केन्द्रीय भूमिजल बोर्ड

जल शक्ति मंत्रालय, जल संसाधन, नदी विकास और गंगा संरक्षण विभाग

भारत सरकार

Central Ground Water Board

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

Report on

AQUIFER MAPPING AND MANAGEMENT PLAN

Piriyapatna Taluk, Mysore District, Karnataka

दक्षिण पश्चिमी क्षेत्र, बेंगलुरु

South Western Region, Bengaluru

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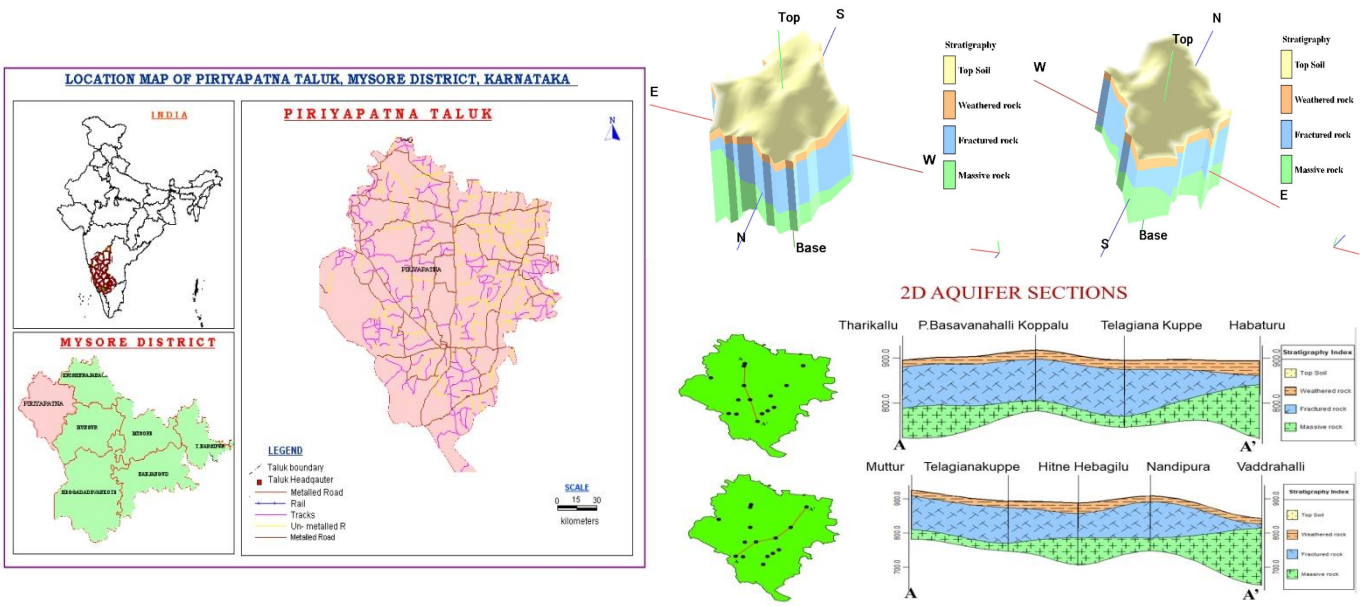
AQUIFER MAPS AND MANAGEMENT PLAN, PIRIYAPATNA TALUK, MYSURU DISTRICT, KARNATAKA STATE

(AAP: – 2021-2022)



By

V.HEMALATHA, Assistant Hydrogeologist, CGWB, SWR, Bengaluru

AUGUST 2022

AQUIFER MAPS AND MANAGEMENT PLAN, PIRIYAPATNA TALUK, MYSURU DISTRICT, KARNATAKA STATE

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AQUIFER MAPS AND MANAGEMENT PLAN, PIRIYAPATNA TALUK, MYSURU DISTRICT, KARNATAKA STATE

1 SALIENT FEATURES

Name of the Taluk: PIRIYAPATNA

District: Mysuru

State: Karnataka

Area: 812 Sq.Kms.

Population: 2,43,076

Annual Normal Rainfall: 852 mm

1.1 Study area

Aquifer Mapping Studies have been carried out in Piriyapatna taluk, Mysore district of Karnataka, covering an area of 812 Sq.Kms under National Aquifer Mapping Project. The Piriyapatna taluk is located between North Latitudes 12°24'05.62'' and 12°34'44.23" and East Longitudes between 76° 02' 35.62" to 76°07'30.32". The study area is bounded on the East by Hunsur taluk, on the North by Arkalgud Taluk of Hassan District, on the South by Virajpet taluk of Kodagu District, on the West by Somwarpet of Kodagu district. Location map of Piriyapatna taluk of Mysore district is presented in **Fig-1.** Piriyapatna is taluk head quarter. There are 203 villages and 34 Gram panchayats in this taluk.

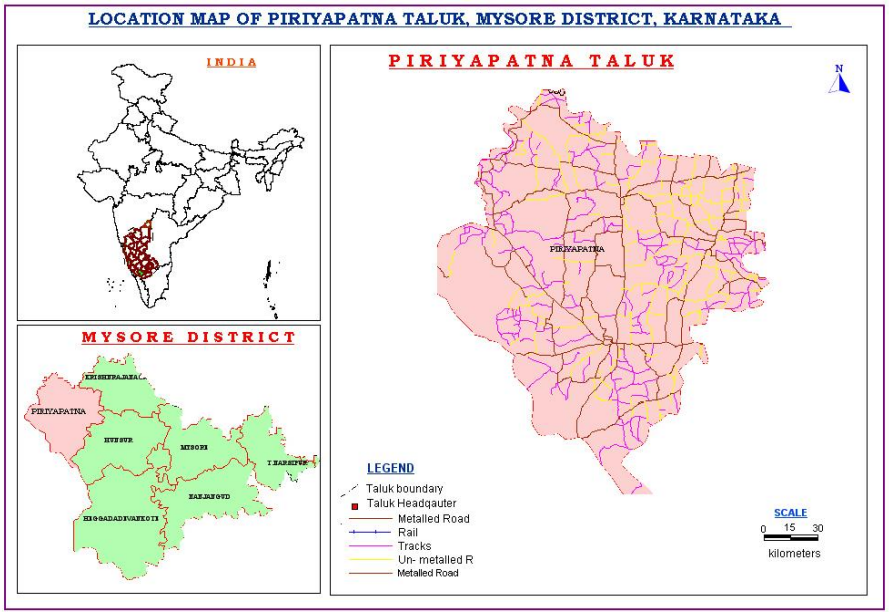

Fig. 1: Location Map

1.2 Population

According to 2011 census, the population in Piriyapatna taluk is 2,43,076, in which 1,24,755 male population and 1,18,321 is the female population. The taluk has an overall population density of 301 persons per sq.km. The decadal variation in population from 2001-2011 is 8.39% in Piriyapatna taluk.

