
**केंद्रीय भूमि जल बोर्ड**

जल संसाधन, नदी विकास और गंगा संरक्षण

विभाग, जल शक्ति मंत्रालय

भारत सरकार

**Central Ground Water Board**

Department of Water Resources, River Development and Ganga Rejuvenation,

Ministry of Jal Shakti

Government of India

# AQUIFER MAPPING AND MANAGEMENT OF GROUND WATER RESOURCES

## RAICHUR TALUK

## RAICHUR DISTRICT, KARNATAKA

दक्षिण पश्चिमी क्षेत्र, बैंगलोर

South Western Region, Bengaluru

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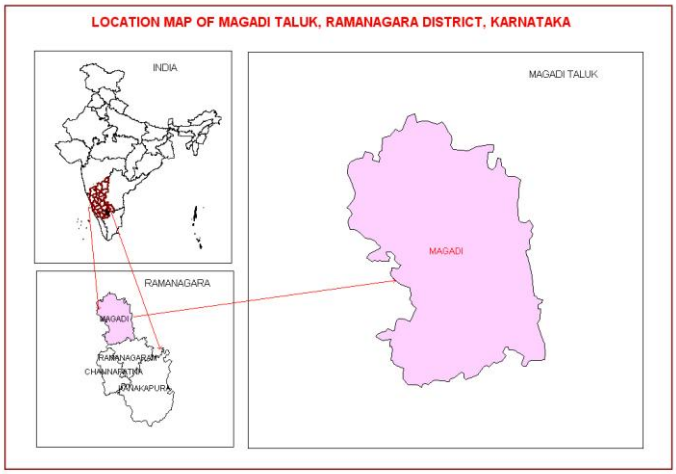
**GOVERNMENT OF INDIA**
**MINISTRY OF JAL SHAKTI,**
**DEPT. OF WATER RESOURCES, RD&GR**
**CENTRAL GROUND WATER BOARD**

# AQUIFER MANAGEMENT PLAN OF RAICHUR TALUK, RAICHUR DISTRICT, KARNATAKA STATE

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**BANGALORE**

**March 2020**

# AQUIFER MANAGEMENT PLAN OF RAICHUR TALUK, RAICHUR DISTRICT, KARNATAKA STATE

## CONTENTS

# AQUIFER MANAGEMENT PLAN OF RAICHUR TALUK, RAICHUR DISTRICT, KARNATAKA STATE

## 1.0 Salient information:

Taluk name : **Raichur**
District : Raichur
State : Karnataka
Area : 1550 sq.km.
Population : 498,637
Normal Annual Rainfall: 697 mm

### 1.1 Aquifer management study area:

Aquifer mapping studies was carried out in Raichur taluk, Raichur district of Karnataka, covering an area of 1550 sq.kms under National Aquifer Mapping. It is located between north latitude 15°55'48" and 16°25'12" & east longitude 77°08'24" and 77°36'00" and is covered in parts of Survey of India Toposheet No 56 H/7, 56 H/8 and 56 H /11. The taluk is bounded by Andhra Pradesh in the northern, southern and eastern part, western side by Manvi and Devadurga taluks. Location map of Raichur taluk of Raichur district is presented in **Fig. 1**.

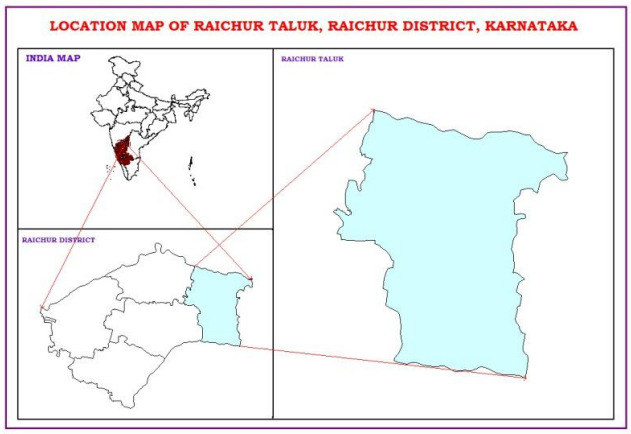


**Fig. 1: Location Map of Raichur taluk, Raichur district**

Raichur is the district headquarters of Raichur district and is located about 411 km north of Bangalore. There are 145 inhabited and 15 uninhabited villages in Raichur taluk. It is well connected by railway and road. The nearest airport to Raichur is the Rajiv Gandhi International airport in Hyderabad and the Hubli airport in Karnataka. The taluk can be approached from Bellary or from Anantapur district of Andhra Pradesh.

### 1.2 Population:

According to 2011 census, the population of Raichur taluk is 498,637. Out of the total population, 247,476 constitute the rural population and 251,161 is the urban population. This constitutes 49.6

% (rural) and 50.36 % (urban) of the total population. The total male population is 249,556 and female population is 249,081. Decadal change in population from 2001-2011 is 14.53 %.

### 1.3 Rainfall:

Raichur taluk has arid to semi climate. Dryness and hot weather prevail in major part of the year. The winter is mild and summer is hot. December is the coldest month with daily minimum temperature of 17º to 18 ºC and May is the hottest month with mean daily maximum temperature hovering around 40ºC.

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.

There is one rain gauge station located in Raichur taluk **(Table 1).** The data in respect of this station from the year 1981 to 2010 is analyzed and presented in **Table 2**. The data pertaining to these gauges is of long-term nature and are well maintained. It is presumed that they are representative of the taluk and the same is used for analysis. Normal annual rainfall for the period 1981 to 2010 is 697 mm and normal monsoon rainfall is 490 mm.

