Assessment of Ground Water Quality in Deralakatte Belma Panchayath Mangalore Dakshina Kannada

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Abstract *— the present work aims at assessing the water quality parameter in the sub-surface water of Belma Panchayath, Dakshina Kannada district Karnataka. There by monitoring ten sampling locations (4 opens wells & 6 bore wells) within Panchayath for a period of 3 months from march to May 2016. The study area is surrounded by many complexes and public buildings such as hospitals and institutions etc. The quality groundwater due to various geochemical processes like saline water intrusion, evaporation and interaction of groundwater with brines is a serious problem in coastal environments. Understanding the geochemical evolution is important for sustainable development of water resources. For calculating the water quality parameters, the water samples were subjected to comprehensive physic-chemical analysis involving major general parameters ph, EC, TDS, alkalinity, Total Hardness, DO, BOD, COD, Colour, turbidity were considered.*

Keywords— *Physicochemical parameters, Groundwater, Belma Panchayath, Dakshina Kannada District Karnataka.*

I. INTRODUCTION

The quality of ground water depends on the composition of the recharge water, the interactions between the water and the soil, soil- gas and rock with which it comes into contact in unsaturated zone, and the residence time and reactions that take place within the aquifer. There, considerable variation can be found, even in the same general area, especially where rocks of different compositions and solubility occur. The principal processes influencing water quality in aquifers are physical (dispersion/dilution, filtration and gas movement), geochemical (complication, acid-base reactions, oxidation-reduction, precipitation- solution) and biochemical (microbial respiration and decay). The type and character of litho units of an area affects the recharging of subsurface water, the aquifer potential and movement of ground water. The hard and crystalline igneous or metamorphic rock lack primary porosity and therefore the ground water conditions in the rocks are dependent on the secondary porosities like joints and fractures hence comparatively ground water potential is low. The sedimentary rocks possess primary porosity and helps in recharge and movement of ground water. Therefore they are having higher ground water potential. Mineralogy and petro-chemistry of the litho units primarily influence the chemical quality of the ground water. Keeping all these points, the geology of a region is pre requisite for any hydro geological and environmental studies.

II. SCOPE

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. The main objective of this project work is to study the pollution, quality, physicochemical parameters of the groundwater and this also includes determination of concentration of various ions. According to preliminary survey conducted it was found that, The water from the bore well not been used for the drinking purposes due to its colours, taste, and hardness. Thus the test results were compared with Indian standard values for drinking purposes. In order to achieve the objective the study will be carried out under the following chapters.

A. Objective

- *Hydro meteorological characteristics.*
- *Geology of the area.*
- *Geochemistry of the area.*
- *Pollution aspect of the area.*
- *Conclusions and suggestions*.

III. STUDY AREA

The study area Deralakatte Belma (12^0 49'N, 74^0 56'E and elevation 24m above MSL) is located in Dakshina Kannada District of Karnataka State. The area has a population of 6432, covers an area of 363 hectors and it is 12 km towards south from district head quarters Mangalore. It lies between the Arabian Sea and the Sahyadri (the western ghat) mountain ranges.

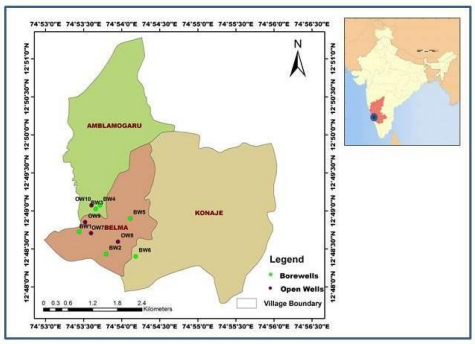


Figure 1: Map of study area.