Table-1: Population details

Total	Male	Female	Share of the district population	Rural population	Urban population	Decadal change in population	Decadal change in rural population	Decadal change in urban population
2,43,076	1,24,755	1,18,321	8.1	2,26,391	16,685	8.39	8.15	11.79

Source: District at a glance 2020-21, Govt. of Karnataka

1.3 Rainfall

Piriyapatna taluk enjoys semi-arid climate. The normal annual rainfall in Piriyapatna taluk for the period 1961 to 2010 is 852 mm. The year is usually divided into four seasons: summer from March to May; rainy season or south-west monsoon season from June to September; post-monsoon season covering the months of October and November and dry or winter Season from December to February.

Table-2 Actual Annual rainfall (mm) in rain gauge station from 2010 to 2020

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**20017**	**2018**	**2019**	**2020**
Rainfall (mm)	519	819	459	695	812	869	451	885	1177	1014	799

Source: District at a glance 2020-21, Govt. of Karnataka

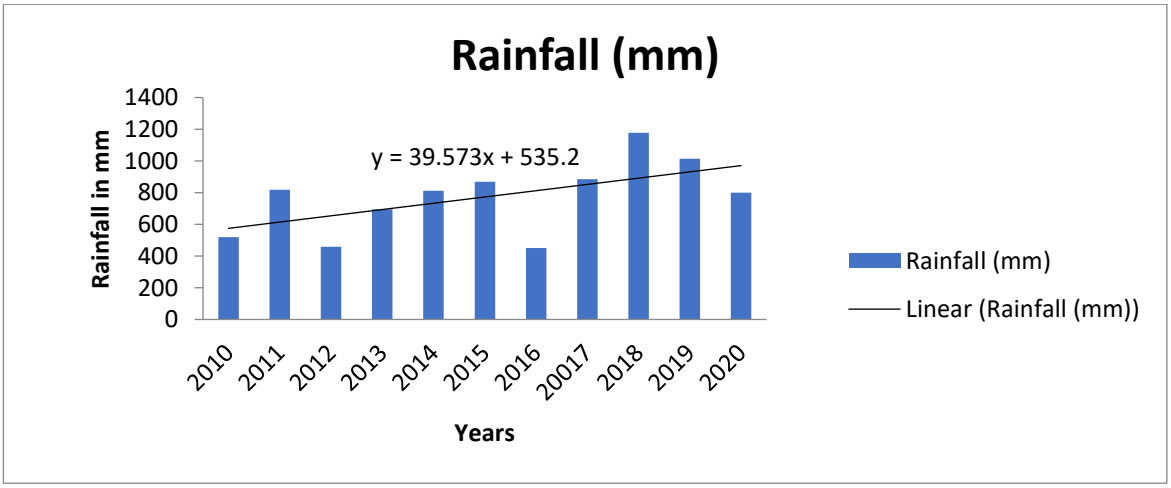

Fig. 2: Rainfall Trend Analysis

1.4 Agriculture & Irrigation

Agriculture is the main occupation in Piriyapatna taluk. Major crops are Paddy, Maize, Tur, Pulses, Tobacco, Fruits and Vegetables. Water intensive crops like Paddy and Tobacco are grown in Piriyapatna Taluk **(Table.3).**

Table-3: Cropping pattern in Piriyapatna taluk as per 2019-2020 (Ha)

Crops	**Cereals (Area in Ha)**				**Pulses (Area in Ha)**						
	Paddy	Jowar	Ragi	Maize	Tur	Horse gram	Black gram	Green gram	Avare	Cowpea	Bengal gram
	10,254	3,430	23,837	9,181	67	997	119	6	2,991	1,590	121
Total	**46,702**				**5,891**						
Total Food grains – 52,593											

Fruits (Area in Ha)	**Veg (Area in Ha)**	**Oil seeds (Area in Ha)**				**Commercial crops (Ha)**		
		Groundnuts	Nigerseed + Musturd	Castor	Sesame	Cotton	Sugarcane	Tobacco
1,749	**1,264**	10	82	1	8	8	13	34,010
		Total Oil seeds – 101				**Total – 34,031**		

Source: District at a Glance 2020-21, Govt. of Karnataka

It is observed that net sown area accounts 49,565 (Ha) and area sown more than once is 45,964 (Ha) of total geographical area 83,121 (Ha) in Piriyapatna taluk (Table-4). Area under Forest is 14,810 (Ha) Area not available for cultivation and Fallow land cover 8,535 (Ha) and 46 (Ha) of total geographical area respectively. 5,810 (Ha) of net area is irrigated from surface water and 15,809 (Ha) are irrigated from Groundwater (Table-5).

Table-4: Details of land use in Piriyapatna Taluk as per 2019-2020 (Ha)

Total Geographical Area	Area under Forest	Area not available for cultivation	Other uncultivable land	Fallow land	Net sown area	Area sown more than once	Gross sown area
83,121	14,810	8,535	10,165	46	49,565	45,964	95,529

Source: District at a Glance 2020-21, Govt. of Karnataka

Table-5: Irrigation details in Piriyapatna taluk as per 2019-2020 (Ha)

Sl.No	Source		Length in Km/No of structures	Gross area irrigated	Net area irrigated
1	Surface water	Canals	34	6,900	5,500
		Tanks	436	540	310
		Lift irrigation	1	0	0
		Total		**7,440**	**5,810**
2	Ground water	Dug wells	46	603	280
		Bore wells	9,001	24,622	15,529
		Total		**25,225**	**15,809**
Grand Total				**32,665**	**21,619**