**Table 1: Raingauge and its location in Raichur Taluk**

| Station | Latitude | Longitude | Altitude |
|---|---|---|---|
| Raichur | 16.20 | 77.35 | 672.2 |

### Statistical analysis

Computations were carried out for the 30 year blocks of 1981- 2010 on Mean, Standard deviation and coefficient of variation of each month pre monsoon, monsoon, post monsoon and annual and are shown in **Table 2**.

The mean monthly rainfall at Raichur taluk is ranging between 3 mm during January to 149 mm during September. The CV percent for pre monsoon, monsoon and post monsoon season is 69, 30 & 80 percent respectively. Annual CV at this station works out to be 24 percent.

**Table 2: Statistical Analysis of Rainfall Data of Raichur Taluk, Raichur District for the Period 1981 to 2010**

| STATION | | JAN | FEB | MAR | APR | MAY | PRE MONSOON | JUN | JUL | AUG | SEP | SW MONSOON | OCT | NOV | DEC | NE MONSOON | ANNUAL RAINFALL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RAICHUR TALUK | Normal Rainfall (mm) | 4 | 3 | 9 | 16 | 38 | 70 | 103 | 124 | 116 | 147 | 490 | 111 | 23 | 3 | 137 | 697 |
| | STDEV | 9 | 10 | 25 | 20 | 39 | 48 | 70 | 66 | 65 | 86 | 147 | 102 | 29 | 11 | 110 | 165 |
| | CV% | 219 | 329 | 272 | 124 | 103 | 69 | 68 | 54 | 55 | 59 | 30 | 92 | 126 | 314 | 80 | 24 |

**Assessment of Drought**

Rainfall data of Raichur taluk has been analyzed for 45 years using IMD method to assess the drought condition. The results of the classification are listed in **Table 3**. It is observed that the taluk has experienced alternating no drought to severe drought conditions over the years.

**Table 3: Classification of drought and its periodicity (IMD, 1971)**

| % Deviation (Di) | | >0 | 0 to -25 | -25 to -50 | 50 to 75 | <-75 | Probability of drought occurrences |
|---|---|---|---|---|---|---|---|
| Category | | No drought | Mild (Normal) | Moderate | Severe | Acute | |
| | | Years | | | | | |
| Taluk | Raichur | 9 | 28 | 8 | 0 | 0 | Once in 6 years |

The details of the drought assessment are discussed. Out of 45 years of analysis in Raichur taluk, "No Drought" condition is experienced in 9 years, "Mild Drought" condition is experienced in 28 years and "Moderate Drought" condition experienced in 8 years. Based on occurrence and frequency of past drought events, the probability of occurrence of various intensities of drought at each station has been studied. It has been observed that the frequency of occurrence of drought is once in **6 years** at Raichur taluk.

## 1.4 Agriculture & Irrigation

Agriculture is the main occupation in Raichur taluk. 49.6% of the total population constitutes the rural population and are engaged in agriculture. The amount of rainfall and its distribution throughout the season contributes to the cropping pattern in the area. There are two agricultural seasons namely Kharif (June – October) and Rabi season (Mid October – Mid February). Major Kharif crops are paddy, Jowar, Bajra and Maize and main crops of Rabi season are Tur pulse, Bengal gram and oilseeds. Commercial plants like cotton and Sugarcane are other crops grown in the taluk. Hence, pulses are the major crops grown in the taluk followed by cereals and cotton as evident from **Table 4**.

**Table 4: Area wise crops grown in Raichur taluk (Area in Ha)**

| Taluk | Cereals | Pulses (Tur and Bengal gram) | Oil seeds | Fruits | Vegetable | Cotton | Sugarcane |
|---|---|---|---|---|---|---|---|
| Raichur | 24461 | 43613 | 4101 | 617 | 1496 | 17081 | 10 |

*(Source: Raichur District at a Glance, 2015-16, Govt. of Karnataka)*

Among the cereals, Paddy (12144 hectare) is grown extensively, followed by Jowar (11133 hectare), Maize (597 hectare) and Bajra (587 hectare). Vegetables like onion (6140 hectare), tomato (5740) green chillies (2640 hectare), brinjal (1080 hectare) are grown more compared to fruits.

And various oilseeds like groundnut (2636 hectare), castor (920 hectare) and sunflower (545 hectare) are also grown. In Raichur taluk, majority of the area is under agriculture (**Fig 2**) with less than 1% of forest cover (**Table 5**).

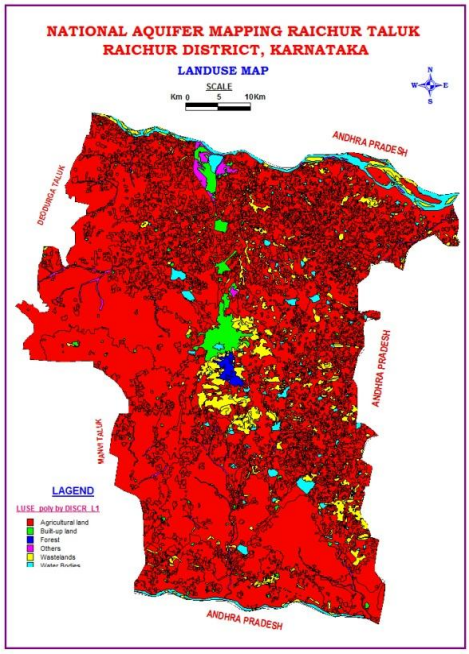


**Fig. 2: Land use map**

**Table 5: Land use pattern of Raichur taluk (Area in Hectare)**

| Taluk | Forest | Land not available for cultivation | Un-cultivable land | Fallow Land | Area sown | | |
|---|---|---|---|---|---|---|---|
| | | | | | Net Sown | Sown more than once | Total |
| Raichur | 401 | 2172 | 11113 | 59713 | 78016 | 12637 | 90653 |

