

Under-Ground Water Resources Scenario of Haveri District (Karnataka State)



Geography

KEYWORDS : Ground Water, National Commission on Agricultural, hydrological techniques, Natural Recharge, hydro-graphic network.

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ABSTRACT

A part of rain water percolates in the rocks and soils is available to us as under -ground water. The assessment of under - ground water resources resource in India dates back to 1949. Dr.A.N.Khosla(1949) estimated the total average annual run-off of all rivers systems in India as 167.4 m.ha.m(Million hectare meter) based on empirical formula which included both surface and ground waters. Since then, several attempts have been made to assess the under-ground water resources in the country. The National Commission on agriculture (1976) assessed the total under- ground water of the country as 67 m.ha.m, excluding soil mixture. The usable under - ground water resources was assessed as 35 m.h.m of which 26 m.ha.m was considered as available for irrigation. The main objectives of this paper are 1) To know the depth of under - ground water level of the district. 2) To know the under - ground water availability of the district. 3) To know the seasonal under - ground water level fluctuations 4) To know the under - ground quality of the district. 5) To know the status of under - ground water uses.

Haveri district was formed on 24 - 08 - 1997 by dividing the earlier Dharwad district, into Dharwad, Haveri and Gadag districts. The district comprising 07 talukas. The total geographical area of the district is 4848 sq.kms. It shares to the total geographical area to the Karnataka State is hardly 2.52 percent.

Haveri district is located exactly in the center of Karnataka with equal distance from Bidar in the far north to Kollegal in the far south. It is also known as the gateway district to the northern districts of Karnataka State. It extends between north latitudes 14° 17' 02" to 15° 5' 55" and east longitudes 75° 0' 35" TO 75° 49' 23". The length of the district from north to south is 82 kms and width from east to west is 72 kms.

The district is generally a gently undulating plain except for the hilly area on the western most part. The landmass of the district is situated between the elevations of 515 to 732 m above from msl. Tunga Bhadra, Varada, Kumudvati and Dharma are the major rivers and tributaries of the district. In the major part of the district red sandy soil is occurring followed by the medium black soil and deep black soil. The district enjoys sub tropical climate with temperatures ranging in between 180 and 400 c. The rainfall in the district from over 903 mm in west(Hangal) to less than 592mm in east(Renebennur).

1. INTRODUCTION

A part of rain water percolates in the rocks and soils and is available to us as under - ground water. The assessment of under - ground water resources in India dates back to 1949. Dr. A.N.Khosla (1949) estimated the total average annual run-off of all rivers systems in India as 167.4 m.ha m (Million hectare metre) based on empirical formula which included both surface and ground waters. Since then, several attempts have been made to assess the under- ground water resources in the country. The National Commission on agriculture (1976) assessed the total under- ground water of the country as 67 m.ha.m, excluding soil mixture. The usable under- ground water resources was assessed as 35 m.ha.m of which 26 m.ha.m was considered as available for irrigation.

The first attempt to estimate the under - ground water resources on scientific basis was made in 1979 when a High Level Committee, known as Ground Water Over Exploitation Committee was Constituted by Agriculture Refinance and Development Corporation (ARDC). Based on the norms for ground water resources computations recommended by this committee, the State Government and Central Ground Water Board computed the gross ground water recharge as 46.76 m.ha.m and the net recharge (70% of the gross) as 32.49 m.ha.m. The norms recommended by the Ground Water Committee (1984) are currently utilized by the Central Ground Water Board and State Ground Water Departments to compute the ground water resources. Based on the recommendations of this committee, the annual replenishable ground water resources in the country works out to be 45.33 m.ha.m keeping a provision of 15% (6.99 m.ha.m) for drinking, industrial and other uses, the utilizable ground water resource for irrigation was computed 38.34 m.ha.m per year.

The methodology adopted for computing ground water resources are generally based on the hydrological techniques. The ground water is recharged and disposed by the following ways.

I. Recharged of ground water:-

- Precipitation infiltration to the water table
- Natural recharge from streams, lakes and ponds
- Ground water inflow into the area under consideration
- Recharge from irrigation, reservoirs and other schemes especially designed for artificial recharge.