Source: District at a Glance 2020-21, Govt. of Karnataka

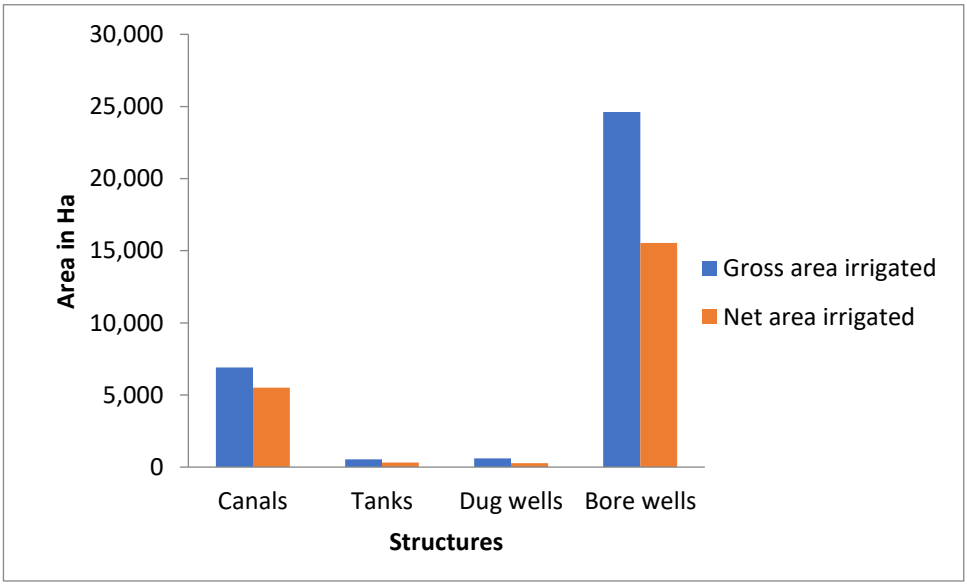

Fig. 3: Sources of Irrigation

1.5 Geomorphology, Physiography & Drainage:

The geomorphology of the Piriyapatna is formed by various land forms like hills and plateaus, piedmont zone, plains and river/stream, etc. Hilly area in central part and plain region in covered all over the taluk. The elevation in the taluk varies from 831m to 937m in the taluk. The drainage system is well developed in the taluk. The differential altitude is significant because, it is likely to cause irregular ground water flow patterns on the micro scale **(Fig.-4).** Topography is dominantly controlled by geological structures. The entire Piriyapatna taluk falls in Cauvery River basin. The Drainage pattern is dendritic to subdendritic **(Fig.-5).**

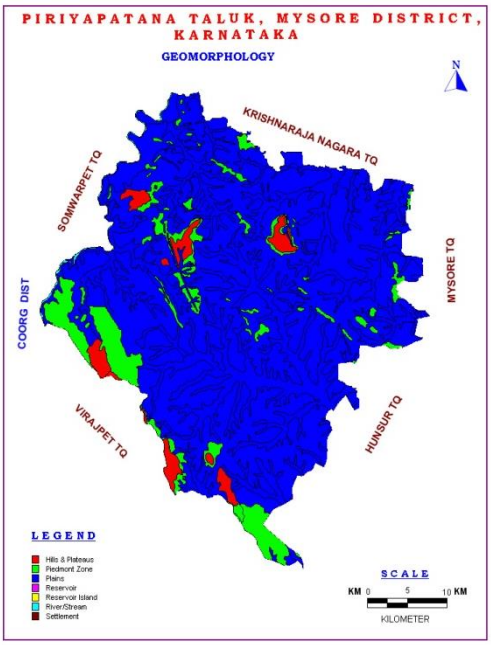

Fig-4: Geomorphology Map

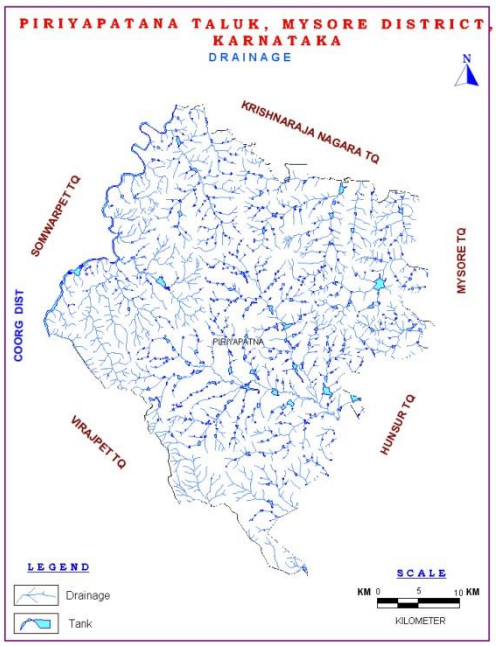

Fig-5: Drainage Map

1.6 Geology, Soil and Landuse

Geologically, the taluk is mainly composed of igneous and metamorphic rocks of Pre-Cambrian age either exposed at the surface or covered with a thin mantle of residual and transported soils. The rock formation in the taluk falls into gneissic complex formation. The geology map has been given in **Fig. 6.**

The soils of Piriyapatna taluk can broadly be classified into Clayey soils and Clayey Skeletal soils and Loamy soils. These soils vary in depth and texture, depending on the parent rock type, physiographic settings and climatic conditions **(Fig-7)** and mainly this taluk covered by agricultural land. Land Use and Land Cover map also included **(Fig.8).**

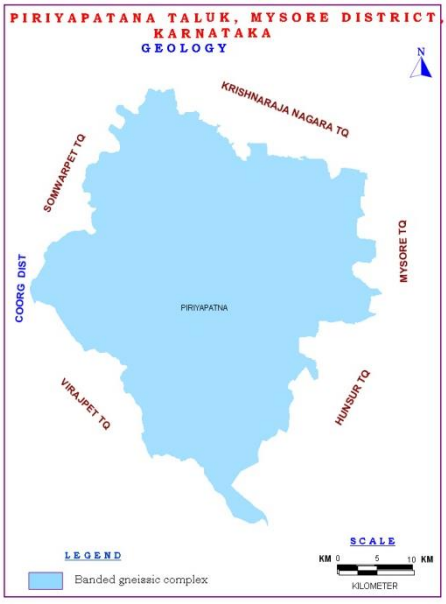

Fig-6: Geology Map

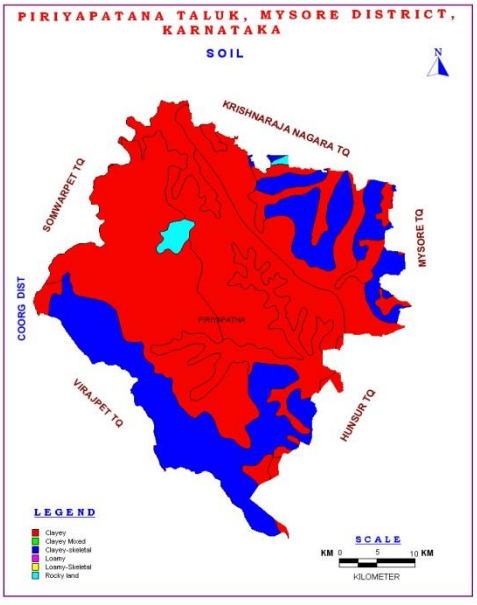

Fig-7: Soil Map

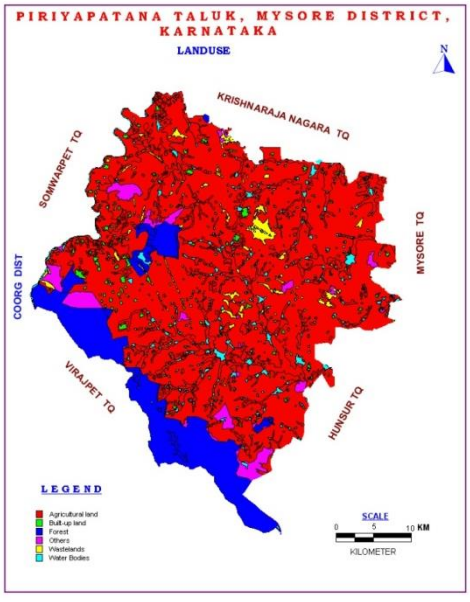

Fig-8: Land use Map

1.7 Ground water resource availability and extraction

As per the ground water resource estimation 2017 **(Table 6a),** the data on ground water resources shows that the net annual ground water availability is 9,240 ham. The existing gross groundwater for irrigation Domestic and Industrial is 5,318 ham. The stage of groundwater development is 58% and falling under 'Safe' category.