*(Source: Raichur District at a Glance, 2015-16, Govt. of Karnataka)*

A major dam has been constructed in Bellary district near Hospet across the river Tungabhadra and the Left Bank Canal of the project provides irrigation facility. The important sources of irrigation are Canals, tube wells, dug wells and tanks and the irrigated area from the different sources are given in **Table 6**. There are 3829 dug wells and 1775 numbers of tube wells in the taluk and ground water also plays an important role as a source of irrigation. The gross and net area irrigated is 7895 hectare and 5287 hectare respectively.

**Table 6: Net Area Irrigated by different sources in Raichur taluk (Area in Hectare)**

| Taluk | Canals | Tanks | Dug wells | Tube wells | Lift irrigation | Other source | Total |
|---|---|---|---|---|---|---|---|
| Raichur | 9548 | 97 | 2259 | 3028 | 1104 | 834 | 22627 |

*(Source: Raichur District at a Glance, 2015-16, Govt. of Karnataka)*

### 1.5 Geomorphology, Physiography & Drainage:

Raichur taluk is predominantly a plain one with the central portion occupied by piedmont zone and hillocks (**Fig 3**). The hills have a North –West to South-East trend. Most of the hill ranges comprises of granitic gneiss and partly of schist. The river Krishna and Tungabhadra runs in the northern part and southern part of the taluk respectively. The drainage pattern is dendritic in nature (**Fig 4**).

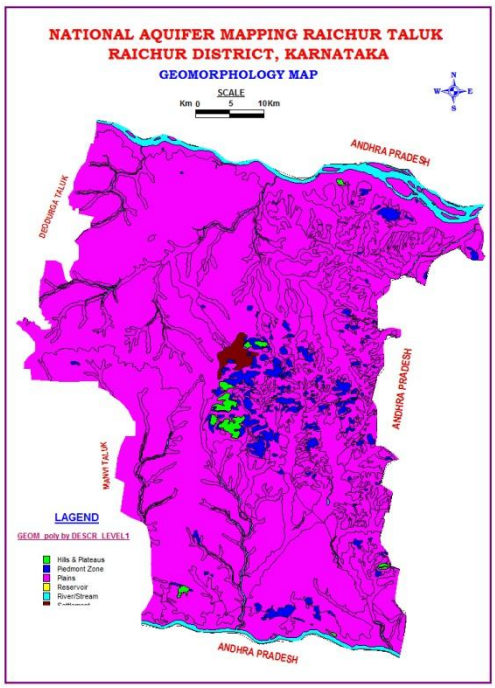


**Fig. 3: Geomorphology map**

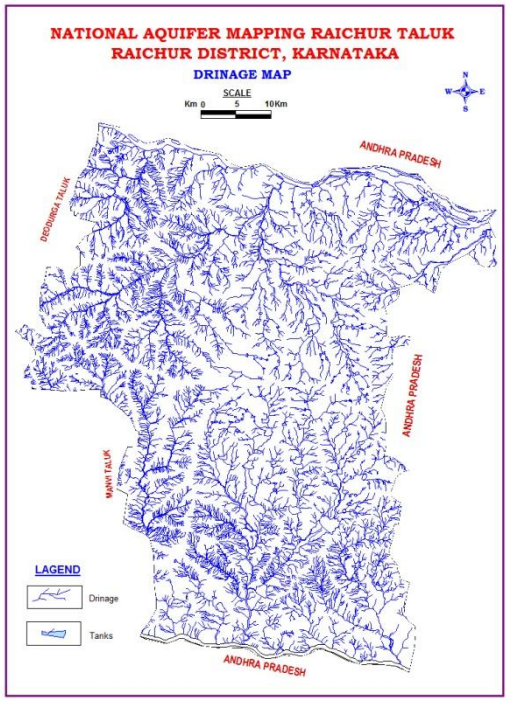


**Fig. 4: Drainage map**

### 1.6 Soil

The taluk is covered mainly by different variants of clayey soil. In the western side of the taluk, clayey soil is prevalent, whereas in the eastern part clayey skeletal is found. Mixed variety of clay in minor amount is exposed in narrow stripes along the northern portion (**Fig 5**).

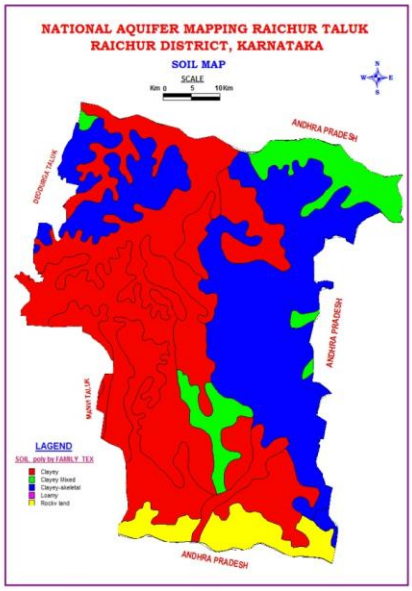


**Fig. 5: Soil map**

### 1.7 Ground water resource availability and extraction

Aquifer wise total ground water resources up to 200 m depth are given in **Table-7**.