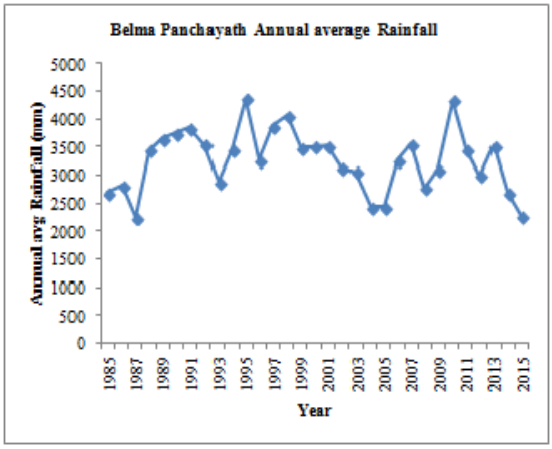
Mangalore is influenced by a tropical monsoon climate and receives high rainfall. The annual precipitation in the area varies between 350 and 400 cm, a major part of which is received during the summer monsoon (June to September). The area of study experiences a hot summer season (March to May) when temperature rises up to 38 °C, whereas during winter temperature drops to an average of ~20 °C. Economically, Mangalore is one of the fast growing cities in southern India. Belma village consist of many educational institutions like K.S.Hegde medical college, Kanachur Group of institutions etc, and surrounded by hospitals like K.S.Hegde charitable trust, Kanachur hospital etc. It is a fast developing village including many shopping centers and saw mills.

The work has been undertaken for the following reasons;

A. *The degree of water pollution can be achieved by the evaluation of the physical and chemical characteristics of the water. In our study area number of the bore wells is more compared to open wells. Majority of the peoples of that area only depends on groundwater for various activities like drinking, irrigation and cooking.. Our present works is to check the physical and chemical parameters of water affecting the quality of the subsurface water of Belma Panchayath.*

B. Hydrometeorology- Hydrogeology is directly linked to Hydrometeorology. In hydrological studies, Hydro meteorological data are required to determine the water balance of the basin for developing and managing its water resource (Raghunath, 1982). The atmospheric precipitation, evaporation, evapo transpiration, solar radiation, air temperature and humidity, soil moisture, water level (surface and subsurface), stream discharge and the water quality are the important Hydrometeorological elements. Hydrometeorological studies help in accessing various Hydrogeological parameters. Hence study of various Hydrogeological elements and their relation to ground water of the study area are discussed.

C. Annual average rainfall of Belma Panchayath from 1985 to 2015



IV TABLE I:
Results of various parameters analysed for the water sample collected from Belma Panchayath during March-2016

SL NO	Location	pH	EC	TDS (mg/l)	Chloride (mg/l)	Iron (mg/l)	Nitrate (mg/l)	Sulphate (mg/l)	TH (mg/l)	Turbidity (NTU)	DO (mg/l)
1	Kaanekere	6.5	0.15	975	85.05	0.2018	1.6063	30.01	330	4.2	6.4
2	Badriya juma masjid	6.7	0.1	650	15.69	0.3713	0.95	50.101	170	16.3	7.4
3	Renjady1	6.29	0.19	1235	156.2	3.9269	1.48	39.5141	394.6	43.5	5.6
4	Renjady2	6.23	1.19	7735	701.28	0.1428	0.95	111.61	1181.28	3.1	6
5	Kalpadhe	6.53	0.23	1495	164.8	0.6827	1.49	39.03	225.05	7.9	7.8
6	Guddemaar	6.69	0.05	325	20.68	0.5352	1.58	13.22	172.86	5.3	6
7	Near gov high school	5.35	0.08	520	47.02	0	57.7	6.86	133.2	0	6
8	Guddemaar	6.08	0.05	325	51.02	0	45.36	4.083	225.02	0.7	6.1
9	Yashasvi nilaya	6.12	0.01	65	12.89	8.2857	0.8	5.56	133.2	93.1	6
10	Poydhel	6.01	0.01	65	12.92	0.3297	1.06	2.047	106.6	3.2	5.5

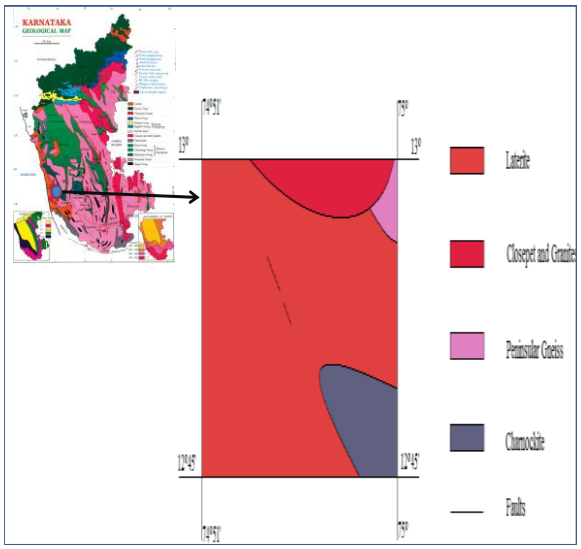
TABLE 2-Results of various parameters analysed for the water sample collected from Belma Panchayath during April-2016