Table-6a. Detail of Dynamic Ground Water resource, (March 2017 Ham)

Annual Extractable GW Resource (Ham)	GW Extraction for Irrigation Use (Ham)	GW Extraction for Domestic and Industrial Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic and Industrial Use for next 25Yaers (Ham)	Net GW Availability for future Irrigation Development (Ham)	Stage of GW Extraction (%)	Categorization
9,240	4,795	523	5,318	697	4,091	58	Safe

Aquifer-wise total ground water resources down to 200 m depth are given in Table-6b below as per 2017 estimations.

Table-6b: Total Ground Water Resources (2017) (Ham)

Taluk	Annual Replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
Piriyapatna	9,240	Phreatic	Fractured (Down to 150m)	Dynamic + Phreatic in-storage + fractured
		7,874	1,738	18,852

1.8 Existing and future water demands (as per GWRA-2017 and 2020)

As per the GWRA 2017, the net ground water availability is 9,240 ham and the total ground water draft for all uses is 5,318 ham with stage of development at 58% and the taluk falls in Safe category. The domestic (Industrial sector) demand for next 25 years is estimated at 697 Ham.

The details of dynamic (Phreatic) ground water resources for Piriyapatna taluk as on March 2020 is shown in Table-7**.** It is observed that the stage of ground water extraction is all most same as 2017 to 2020 like 58%to 58.07%.

Table-7. Detail of Dynamic Ground Water resource, (as on March 2020)

Annual Extractable GW Resource (Ham)	GW Extraction for Irrigation Use (Ham)	GW Extraction for Industrial Use (Ham)	GW Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net GW Availability for future use (Ham)	Stage of GW Extraction (%)	Categorization
9,815.21	5,079.02	0	620.60	5,699.63	847.95	4,449.70	58.07	Safe

1.9 Water level behavior

The water level data have been monitored from the representative dug wells and borewells under NHS monitoring programme for both pre and post monsoon seasons in Aquifer I **(Table 8).** During Pre Monsoon season water level ranges from 3.3 to 9.7 mbgl, whereas in Post Monsoon it varies from 0.65 to 2.52 mbgl. Whereas in Aquifer II, the water level ranges from 12 to 14.25 mbgl in Pre Monsoon and 4.88 to 8.43 mbgl during Post Monsoon, the maps shown in **Fig 9 and 10.**

Table.8 Depth to Water level in Piriyapatna Taluk

	Pre Monsoon		Post Monsoon	
	Aquifer-I	**Aquifer-II**	**Aquifer-I**	**Aquifer-II**
Range	3.3-9.7	12-14.25	0.65-2.52	4.88-8.43
Average	5.68	13.13	1.36	6.66

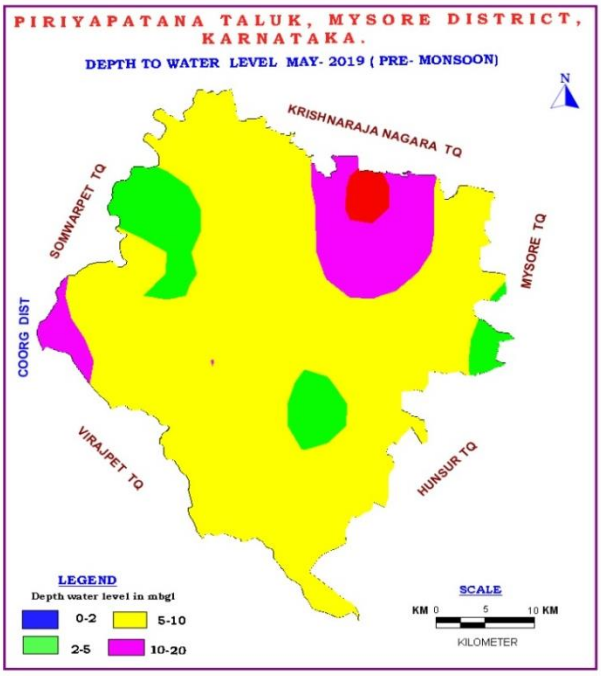

Fig-9: Pre-monsoon Depth to Water Level

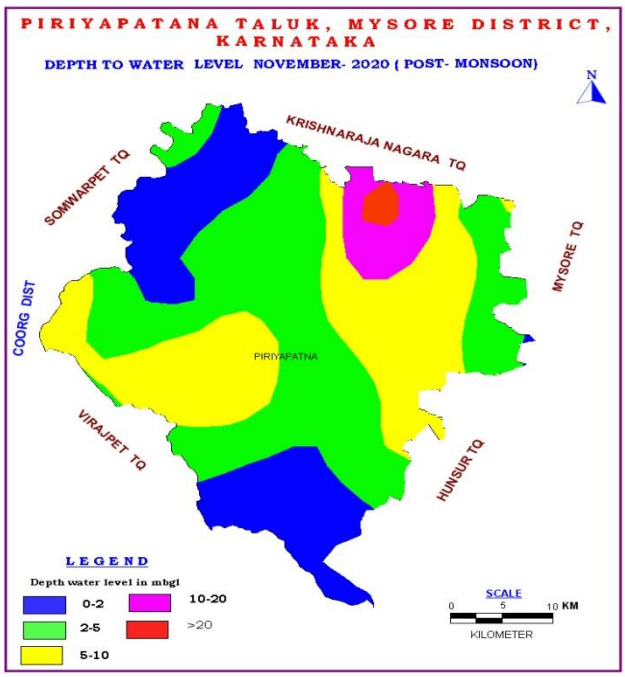

Fig-10: Post-monsoon Depth to Water Level

2 AQUIFER DISPOSITION

The occurrence and movement of water in the subsurface is broadly governed by geological frameworks i.e., nature of rock formations including their porosity (primary and secondary) and permeability. The principal aquifers in the area are Gneisses the occurrence and movement of ground water in these rocks is controlled by various factors and it primarily depends on the degree of interconnection of secondary pores/voids developed by fracturing and weathering in the hard rock.

2.1 Aquifer Types

In Piriyapatna taluk, there are mainly two types of aquifer systems

- Aquifer-I (Phreatic aquifer) comprising weathered Gneisses.
- Aquifer-II (Fractured aquifer) comprising fractured Gneisses.