Table 7: Total GW Resources (2017)

| Taluk | Annual replenishable GW resources (in ham) | Fresh In-storage GW resources | | Total availability of fresh GW resources |
|---|---|---|---|---|
| | | Phreatic (in ham) | Fractured (Down to 200 m) (in ham) | Dynamic + phreatic in-storage + fractured (in ham) |
| Raichur | 8197 | 25736 | 4765 | 38698 |

### 1.8 Existing and future water demands (as per GEC-2017)

Net ground water availability for future irrigation development: 2068ham

Domestic and Industrial sector demand for next 25 years: 809 ham

### 1.9 Water level behavior

**a) Depth to water level**

**Aquifer - I**

Pre-monsoon: 1.85 to 5.60 mbgl **(Fig 6)**
Post-monsoon: 0.85 to 2.05 mbgl **(Fig 7)**

**Aquifer- II**

Only one peizometer is present in the taluk.
Pre-monsoon: 4.36 m bgl **(Fig 8)**
Post-monsoon: 1.8 m bgl **(Fig 9)**

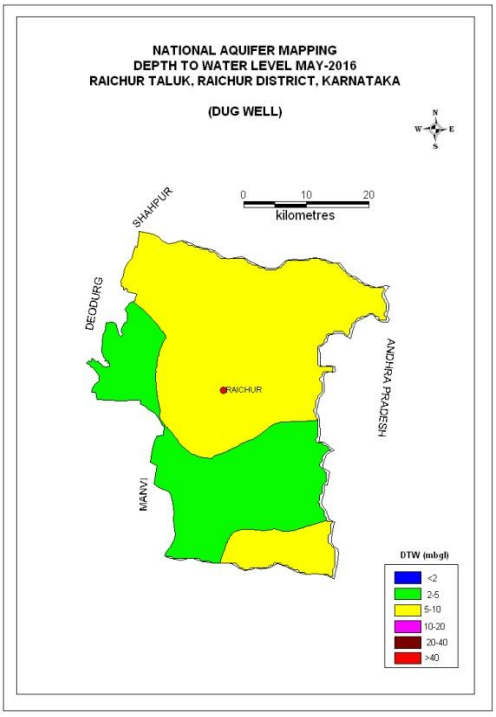


Fig 6: Pre-monsoon Depth to water level, Aq-I

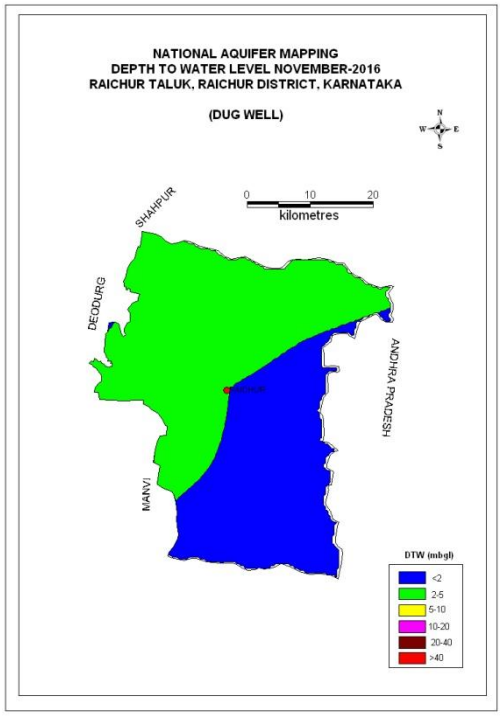


Fig 7: Post-monsoon Depth to water level, Aq-I

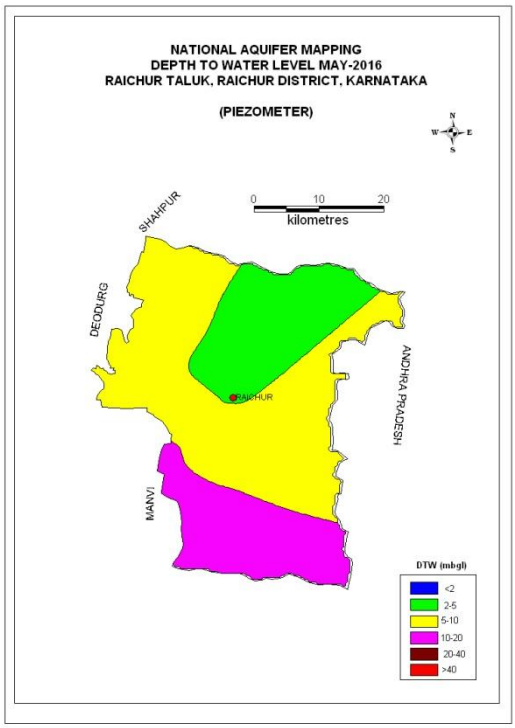


Fig 8: Pre-monsoon Depth to water level, Aq-II

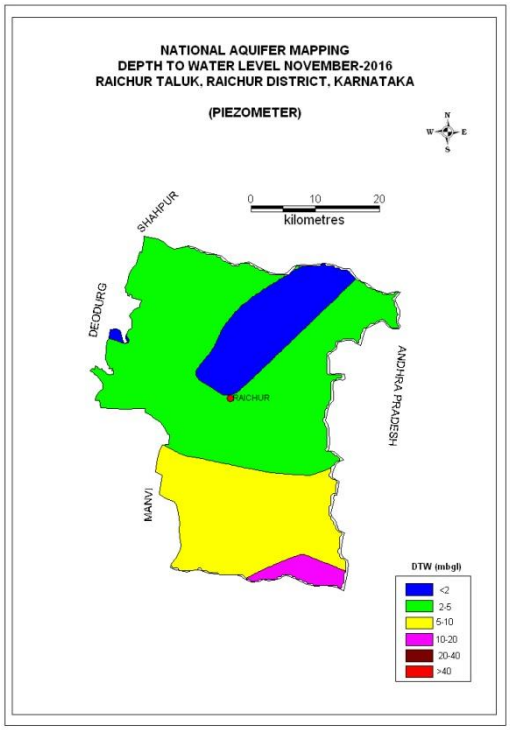


Fig 9: Post-monsoon Depth to water level, Aq-II

**(b) Seasonal water level fluctuation**

Seasonal Fluctuation: (May, 2016 to Nov, 2016)

**Aquifer – I (Fig 10)**

Rise range :( 0.55 to 2.9) m

Fall: No fall observed

**Aquifer – II (Fig 11)**

- Only one peizometer showing rise of 2.56 m

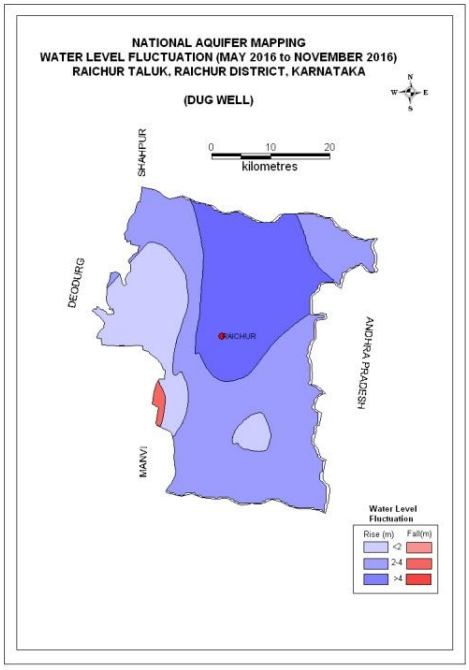


Fig 10: Seasonal water level fluctuation (Aq–I)