II. Disposed of ground water:-

- Evaporation from capillary fringe in areas of shallow water table and transpiration by vegetation
- Natural discharge by seepage and spring flow to streams, lakes and ponds
- Ground water outflow
- Artificial discharge by pumping or flowing wells or drains

II. STUDY AREA:-

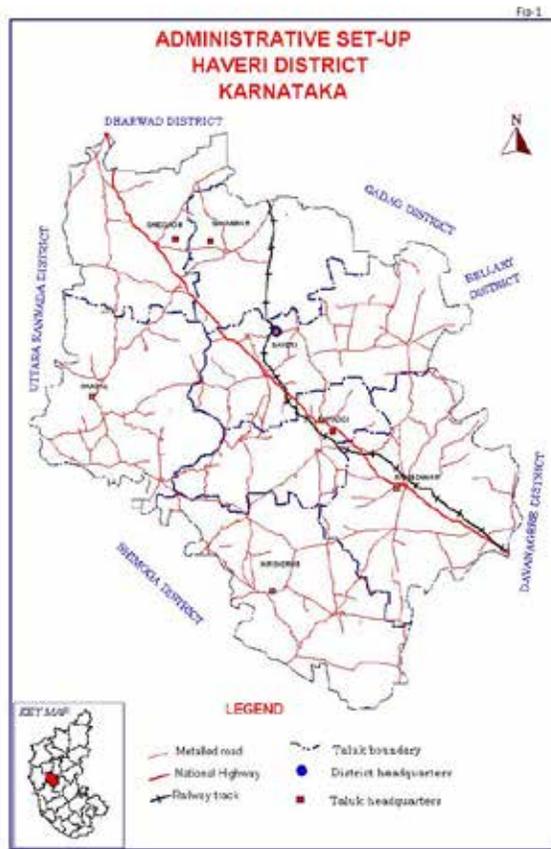
Haveri district was formed on 24 - 08 - 1997 by dividing the earlier Dharwad district, into Dharwad, Haveri and Gadag districts. The district comprising 07 talukasviz, Haveri, Bydagi, Hangal, Hirekerur, Renebennur, Savanur and Shiggaon and two revenue divisions, i.e.Haveri and Savanur. The total geographical area of the district is 4848 sq.kms. It shares to the total geographical area to the Karnataka State is hardly 2.52 percent.

Haveri district is located exactly in the center of Karnataka with equal distance from Bidar in the far north to Kollegal in the far south. It is also known as the gateway district to the northern districts of Karnataka State. It extends between north latitudes 14° 17' 02" to 15° 5' 55" and east longitudes 75° 0' 35" TO 75° 49' 23". The length of the district from north to south is 82 kms and width from east to west is 72 kms.

As shown in the map no - 01 it is bounded by Dharwad and Gadag districts on north, Bellary and Davanagere districts on east, Shimogga district on south and Uttara kannada district on

the west.

The district is generally a gently undulating plain except from the hilly area on the western most part. The landmass of the district is situated between the elevations of 515 to 732 m above from msl. Tunga Bhadra, Varada, Kumudvati and Dharna are the major rivers and tributaries of the district. In the major part of the district red sandy soil is occurring followed by the medium black soil and deep black soil. The district enjoys sub tropical climate with temperatures ranging in between 18° and 40° c. The rainfall in the district from over 903 mm in west(Hangal) to less than 592mm in east(Renebennur).



Map No - 01

III. OBJECTIVES:-

Following are the specific objectives of this paper.

- To know the depth of under - ground water level of the district.
- To know the under - ground water availability of the district.
- To know the seasonal under - ground water level fluctuations
- To know the under - ground quality of the district.
- To know the status of under - ground water uses.

IV. DATA BASE AND METHODOLOGY:-

The present study is mainly based on secondary data collected from Central Ground Water Board, District Gazetteer, District census hand books and internet. Data has been analyzed with the help of statistical diagrams and maps.

V. DEPTH OF UNDER GROUND WATER LEVEL:-

The depth under - ground water level (table) is influencing by topography, soil, permeability, amount of rainfall, natural vegetation and other factors. According to 2005-06 data the highest

depth of under - ground water table is marked in Savanur taluk followed by Hirekerur and Renebennur taluks. The minimum under - ground water level is found in Savanur taluk followed by Hanagal and Bydagi taluks. See table no - 1 and fig no - 2.

**Table no - 1
DEPTH OF UNDER GROUND WATER LEVEL**

Sl.no	Taluk	Under -ground water table (meters)	
		Maximum	Minimum
01	Bydagi	26.50	16.95
02	Hanagal	21.81	10.73
03	Haveri	29.81	22.92
04	Hirekerur	30.11	17.08
05	Ranebennur	29.82	18.92
06	Savanur	38.76	32.12
07	Shiggaon	15.30	7.90

Source: - Haveri District Census Hand Book - 2005-06.