In Piriyapatna taluk, Granitic gneiss are the main water bearing formations (Fig-8). Ground water occurs within the weathered and fractured Granitic gneiss under water table condition and semi-confined condition. In Piriyapatna taluk bore wells were drilled from a minimum depth of 90mbgl to a maximum of 200mbgl. Depth of weathered zone ranges from 12 mbgl to 39 mbgl. Ground water exploration reveals that aquifer-II fractured formation was encountered between the depths of 20 to 150mbgl. Yield ranges from Negligible to 4.2lps. The basic characteristics of each aquifer are summarised in **Table-9.**

The 3D aquifer disposition models, 2D aquifer sections and 3D aquifer fence diagrams have been prepared and presented in Fig. 11a, b and c.

Table-9: Basic characteristics of each aquifer

Aquifers	Weathered Zone (Aq.-I)	Fractured Zone (Aq.-II)
Prominent Lithology	Weathered Granitic gneiss	Fractured Granitic gneiss
Thickness range (mbgl)	3-8	Fractures upto 150 mbgl
Depth range of occurrence of fractures (mbgl)	-	20-150
Range of yield potential (lps)	-	<1 – 4.2

2.2 3D Aquifer disposition, Aquifer Fence Diagram and 2D Cross-Sections

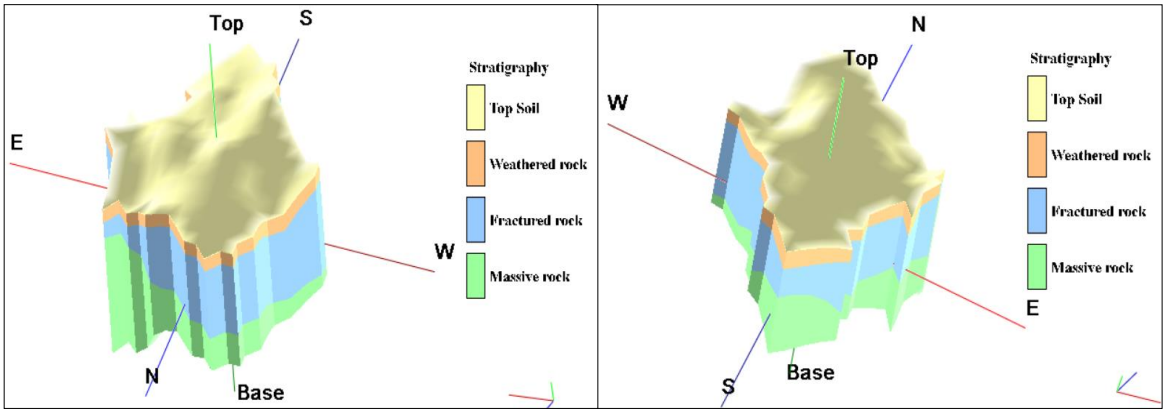

Fig-11a: 3D Aquifer Dispositions

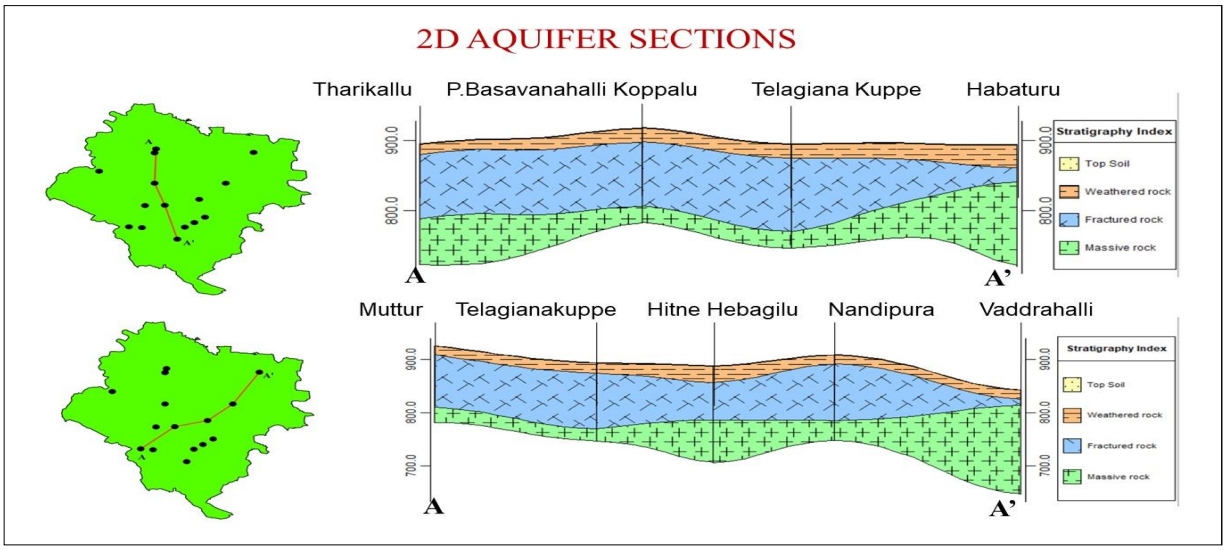

Fig-11b: 2D Cross sections in different directions

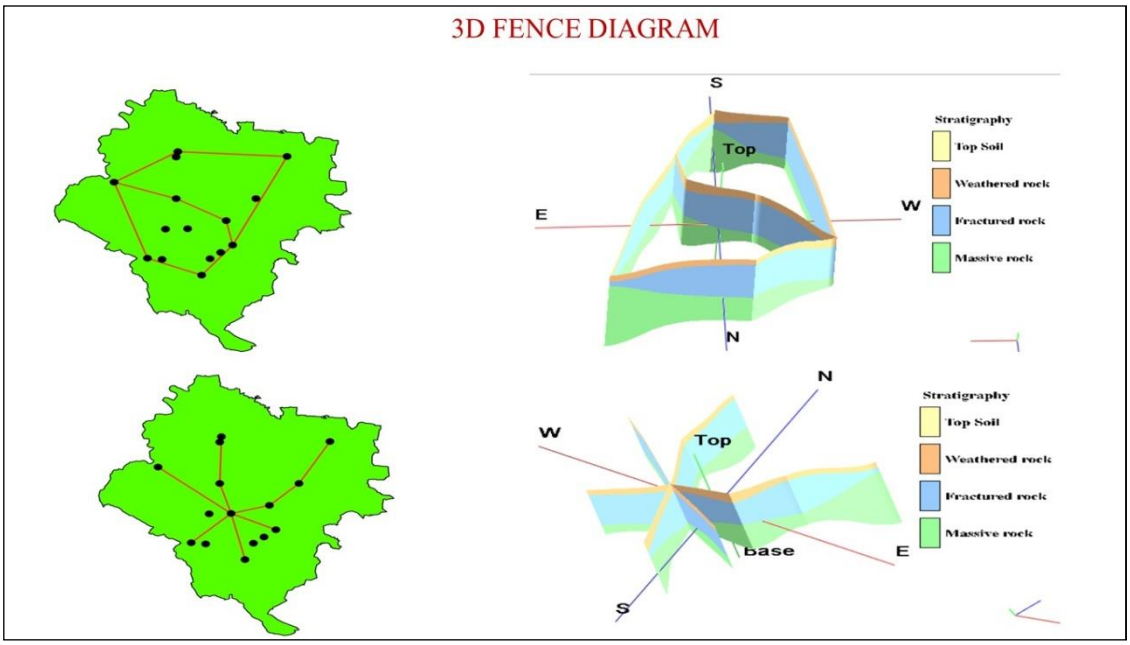

Fig-11c: 3D Aquifer Fence Diagram

3 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION ANDOTHER ISSUES

The main ground water issues are over exploitation, Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels especially in Aquifer II, declining water level trend and urbanized areas of Piriyapatna city thereby reducing the ground water recharge worthy areas which are all inter-related or inter dependent.