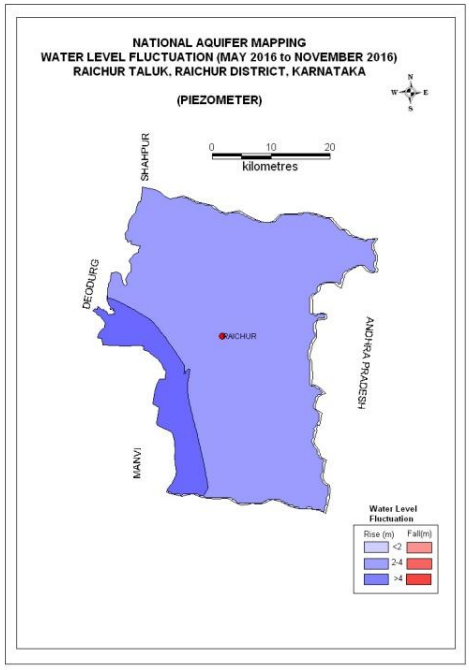


Fig 11: Seasonal water level fluctuation (Aq- II)

## 2.0 AQUIFER DISPOSITION:

**2.1 Number of aquifers:** There are mainly two types of aquifer systems in the taluk:

i. Aquifer-I (Phreatic aquifer) comprising of weathered zone of granite and schist.
ii. Aquifer-II (Fractured aquifer) comprising of fractured granite and schist.

Aquifer II is the main aquifer as the taluk is occupied predominantly by crystalline hard granitic rocks of Archean age **(Fig 12).** This Granitic rock belongs to Closepet granites. The granites are massive in nature and are devoid of primary porosity. They are pink and grey in colour and are rich in potash feldspar. In the western and southern part of the taluk, meta-sediments like schist occur. Fractures and fissures developed along secondary porosity like faults and joints which facilitate moderate movement of ground water. The schist/granites are weathered at shallow depth and ground water occurs under phreatic conditions and in deeper depth under semi-confined to confined conditions.

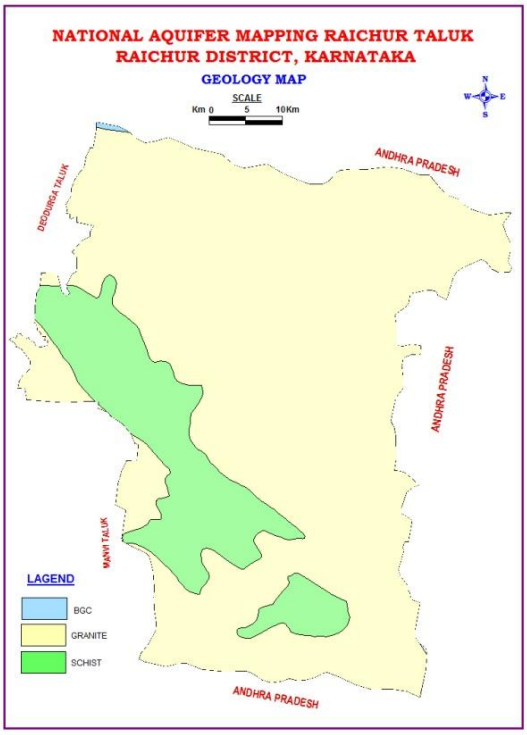


**Fig 12: Geology map**

Ground water exploration (**Table 8**) reveals that aquifer- I is the phreatic one which extends generally from 1.0 mbgl upto 30 mbgl, and aquifer-II is the fractured one which are encountered beyond the depth range of 30 mbgl. Yield ranges from negligible to 1.74 lps and transmissivity ranges from 14 to 84 $m^2$/day. The basic characteristics of each aquifer are summarized in **Table 9**.

