM)
Shiggaon	MSME	0.00091	0.0018	0.0011	0.0022
Savanur	MSME	0.00018	0.0004	0.0002	0.0004
Hangal	MSME	0.00018	0.0004	0.0000	0.0004
Haveri	MSME	0.00110	0.0022	0.0011	0.0026
Byadagi	MSME	0.00018	0.0004	0.0002	0.0004
Hirekerur	MSME	0.00011	0.0002	0.0001	0.0003
Ranebennur	MSME	0.00329	0.0066	0.0039	0.0079
	TOTAL	**0.00595**	**0.0119**	**0.0068**	**0.0143**

Table 5. Total Water Demand of the District for Various Sectors

S. No.	Block	Components					Total, BCM
		Domestic	Crop	Livestock	Industrial	Power generation	
1	Shiggaon	0.0063	0.4164	0.0023	0.0009	0	0.4259
2	Savanur	0.0053	0.3731	0.0020	0.0002	0	0.3806
3	Hangal	0.0075	0.5262	0.0033	0.0002	0	0.5372
4	Haveri	0.0091	0.4292	0.0027	0.0011	0	0.4422
5	Byadagi	0.0045	0.2204	0.0019	0.0002	0	0.2269
6	Hirekerur	0.0065	0.4474	0.0040	0.0001	0	0.4580
7	Ranebennur	0.0121	0.5258	0.0032	0.0033	0	0.5443
	TOTAL	**0.0512**	**2.9386**	**0.0195**	**0.0059**	**0**	**3.0152**

Table 6. Water Budget

Name of Blocks	Existing water availability (BCM)		Total (BCM)	Water Demand (BCM)		Water Gap (in BCM)	
	Surface water	Ground water		Present	Projected (2020)	Present	Projected (2020)
Shiggaon	0.00	0.04	0.04	0.43	0.43	-0.382	-0.38
Savanur	0.01	0.03	0.04	0.38	0.38	-0.342	-0.34
Hangal	0.10	0.19	0.29	0.54	0.54	-0.249	-0.25
Haveri	0.01	0.08	0.09	0.44	0.45	-0.348	-0.35
Byadagi	0.03	0.06	0.09	0.23	0.23	-0.138	-0.14
Hirekerur	0.06	0.08	0.14	0.46	0.46	-0.317	-0.32
Ranebennur	0.12	0.05	0.17	0.54	0.55	-0.370	-0.38
TOTAL	**0.340**	**0.530**	**0.870**	**3.015**	**3.039**	**-2.146**	**-2.170**

4 Conclusion

Water is one of the most crucial and essential natural resources for sustaining life. In the coming decades it is likely become critically scarce due to rapid increase in population, increase in its demands for agriculture, industries, commercial development and expanding economy of the country. These measures are concentrating towards making the existing insufficient supply source (whatever it may be) serve water users as effectively as possible and a balance between supply and demand to be achieved. As per the research the various techniques used for the same are based either on giving economic incentives or penalties or involve rationing, legal sanctions, and various other types of social or political pressures. The water supply infrastructures of the public water supply departments are important and can further be strengthened with modern technology.

Demand management is defined as the development and implementation of strategies aimed at influencing demand, so as to achieve efficient and sustainable use of a scarce resource. Besides efficiency, it should promote equity and environmental integrity. Because water resources issues are not isolated in one sector, but are shared by agriculture, sanitation, industry, urban development, etc., and create repercussions in the economic, social, and environmental spheres, integrated management is key .

5 Suggestions

Sprinkler / Drip Irrigation: To promote efficient water conveyance and precision water application devices like drips and sprinklers will be supplied to the farming community. Haveri District is having suitable climatic and soil condition to grow various horticulture corps and nearly 19% of cultivable area (61460 ha.) covered under horticulture crops like mango, Sapota, Banana, Guava etc., vegetable crops like Chilli, Tomato, Brinjal, Onion, Garlic, Cabbage, Cauliflower etc. Plantation crops like Coconut, Betelvine, Arecanut etc., and Flowers crops like Jasmine, Tuberose, Chrysanthemum etc., Ranebennur, Byadgi and Hirekerur talukas are known for vegetable seed production. Drip irrigation scheme is being implemented since 2006-07 from the Department of Horticulture. Up to 2015-16 an area of21609.31 ha. area has been brought under drip irrigation. In a span of5 years additional area of 10188ha. will be covered by drip irrigation system and to achieve this, action plan of Rs. 6500.16 lakhs has been submitted.