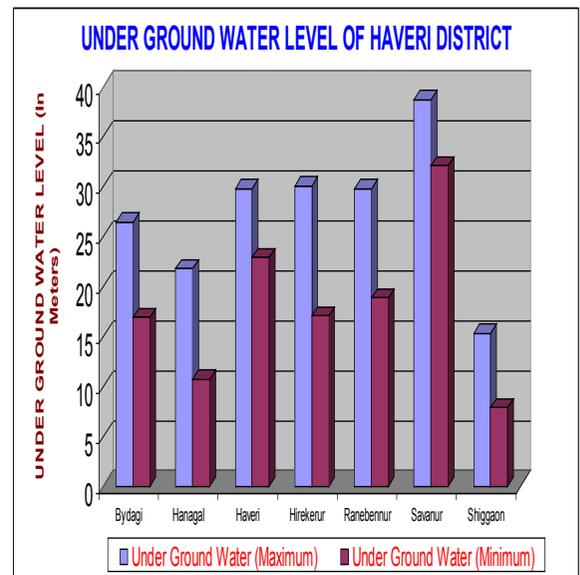


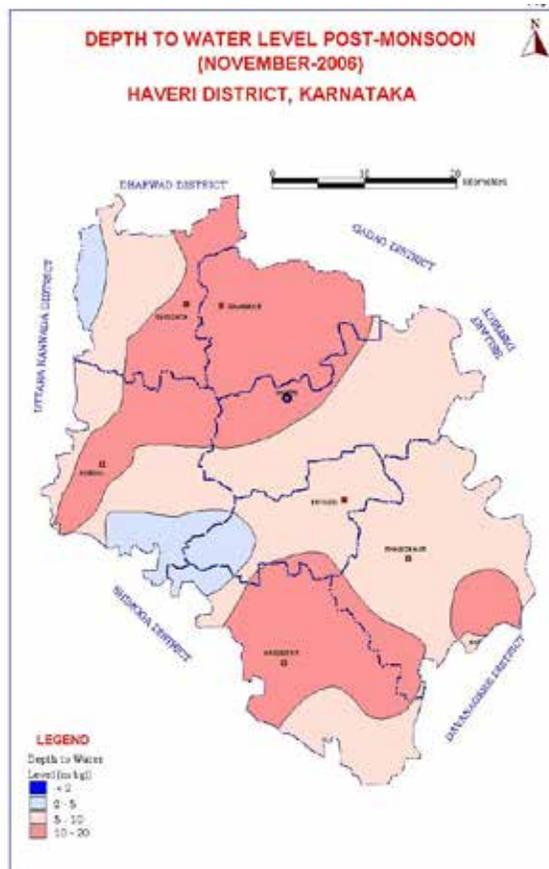
Fig No - 01

Out of 23 national hydrograph stations located in Haveri district, during May 2006, 12 national hydrograph stations were found to be dry and during November 2006, 8 national hydrograph stations were found to be dry. The general depth to water level in the national hydrograph stations recorded during May 2006 was in the range of 6.36 to 16.63 mbgl. The pre-monsoon depth to water level of the district for the year 2006 is shown in map no - 02.

Table No – 01

The Summary of the Ground Water Estimation Studies in Haveri District.

Sl No	Taluk	Recharge from rainfall during monsoon season (mcm)	Recharge from other sources during monsoon season (mcm)	Recharge from rainfall during non-monsoon season (mcm)	Recharge from other sources during non-monsoon season (mcm)	Net Annual Ground water availability (mcm)	Ground water draft for drinking and industrial use (mcm)	Irrigation Bore well & Dug well draft (mcm)	Existing gross annual water draft for all uses (mcm)	Allocation for domestic & industrial use for next 25 years (mcm)	Net ground water availability for future irrigation development (mcm)	Balance ground water irrigation potential available (km)	Stage of Development in %	Category as on March 2004
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
01	Bydagi	15.91	6.53	32.00	4.62	4.61	30.83	2.95	34.09	37.04	4.48	2.37	290.14	10
02	Hangal	33.82	32.60	9.53	4.00	98.21	3.16	27.04	30.20	4.68	45.86	54.34	100	1
03	Haveri	31.35	13.36	8.81	7.67	59.24	6.30	55.31	61.61	9.56	9.59	1249.31	38.92	1
04	Hirekerur	28.14	30.38	3.56	7.94	66.64	3.95	52.70	56.65	7.14	1.66	1140.96	15	62
05	Ranebennur	43.52	18.83	8.15	7.41	74.06	4.71	68.05	72.75	1.66	197.58	352.91	100	31
06	Savanur	26.74	12.59	6.30	1.34	45.00	5.13	9.04	14.17	7.74	33.66	3988.10	31.76	1
07	Shiggaon	31.54	15.07	6.32	2.32	52.73	2.16	15.46	17.62	3.18	27.85	37.90	100	1
08	Total	213.02	129.36	47.47	35.29	406.70	28.36	261.70	290.06	42.58	130.38	15820.3	71.90	72