**Table 8: Details of Ground Water Exploration by in house and outsourcing (By WAPCOS)**

| Location | Latitude | Longitude | Depth Drilled (m bgl) | Total Casing (in m) | Fractures zone (m bgl) | Yield (lps) | SWL (m) | Formation |
|---|---|---|---|---|---|---|---|---|
| Yeramarus | N 16° 15' 25.4" | E 77° 21' 14.6" | 200.00 | 7.30 | 153 to 156 | 0.21 | 66.37 | Granite |
| Shaktinagar | N 16°22' 02.3" | E77° 20' 57.7" | 200.00 | 15.64 | Dry | - | - | Granite |
| Sankamkunte | N 16° 18' 00.0" | E 77° 26' 01.2" | 200.00 | 7.70 | 150 to 151.60 | 1.74 | 24.57 | Granite |
| Dinni | N 16° 06'28.06" | E 77° 15' 43.00" | 200.00 | 7.50 | Dry | - | - | Granite |
| Jagarkkal | N 16°18' 24.15" | E 77° 17' 6.23" | 200.00 | 25.11 | Dry | - | - | Granite |
| Atkur | N 16° 19' 21.4" | E 77° 32' 25.8" | 200.00 | 18.50 | Dry | - | - | Granite |
| Matamari | N 16°02' 8.50" | E 77° 17' 42.96" | 200.00 | 12.15 | Dry | - | - | Granite |
| J. Venkatapuram | N 16° 15' 54.7" | E 77° 14' 38.6" | 200.00 | 12.16 | 27.36 to 30.40 | 0.08 | 22.45 | Granite |
| Chandrabanda | N 16°14' 42.90" | E 77°27' 15.7" | 200.00 | 24.50 | Dry | - | - | Granite |
| Gillesugur | N 15° 58' 32.6" | E 77° 22' 19.4" | 200.00 | 21.00 | Dry | - | - | Granite |
| Askihal | N 16°12' 22.3" | E 77° 19' 20.7" | 200.00 | 12.16 | 39.52 to 42.56<br>109.44 to 112.48 | 1.39 | 3.33 | Granite |
| Gunjehalli | N 16° 02' 21.2" | E 77° 24' 44.4" | 200.00 | 30.36 | Dry | - | - | Granite |
| Raichur | N 16°12' 22.25" | E 77° 20' 27.5" | 200.00 | 24.32 | Dry | - | - | Granite |
| Tuntapur | N 16° 6' 55.2" | E 77° 24' 5.7" | 200.00 | 6.10 | Dry | - | - | Granite |
| Idapnur | N 16° 01' 30.2" | E 77° 27' 11.8" | 200.00 | 15.2 | 26.19 to 29.10<br>43.65 to 46.56<br>151.32 to 154.23 | 0.75 | 14.72 | Granite |
| Bijanagera | N 16° 10' 06.4" | E 77° 24' 42.6" | 200.00 | 9.0 | 78 to 81<br>90 to 93 | 0.43 | 15.32 | Granite |
| J. Malapur | N 16°19'0" | E 77°17'20" | 69.5 | 0.70 | -- | 0.91 | 11.70 | Granite |
| Jagarkal | N 16°18'0" | E 77°17'45" | 69.5 | 1.53 | -- | < 1.00 | 3.13 | Granite |

**Table 9: Basic characteristics of each aquifer**

| Aquifer | Weathered Zone (Aq.-I) | Fractured Zone (Aq.-II) |
|---|---|---|
| Prominent Lithology | Granite, schist | Granite, schist |
| Thickness range (m bgl) | Up to 30 | Fractures ranging from 30 up |
| Depth range of occurrence of fractures(mbgl) | Within 30 | 31-156 |
| Range of yield potential (lps) | 0.08 | 1.74 |
| T ($m^2$ /day) | --- | 14-84 |
| Quality, Suitability for Irrigation | Suitable | Suitable |
| Remarks | One set of fracture | One to two sets of fractures are common |
| Suitability for Domestic purposes | Sporadic occurrence of Nitrate | Generally suitable with sporadic occurrence of Nitrate |

## 2.2 3D aquifer disposition and basic characteristics of each aquifer:

The available Exploration drilling data is utilised for generating aquifer disposition maps through Rock works soft ware. The outputs obtained are presented in **Fig 13 a to d**.