3.1 Comparison of Ground Water Resource and Extraction

The Dynamic Ground Water Resource 2017 and as on 2020 have already been summarised above and are shown in **Table 10.** It is observed that the ground water availability in 2020 is more compare to 2017 due to increase in rainfall and in water table and also due to the water conservation / recharge activities carried out in the taluk by various state govt. and other agencies.

Table-10 Comparison of ground water availability and draft scenario in Piriyapatna taluk

Taluk	GW availability (in ham)	GW draft (Extraction) (in ham)	Stage of GW development	GW availability (in ham)	GW draft (Extraction) (in ham)	Stage of GW development
Piriyapatna	**2017**			**2020**		
	9,240	5,318	58%	9,815.21	5,699.63	58.06%

3.2 Chemical quality of ground water and contamination

The water samples were collected in different parts of Piriyapatna taluk (Aquifer – I) and the Fig 12 given below.

The results of quality parameters show that:

- **Electrical Conductivity:** EC values range from 684 to 1651µS/cm at 25°C.
- **Nitrate:** Nitrate concentration in ground water ranges from 41.5 to 138 mg/l.
- **Fluoride:** Fluoride concentration in ground water ranges between 0.3 to 0.75 mg/l

Chemical Analysis result in Piriyapatna taluk (Aquifer.II) basic parameters is mentioned below in **Table.11.**

- **Electrical Conductivity:** EC values range from 337 to 2930µ S/cm at 25°C. The villages which have more EC value than the permissible limit are Pachavalli and Arenahalli.
- **Nitrate:** Nitrate concentration in ground water ranges from 4 to 209 mg/l. There are 23 villages which have more Nitrate value than the permissible limit are Kampalapura, Bekya, Chowkur, Panchvalli, Muddanahalli, Malangi gomala, Hebbaturu Koppalu, Buditiru, Chikkamagali, Chowdenahalli, Kundanahalli, Bylakuppe, Kogilur, Tirumalapura, Seegikorikaval, G.Basanahalli, Hitnehabbalu, Seeguru, Hasivinskavalu, Attigod, Chikkamalali, Ravandur, Arenahalli, Makanahalli.

- **Fluoride:** Fluoride concentration in ground water ranges between 0.05 to 1.4 mg/l.

Table-11. Basic parameter values of Piriyapatna Taluk, Mysore District (Aquifer.II)

Sl. No.	Location	Taluk	District	pH (6.5-8.5)	EC in µS /Cm	TH (600)	Ca (200)	Mg (100)	Na	K	CO_3	HCO_3	Cl (1000)	SO_4 (400)	NO_3 (45)	F (1.5)	TDS&
						mg/L											
1	Kampalapura	Piriyapatna	Mysuru	7.88	1163	435	92	50	76	9.1	0	360	67	105	122	0.20	756
2	Bekya	Piriyapatna	Mysuru	7.56	1193	545	58	97	46	6.2	0	537	50	54	103	0.27	775
3	Chowkur	Piriyapatna	Mysuru	7.66	1045	385	84	43	71	8.9	0	390	75	63	65	0.15	679
4	Panchvalli	Piriyapatna	Mysuru	7.93	2270	265	66	24	101	422.0	0	616	160	147	158	0.56	1476
5	Muddanahalli	Piriyapatna	Mysuru	7.92	940	320	68	36	54	15.8	0	366	37	52	62	0.23	611
6	Malangi gomala	Piriyapatna	Mysuru	7.71	2040	795	112	125	125	4.3	0	653	212	128	123	0.05	1326
7	Malangi	Piriyapatna	Mysuru	7.86	1301	565	74	92	130	5.1	0	702	25	194	27	0.50	846
8	Hebbaturu koppalu	Piriyapatna	Mysuru	7.74	1149	350	78	38	99	3.6	0	390	75	64	66	0.18	747
9	Budititu	Piriyapatna	Mysuru	7.32	1127	360	78	40	92	5.5	0	293	77	101	129	0.15	733
10	Piriyapatna	Piriyapatna	Mysuru	7.54	1541	475	100	55	161	5.6	0	622	127	82	38	0.18	1002
11	Chikkamagali	Piriyapatna	Mysuru	7.85	1261	385	132	13	121	4.0	0	519	70	76	56	0.23	820
12	Ilapura	Piriyapatna	Mysuru	7.99	617	225	34	34	63	3.7	0	329	17	40	4	0.35	401
13	Lingapura	Piriyapatna	Mysuru	6.69	337	85	14	12	35	6.0	0	98	10	46	19	0.25	219
14	Chowdenahalli	Piriyapatna	Mysuru	7.61	1551	585	108	77	107	7.3	0	500	125	144	69	0.49	1008
15	Kundanahalli	Piriyapatna	Mysuru	7.68	970	285	66	29	84	3.7	0	232	52	90	123	0.28	631
16	Bylakuppe	Piriyapatna	Mysuru	7.48	1483	505	112	55	110	4.2	0	427	110	129	117	0.35	964
17	Kogilur	Piriyapatna	Mysuru	7.25	604	155	40	13	70	0.7	0	140	22	105	49	0.37	393
18	Tirumalapura	Piriyapatna	Mysuru	7.44	1693	530	96	71	145	41.9	0	439	112	193	140	0.32	1100
19	Seegikorikaval	Piriyapatna	Mysuru	7.29	1085	395	94	39	67	4.2	0	214	72	117	137	0.22	705
20	G. Basanahalli	Piriyapatna	Mysuru	7.34	942	310	80	27	89	2.9	0	195	35	145	133	0.44	612
21	Hitnehebbalu	Piriyapatna	Mysuru	7.58	1628	500	120	49	153	12.4	0	433	105	153	171	0.31	1058
22	Seeguru	Piriyapatna	Mysuru	7.88	1037	355	86	34	65	4.2	0	293	45	98	114	0.53	674
23	Bettadapura	Piriyapatna	Mysuru	7.32	1237	485	98	58	100	3.6	0	531	45	160	6	1.40	804
24	Hasuvinskavalu	Piriyapatna	Mysuru	7.56	1337	425	100	43	136	8.9	0	348	65	170	152	0.52	869
25	Attigod	Piriyapatna	Mysuru	7.84	963	340	54	50	100	7.7	0	372	30	98	89	1.00	626
26	Chikkamalali	Piriyapatna	Mysuru	7.87	1243	465	122	39	91	4.9	0	500	70	34	102	0.49	808
27	Kelaganadoddakoppalu	Piriyapatna	Mysuru	7.48	2020	615	214	19	185	1.1	0	927	95	159	13	0.43	1313
28	Ravandur	Piriyapatna	Mysuru	7.85	1011	400	154	4	48	5.5	0	409	22	40	111	0.25	657
29	Arenahalli	Piriyapatna	Mysuru	7.50	2930	1040	304	68	180	23.2	0	659	305	180	209	0.17	1905
30	Makanahalli	Piriyapatna	Mysuru	7.89	1081	430	92	49	51	8.5	0	348	57	102	84	0.34	703