SL NO	Location	pH	EC	TDS (mg/l)	Chloride (mg/l)	Iron (mg/l)	Nitrate (mg/l)	Sulphate (mg/l)	TH (mg/l)	Turbidity (NTU)	DO (mg/l)
1	Kaanekere	7.32	0.24	1560	82.65	0.3127	1.2925	30.21	209.92	4.7	5.7
2	Badriya juma masjid	7.22	0.11	715	14.19	0.3925	1.4072	39.24	131.2	15.6	6.3
3	Renjady1	7.02	0.24	2275	169.36	1.1393	1.811	48.3249	262.4	33.9	5.8
4	Renjady2	6.84	1.68	10920	755.54	0.8401	2.895	112.32	1200.6	19.2	6.2
5	Kalpadhe	7.28	0.3	1950	13.84	0.1251	1.6578	42.593	170.56	1.5	6.4
6	Guddemaar	7.14	0.11	715	18.76	0.1653	1.8044	17.0391	144.32	3.4	6.2
7	Near gov high school	5.95	0.09	585	45.12	0.0127	55.752	7.7914	52.48	0	6.3
8	Guddemaar	6.63	0.13	845	41.58	0	55.568	2.12	131.2	0	6
9	Yashasvi nilaya	6.54	0.05	325	16.73	8.2371	1.69	0	65.6	91.6	6.1
10	Poydhel	6.82	0.04	260	12.67	0.0471	3.607	0	39.36	1.9	6.2

TABLE 3 - Results of various parameters analysed for the water sample collected from Belma panchayath during May-2016

SL NO	Location	pH	EC	TDS (mg/l)	Chloride (mg/l)	Iron (mg/l)	Nitrate (mg/l)	Sulphate (mg/l)	TH (mg/l)	Turbidity (NTU)	DO (mg/l)
1	Kaanekere	6.92	0.17	1105	85.69	0.4017	1.4063	31.01	328	5.2	6.3
2	Badriya juma masjid	6.89	0.12	780	15.72	1.5836	0.9307	51.511	169.32	14.3	7.3
3	Renjady1	6.5	0.23	1495	158.2	3.7269	1.63	40.5141	393.6	44.5	5.7
4	Renjady2	6.53	1.2	7800	702.45	0.1628	0.9697	111.6079	1180.8	5.1	6
5	Kalpadhe	6.93	0.26	1690	163.8	0.5827	1.5084	40.03	223.04	8.2	7.7
6	Guddemaar	6.86	0.07	455	19.62	0.4302	1.6178	13.2546	170.56	5.9	6
7	Near gov high school	5.57	0.09	585	4.14	0	56.7	6.8666	131.2	0	6
8	Guddemaar	6.16	0.07	455	50.2	0	46.37	5.073	223.04	0	6.2
9	Yashasvi nilaya	6.66	0.02	130	13.69	8.1837	0.53	6.536	131.2	92.1	6
10	Poydhel	6.02	0.01	65	13.69	0.3497	1.94	2.1147	104.96	4.2	5.6

FIGURE- GEOLOGICAL MAP OF STUDY AREA



The geology of Karnataka is mostly confined to the Archean and proterozoic eras of earth history. Sargur schist is the oldest rock type identified in the Karnataka so far. Major part of central and southern Karnataka is covered by peninsular gneiss. There are more extensively developed younger schist belts of Dharwar toe in the western part of Karnataka. Southern most part of Karnataka is covered by pyroxene bearing granulites. At the northern part of Karnataka, the rocks of proterozoic age refer to Kaladgis and Bhimas are present. Sediments of recent age covering very negligible area occur along the coastal margin to the west. Geology of Dakshina Kannada district is simple with peninsular gneisses covering major portion of the district. The fracture system developed along with joints and faults traversing the rock, which facilitate for ground water circulation clod moderate quantity of water. The ground water quality is governed by mineralogical composition of the rock. The alluvial deposit is present all along the district. A small part of southern most extension of Kudremukh schist belt consisting of metavolcanics associated with iron formation. Study area Belma Panchayath has an elevation of 24 m above MSL. The river bed is covered by outcrops of granite gneiss. The major rocks like Granite gneiss, Laterite, Charnockite, are present in the area. The area has been subjected to faulting.