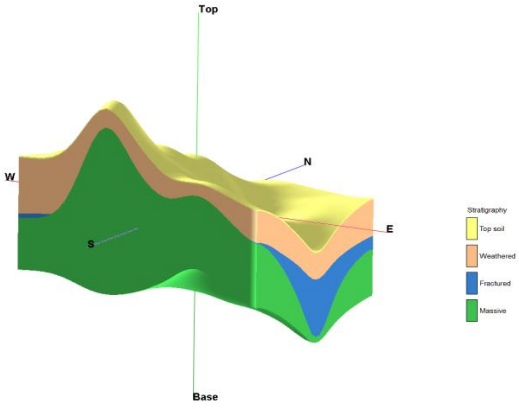


**Fig-13a**

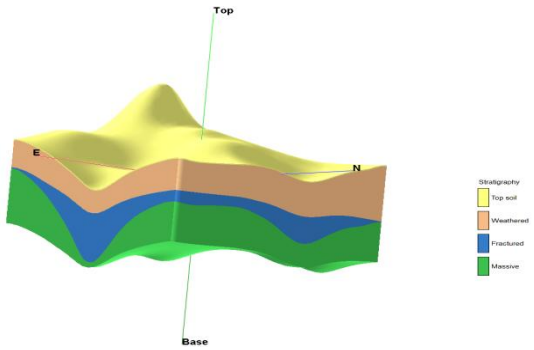


**Fig-13b**

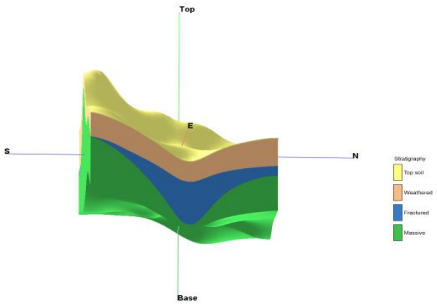


**Fig-13c**

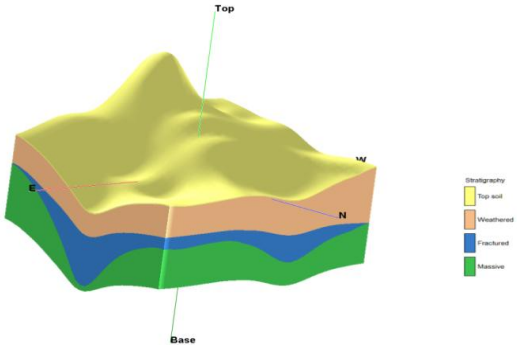


**Fig-13d**

**Fig-13 a to 13d: 3d Aquifer model**

## 3.0 GROUND WATER RESOURCES, EXTRACTION, CONTAMINATION ANDOTHER ISSUES

### 3.1 Aquifer wise resource availability and extraction

**Table 10*:* Present Dynamic Ground Water Resource (As on March 2017)**

| Taluk | Net annual ground water availability | Existing gross ground water draft for irrigation | Existing gross ground water draft for domestic and industrial water supply | Existing gross ground water draft for all uses | Allocation for domestic and industrial use for next 25 years | Net ground water availability for future irrigation development | Existing stage of ground water development | Category |
|---|---|---|---|---|---|---|---|---|
| | **Ham** | **Ham** | **Ham** | **Ham** | **Ham** | **Ham** | **%** | |
| Raichur | 8197 | 5413 | 482 | 5895 | 809 | 2068 | 72 | Semi Critical |

**Table 11: Present total Ground Water Resource as on March 2017**

| Taluk | Annual replenishable GW resources (in ham) | Fresh In-storage GW resources (in ham) | | Total availability of GW resource (in ham) |
|---|---|---|---|---|
| | | Phreatic Aq-I | Fractured Aq-II | Dynamic + phreatic in-storage + fractured in-storage |
| Raichur | 8197 | 25736 | 4765 | 38698 |

**Table 12: Comparison of ground water availability and draft scenario (2009 to 2013)**

| Taluk | 2009 | | | 2013 | | |
|---|---|---|---|---|---|---|
| | GW Availability | GW Draft | Stage of GW withdrawal % | GW Availability | GW Draft | Stage of GW withdrawal % |
| Raichur | 7465 | 5256 | 70 | 7494 | 5628 | 75 |

### 3.2. Chemical Quality of Ground Water and Contamination

On perusal of available ground water analysis, it has been found that the ground water quality in Raichur taluk is overall good and potable. Parameters like Electrical conductivity **(Fig 14)** and Fluoride (**Fig 15**) in groundwater is within permissible limit as per BIS 10200, 2012. However, there are some sporadic occurrences of Nitrate, in the ground water (**Fig 16**) which warrants remedial measures before consumption. The presence of nitrate may suggest an anthropogenic origin like pollution from septic tanks, animal waste and application of nitrogen rich fertilizers by the farmers.