Aquifer – I

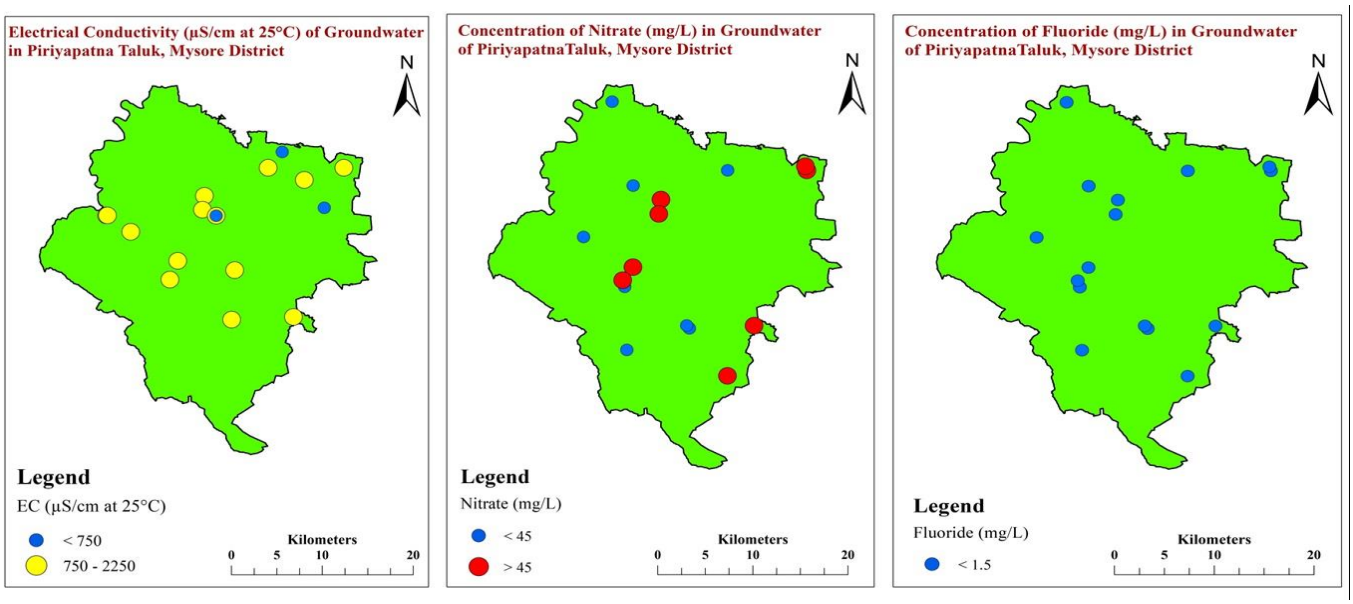

Figure-12. Groundwater Quality Map

4 GROUND WATER RESOURCE ENHANCEMENT

4.1 Resource Enhancement by Supply Side Interventions

Recharge dry **phreatic aquifer (Aq-I)** in the taluk, through construction of artificial recharge structures, viz; check dams, percolation tanks & Sub surface dyke **(Table-12).** The choice of recharge structures should be site specific and such structures need to be constructed in areas already identified as feasible for artificial recharge. **(Fig.13).**

Table-12: Quantity of non-committed surface runoff & expected recharge through AR Structures

Details of Artificial Recharge structures in Piriyapatna Taluk		
Sl.No	**Artificial recharge structures available/proposed**	
1	Non committed monsoon runoff available in (MCM)	59.354
2	No of sub surface dykes	2
3	No of Check Dams	310
4	No of percolation tanks	53
5	Filter Beds	14
6	Tentative total cost of the project (Rs in lakhs)	4216.92
7	Expected Recharge in (MCM)	23.83
8	Expected Rise in water level in (m)	0.095
9	Cost benefit ratio (Rupees/Cubic.m of water harvested)	10.09

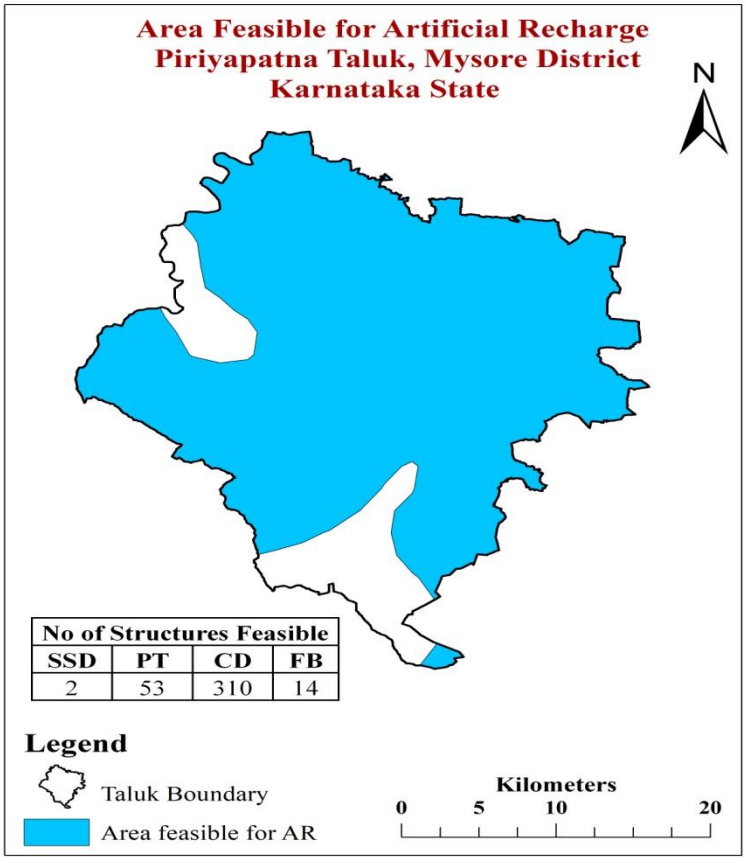

Fig-13. Area feasible for Artificial Recharge structures

4.1.1 Benefit of Artificial recharge scheme

Artificial recharge structures namely Check Dams, Percolation Tanks, Filter Beds, Subsurface Dyke and Nala bunds can be taken up on large scale in the over-exploited areas as a management plan to tackle falling ground water levels.