Map No - 03

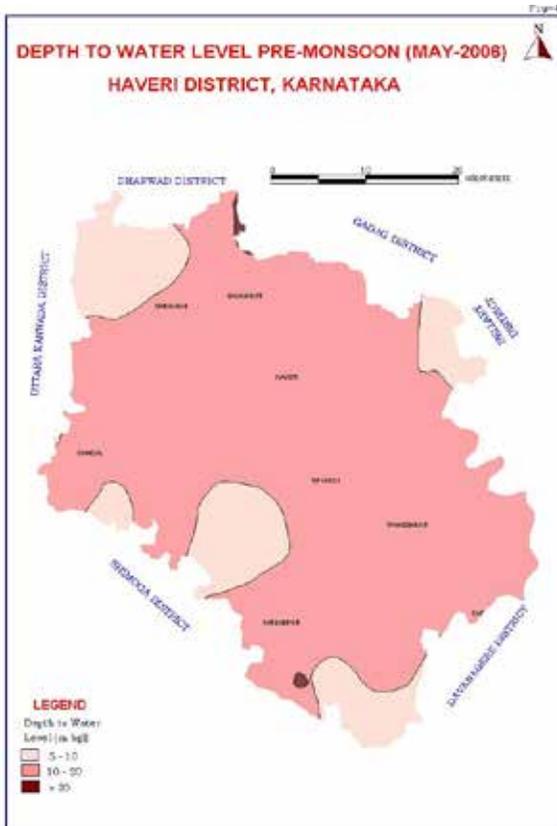
VI. SEASONAL UNDER GROUND WATER LEVEL FLUCTUATION:-

Under ground water level is fluctuates by seasons. Normally in rainy season the under - ground water level is increases and in summer season the under - ground water level is decreases. In the district the seasonal water level fluctuation for the year 2006 is ranges between 0.43 to 4.28 m. in dug wells. It is ranges between 2.96 to 34.42m in piezometer hydrograph network stations in the district.

The pre-monsoon water level trends calculated for the period from 1997 to 2006 are rising in the range between 0.011 and 1.303 m/year at eight hydrograph network stations and declining in the range of 0.027 to 1.057m/year at six hydrograph network stations. The post-monsoon water level trends calculated for the period from 1997 to 2006 are rising in the range of 0.056 to 0.667m /year at four hydrograph network stations and declining in the range of 0.018 to 1.119 m /year at sixteen hydrograph network stations.

VII. UNDER GROUND WATER AVAILABILITY:-

The under- ground water resource estimation indicates that total annual ground water recharge as 421.59 mcm and net annual ground water availability as 406.70 mcm for Haveri district for the year 2004. Annual ground water draft for domestic and industrial uses was 28.36 mcm and for irrigation purposes the draft computed was 261.70 mcm. Total draft during the year 2004 was 290.06mcm. The net ground water availability for future irrigation development was computed as 130.38 mcm, after allocating 42.58 mcm of ground water for domestic and industrial uses for the next 25 years. The stage of ground water development for the whole district was computed as 72 percent. But the taluk wise ground water estimation data indicates the stage of ground water development varies between 31.76 and 38.92 per-



Map No - 02

The general depth of water levels in the national hydrograph stations recorded during November 2006 was in the range of 2.08 to 19.26 mbgl. The post - monsoon depth to water level of the district for the year 2006 is shown in map no - 03.

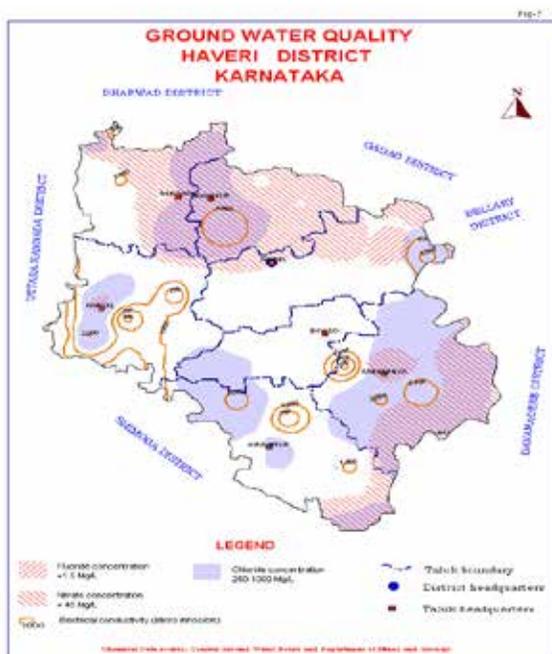
cent for Hangal, Savanur and Shiggaon taluks where 100 percent area belongs to safe category. The taluk wise ground water estimation data also indicates the stage of ground water development varies between 99.06 to 121.13 percent for Byadagi, Haveri and Ranibennur where 64 to 88 percent of area of these taluks is 85.70 percent and 62 percent of this taluk is categorized as critical. The taluk wise ground water estimation studies is summarized in table no - 02.