Water harvesting structures: Over the past three decades, growing populations and increase in irrigation has led to excess withdrawal of ground water without commensurate recharging, resulting in a rapid fall in the water table. The reason for this is that large part water comes as rainfall is lost to the sea in the form of run-off and rest is evaporated. So future irrigation needs would have to be met by tapping ground water and utilizing it more efficiently. Renovation of old water harvesting structures is also very essential to make use of them efficiently.

Field bund: The technology is simple to implement at the local level. Bunds slow down water sheet flow on the ground surface and encourage infiltration and help to reduce soil erosion. The major advantage of field bund is that higher crop returns can be expected in dryer years which allow farmers to diversify income sources in normal years.

Agro forestry: Agro forestry provides a different land use option, compared with traditional arable and forestry systems. It makes use of the complementarily between trees and crops, so that the available resources can be more effectively exploited. The agro forestry plot remains productive for the farmer and generates continuous revenue, which is not the case when arable land is exclusively reforested. Agro forestry allows for the diversification of farm activity and makes better use of environmental resources.

Dry Land Horticulture: There is a wild scope in the district to go for dry land horticulture. Growing of fruit crops is one of the many ways of crop diversification in dry lands. Dry land horticulture not only provides higher income to the farmers, but also more stable returns, besides utilizing the off-season precipitation. Several farmers are showing keen interest in cultivating fruit crops under dry lands.

Haveri District irrigation plan for the minor irrigation works has been prepared for a period of five years, with intension of mainly conservation of ground water and harvesting of available natural water sources. Minor irrigation works are categorically classified as Tank filling from natural rivers, construction of new tanks, improvements to existing water bodies, construction of new lift irrigation schemes and restoration of existing schemes, construction of new barrages across rivers and nalas and improvements to feeder channels and catchments areas. These schemes are planned to irrigate 28682.00 hectares of land in five years with the cost of 77565.00 lakhs.

The use of various measures to reduce the demand or water use likely to conserve the existing limited water supply through the practices which require less water and reduces the wastage and misuse of water.

References

1) Arbues F, Garcıa-Valinas MA, Martınez-Espineira R. Estimation of residential water demand: a state-of-the-art review. *Journal of Socio-Economics*. 2003;32(1):81–102. Available from: https://doi.org/10.1016/S1053-5357(03)00005-2.
2) Bakker P. Pathways to Improved Water Security - Reflections. *Aquatic Procedia*. 2013;1:172–177. Available from: https://doi.org/10.1016/j.aqpro.2013.07.016.
3) Beal CD, Sharma A, Gardner T, Chong M. A Desktop Analysis of Potable Water Savings from Internally Plumbed Rainwater Tanks in South-East Queensland, Australia. *Australia Water Resources Management*. 2012;26(6):1577–1590. Available from: https://doi.org/10.1007/s11269-011-9973-0.
4) Bhattacharyya A, Reddy SJ, Ghosh M, Naika RH. Water Resources in India: Its Demand, Degradation and Management. *International Journal of Scientific and Research Publications*. 2015;5(12):346–356. Available from: https://www.ijsrp.org/research-paper-1215/ijsrp-p4854.pdf.
5) Bougadis J, Adamowski K, Diduch R. Short-term municipal water demand forecasting. *Hydrological Processes*. 2005;19:137–148. Available from: https://www.oieau.fr/eaudoc/system/files/documents/40/200193/200193_doc.pdf.
6) Brooks DB. An operational definition of water demand management. *International Journal of Water Resources Development* . 2006;22(4):521–528. Available from: https://doi.org/10.1080/07900620600779699.
7) Caiado J. Performance of combined double seasonal univariate time series models for forecasting water demand. *Journal of Hydrologic Engineering*. 2010;15(3):215–222. Available from: https://doi.org/10.1061/(ASCE)HE.1943-5584.0000182.
8) Cole G, Stewart RA. Smart meter enabled disaggregation of urban peak water demand: precursor to effective urban water planning. *Urban Water Journal*. 2013;10(3):174–194. Available from: https://doi.org/10.1080/1573062X.2012.716446.
9) Deverill P. Sharing it out - Introducing water demand management strategies for small towns. London and Loughborough, UK. WELL: Water and Environmental Health. 2001. Available from: https://database.waterwise.org.uk/wp-content/uploads/2019/09/Deverill-2001_Sharing-it-out_Introducing-water-Demand-Management-Strategies-for-Small-Towns.pdf.