IV. CONCLUSIONS

IN THIS STUDY, AN ATTEMPT WAS MADE TO EVALUATE GROUNDWATER QUALITY IN A COASTAL REGION, BELMA PANCHAYATH, DAKSHINA KANNADA DISTRICT OF KARNATAKA, INDIA. GROUNDWATER QUALITY DEGRADATION AND SALINE INTRUSION ARE COMMON OCCURRENCES IN COASTAL AQUIFER. MAJOR PART OF CENTRAL AND SOUTHERN KARNATAKA IS COVERED BY PENINSULAR GNEISS.

THE GEOLOGY OF DAKSHINA KANNADA DISTRICT IS SIMPLE WITH PENINSULAR GNEISSES COVERING MAJOR PORTION OF THE DISTRICT. THE MAJOR PART OF THE STUDY AREA IS COVERED WITH IRON LATERITE WHICH IS HIGHLY POROUS AND UNDULATED TOPOGRAPHY WITH THICK VEGETATION. THE AVERAGE RAINFALL OF THE STUDY AREA IS 3975MM AND OCCURS MAINLY DURING THE SOUTH WEST MONSOON EXTENDING FROM JUNE TO SEPTEMBER. THE TOTAL 30 YEARS RUNOFF IN BELMA PANCHAYATH IS FOUND TO BE 35.286CM. AS PER RAINFALL DATA PROVIDED BY THE STATISTICAL DEPARTMENT OUR STUDY AREA HAS RECEIVED THE MAXIMUM RAINFALL IN THE YEAR 2010 AND RUNOFF WAS FOUND TO BE MAXIMUM IN THAT YEAR. ON THE BASIS OF PHYSICO-CHEMICAL ANALYSIS CONDUCTED IT MAY BE CONCLUDE THAT THE PH, SULPHATE AND NITRATE CONTENT OF BELMA PANCHAYATH WATER ARE WELL WITHIN THE ALLOWABLE LIMIT . ELECTRICAL CONDUCTIVITY, TOTAL HARDNESS AND CHLORIDE CONTENT IN EACH SAMPLING 9 SAMPLES ARE WITHIN THE ALLOWABLE LIMIT AND 1 SAMPLE IN EACH TRIAL EXCEEDS THE ALLOWABLE LIMIT DURING THE TRIAL. THE TEMPERATURE OF THAT REGION WAS VERY HIGH AND THERE IS INTERACTION OF SALT WATER WITH THE GROUND WATER AS THE STUDY AREA IS A COASTAL AREA WHICH IS AT LOWER REGION. THE TOTAL DISSOLVED SOLIDS OF THE WATER SAMPLE IN THE STUDY AREA HAS A VARIATION FROM MONTH TO MONTH, 5 SAMPLES IN THE FIRST TRIAL EXCEEDS THE ALLOWABLE LIMIT WHILE DURING SECOND TRIAL 6 SAMPLES EXCEEDS THE ALLOWABLE LIMIT. THE VARIATION IS MAINLY DUE TO TEMPERATURE. THE IRON CONTENT IN THE WATER SAMPLE ALSO HAS A SEASONAL VARIATION. LOCATED IN SLOPPY MANNER AND THE WATER FLOWS DOWNWARD SIDE OF THE AREA THUS THE DISSOLVED SOLIDS ARE PRESENT IN THE WATER AND PRESENT OF CLAY SOIL IS MAIN REASON FOR THE TURBIDITY. COLLECTION OF WATER SAMPLES ARE CARRIED OUT DURING THE PEAK TIMES, THE EVAPORATION OF WATER FROM THE WELL WAS VERY HIGH, AND DUE TO THIS SETTLED SOLIDS ARE MIXED WITH THE WATER WHICH IS RESPONSIBLE FOR THE FORMATION OF TURBIDITY. FROM TEST RESULT IT WAS FOUND THAT THE ENTIRE BORE WELL WATER ARE NOT POLLUTED AND SOME BORE WELL WATER ARE USEFUL FOR DRINKING PURPOSE.

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