VIII. UNDER GROUND WATER QUALITY:-

The entire Savanur taluk eastern half of the Shiggaon taluk northern part of Haveri taluk and Hangal taluk eastern parts of Ranibennur and Hirekerur taluk is having excess Nitrate in ground water. (Nitrate content more than 45ppm).

Fluoride content is observed to be present in excess in the district (Fluoride content more than 1.5 ppm) in confined to a small patch in northeastern part of Haveri taluk.

Chloride problem in the district (Chloride content more than 250ppm) is observed in eastern part of Shiggaon, Byadagi, Hirekerur and Hangal taluks, western parts of Savanur and Haveri taluk, almost complete Ranibennur taluk also in central parts of Hirekerur taluk. See map no- 04.



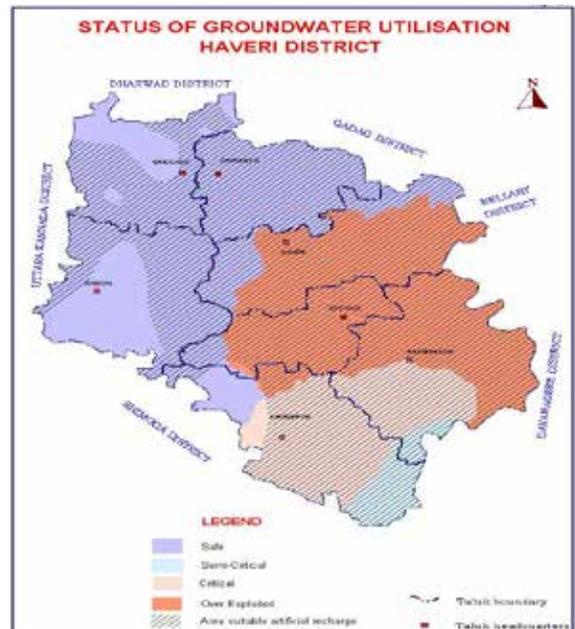
Map No - 04

VIII. STATUS OF UNDER GROUND WATER USES:-

As per the data of 2004 - 05 the domestic water requirement is supplied through 635 numbers of Mini-water supply schemes, 597 numbers of piped water supply schemes through bore wells along with 6599 number of bore wells installed with hand pumps. The ground water is a major source for drinking purpose. Irrigation from ground water is mainly through bore wells with depth ranging between 60 to 200mts. According to 2004-05 data totally 59,928 hectares of land was irrigated by canals, tanks, wells, tubewells, liftirrigation and other systems. Out of it 28,807 hectares of land was irrigated by tube wells it covers

48.06 percent.

Hanagal taluk, it located in semi-malnad region, hence the larger part of the area was irrigated by tanks followed by tube wells. In Byadagi taluk 100 percent of irrigated land belongs to tube wells.



Map No - 05

XI. SUGGESTIONS:-

Following suggestions should be implemented for the conservation, recharge of under- ground water resources.

- In the district, where the topography is comparatively rugged artificial recharge structures like nalla and gully plugs contour bonds and contour trenches and nalla bunds should be constructed.
- In plain areas percolation tanks and point recharge structure like recharging shafts recharging pits and recharging through existing dug / bore wells should be practiced.
- In Semi-urban areas in the district (Haveri, Savanur, Shiggaon, Hangal, Hirekerur, Byadagi, Ranibennur and Bankapur) rainwater harvesting, So in these Semi-urban areas rooftop rainwater harvesting practices should be encouraged. This will help in reducing the load of urban water supply system.

REFERENCE

- Khullar, D.R. 2005 - "India, A comprehensive Geography" Kalyani Publishers, New Delhi, p - 470.
- District Gazetteer, Dharwad District - 2002.
- Haveri District Census Hand Book - 2004 - 05 4. http://cgwb.gov.in/dis-profile/karnataka/Haveri_brochure.pdf.
- [http:// parsaramaiti.kar.nic.in/](http://parsaramaiti.kar.nic.in/)

nr_grdwater.html