- These structures have proved in building-up of ground water levels and sustainability of ground water abstraction structures, mainly in bore wells.
- An increase in the area irrigated by ground water source is also observed in the area of influence.
- Such activities help in providing sustainable drinking water to the rural population. The qualitative result from farmer's perception indicates that, there is rising trend in ground water levels in the area of influence, productivity of crops enhanced and improvement in yield is observed in bore wells.
- The cropping pattern has shown that farm households have resumed growing crops such as grapes which were not previously grown in the area.

4.2 Resource Savings by Demand Side Interventions

4.2.1 Advanced irrigation practices

Piriyapatna Taluk falls under Safe category with the stage of groundwater extraction of 58.07%. However, Water Use Efficiency (WUE) practices like Drip irrigation needs to be strengthened to save irrigation water by way of precision farming mechanism. This ultimately enhances the area under irrigation potential.

4.2.2 Water Use Efficiency by Micro Irrigation Practices

It is observed that wells and bore wells are the source for 21,619 ha of net irrigation in the taluk. Adoption of water use efficiency (WUE) techniques will contribute in ground water resource enhancement in the long run by way of saving of water. Efficient irrigation practices like Drip irrigation & sprinkler needs to be adopted by the farmers in the existing 21,619 ha of net irrigated area by wells & bore wells.

4.2.3 Change in cropping pattern

Agriculture is the main occupation in Piriyapatna taluk. Water intensive crops like Paddy and Tobacco is grown in 44,264 ha of net cropped area of 89,738 ha. However, oil seeds are grown during kharif and rabi. At present (2020), the stage of ground water extraction is 58.06% and taluk has been categorised as Safe, thus change in cropping pattern has not been suggested.

Table 13: Details of Resource Enhancement after proposed supply side and demand side interventions

Sl.No	Resource Details	As per 2020 Estimation
1	Net Groundwater Availability in Ham	9815.21
2	Existing stage of Ground water development in %	58.06
3	Existing Gross Groundwater Draft for all use in Ham	5699.63
4	Expected recharge from Artificial recharge projects Ham	2383
5	Saving due to adopting WUE measures	188
6	Expected improvement in stage of ground water development after implementation of project in %	46
7	Expected improvement in overall stage of ground water development in %	12
8	Expected additional irrigational potential in Lakh Ha	0.054

4.2.4 Regulation and Control

Piriyapatna taluk has been categorized as **Safe**, since the stage of ground water development has reached 58.06% (GEC 2020), it may be encouraged to extract the ground water with care so that further ground water exploitation should not happen in the taluk However mandatory guideline issued by Government of Karnataka like rain water harvesting and Artificial recharge structures should be constructed. Ground water recharge component needs to be made mandatory in the non-command area of the taluk for further development of ground water.

4.2.5 Other interventions proposed

- Periodical maintenance of artificial recharge structures should also be incorporated in the Recharge Plan.
- Excess nitrate concentration is found in ground water samples require remedial measures viz.
  - Dilution of nitrate rich ground water through artificial recharge & water conservation.
- Roof top rain water harvesting.

5 SUMMARY AND RECOMMENDATIONS

The main ground water issues are Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels particularly in Aquifer II in some parts, hilly and plateau areas which are all inter-related or inter dependent. The summary of ground water management plan of Piriyapatna taluk is given in **Table-14.**

Table 14: Summary of Management plan

Stage of GW Extraction and Category (2020)	58%, Safe
Annual Extractable GW Resource (Ham)	9815.21
Total Extraction (Ham)	5699.63
Ground Water Draft for Irrigation (Ham)	5079
Ground Water Resource Enhancement by Supply side Interventions	
No of Proposed AR structures SSD PT CD FB	 2 53 310 14
Expected Additional Recharge to GW due to AR (Ham)	2383
Additional Irrigation Potential that can be created (Lakh Ha)	0.054
Total Estimated Expenditure (Rs. in Lakhs.)	4216.92
Saving due to adopting WUE measures, **Demand side** (Ham)	188
Change in Stage of GW Extraction (%)	58 to 46

- **Ground water resource enhancement:** Continuous drought, increase in agricultural activity, subjected to excessive ground water withdrawal leading to depletion of ground water level, reduction in yield and deterioration of ground water quality etc., suggests a need for proper ground water management and enhancement of storage capacity of aquifers, protection of ground water quality and proper utilization of ground water. To enhance the storage capacity of aquifers, the dewatered aquifers are to be recharged, for which the artificial recharge structures like Check dams, percolation tanks, point recharge structures etc have to be constructed.
- **Ground Water resource**: As per the resource estimation – 2020, Piriyapatna taluk falls under Safe category with the stage of ground water extraction of 58.06%. However, there is need to formulate management strategy to tackle the water scarcity related issues in the taluk during the summer and scarcity of water during the future days.

- **Ground water resource enhancement**: Increase in agricultural activity, excessive ground water withdrawal, depletion of ground water levels, reduction in yield and ground water quality related issues etc., suggests the need for scientific ground water management, enhancement of storage capacity of the aquifers and protection of ground water quality.
- **Quantity of water available through non-committed surface run-off:** The surplus non-committed monsoon run off is estimated to be approximately 59.354 MCM. This can be used to recharge the aquifer mainly through Sub surface Dykes (about 2) percolation tanks (about 53), Check Dams (about 310), Filter Beds (about 14) (CGWB, 2020).
- **Advanced irrigation practices:** The important crops grown are Paddy, Ragi, Maize, gram, tur, groundnut about 65.50 sq.km area is being by canal irrigation and the remaining part of the irrigated area is fed by ground water. In view of this, Water Use Efficiency (WUE) practices like Drip needs and Micro irrigation to be strengthened to save irrigation water by way of precision farming mechanism. This ultimately enhances the area under irrigation potential.
- **Conjunctive use plan in water logged area**: Out of the total 232 sq.km of the canal command area in the taluk, about 12ha is water logged. About 12ha of this is reclaimed since inception. (Source: CADA as on March 2021). In addition to this reclamation, conjunctive use plan is also recommended to benefit the tail end area of the irrigation command.
- **Change in cropping pattern**: Farmers are facing inadequacy of groundwater for agriculture during summer and can opt for more rain-fed millets and water efficient Pulses for agricultural production.
- **Drinking water Supply**: In view of ground water contamination with mainly higher concentration Nitrate and fluoride, drinking water supply from surface water needs to be explored/ ensured.
- **Regulation and control:** Taluk is categorized as "Safe". However, the mandatory guidelines like rainwater harvesting and artificial recharge issued by Karnataka Ground Water Authority needs to be strictly implemented in the taluk, so that quality of ground water will improve in due course of time.
- **Participatory management**: Awareness programmes and practice of participatory approach needs to be strengthened with the involvement of all the stake holders for sustainable management.