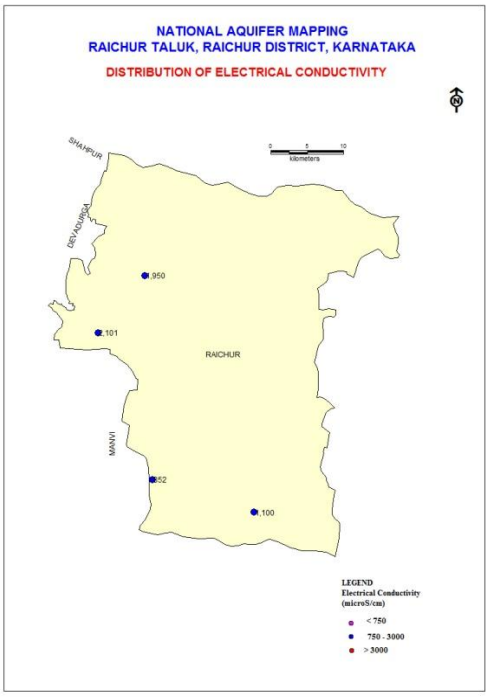


Fig 14: Distribution of EC

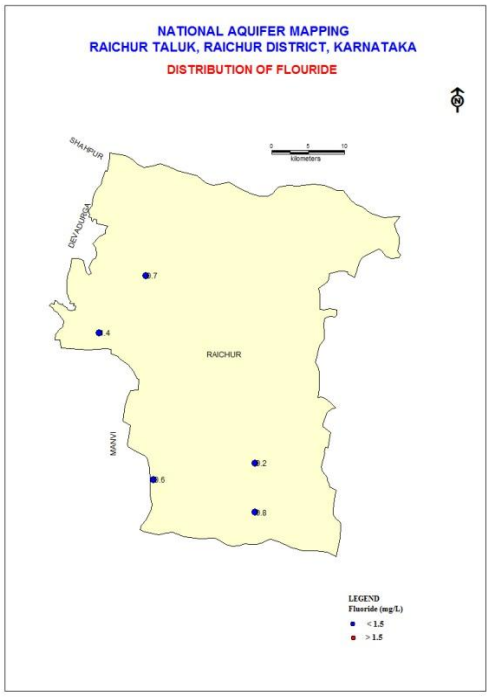


Fig 15: Distribution of Fluoride

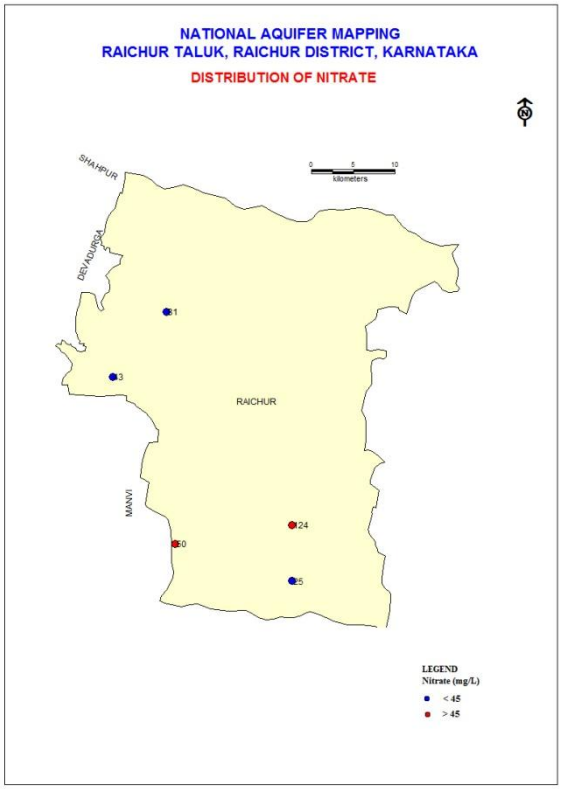


Fig 16: Distribution of Nitrate

## 4. GROUND WATER RESOURCE ENHANCEMENT

### 4.1 Aquifer wise space available for recharge and proposed interventions

The choice of recharge structures should be site specific. An area of 1249 sq km is suitable for artificial recharge in the taluk and structures like Check dams, Point recharge structures and percolation tanks are recommended. The non-committed surface runoff and expected recharge through artificial recharge structures is presented in **Table 13** and the improvement in availability of ground water through proposed intervention is presented in **Table 14**.

**Table 13: Quantity of non-committed surface runoff and expected recharge through artificial recharge structures**

| Artificial Recharge Structures Proposed | Raichur Taluk |
|---|---|
| Non-committed monsoon runoff available (MCM) | 35.54 |
| Number of Check Dams | 219 |
| Number of Percolation Tanks | 15 |
| Number of Point Recharge structures | 24 |
| Tentative total cost of the project (Rs. in lakhs) | 816 |
| Expected recharge (MCM) | 20 |
| Expected rise in water level (m) | 0.806 |
| Cost Benefit Ratio (Rupees / cu.m. of water harvested) | 4.26 |

**Table 14: Improvement in GW availability due to Recharge in Raichur taluk**

| Taluk | Net annual ground water availability | Existing gross ground water draft for all uses | Existing stage of ground water development | Expected recharge from proposed Artificial Recharge Structures | Additional potential from proposed irrigation development schemes through inter-basin transfer | Cumulative annual ground water availability | Expected improvement in stage of ground water development after the implementation of the project | Expected improvement in overall stage of ground water |
|---|---|---|---|---|---|---|---|---|
| | HAM | HAM | % | HAM | HAM | HAM | % | % |
| Raichur | 8197 | 5895 | 72 | 2000 | 2456 | 12653 | 47 | 25 |

After implementation of Artificial Recharge structures for GW recharge, the annual ground water availability will increase from 8197 ham to 12653 ham and the expected improvement in stage of development will be 25 % i.e., from 72% to 47%.

## 5. DEMAND SIDE INTERVENTIONS

### 5.1 Advanced irrigation practices

The taluk is dependent on both groundwater and surface water for irrigation. But dependence of groundwater is more. So efficient irrigation practices like drip and sprinkle irrigation, mulching and spreading of plastic sheets to reduce ground water wastage needs to be adopted by the farmers. These efficient irrigation techniques will contribute in saving ground water and thus will reduce the irrigation draft. By adopting the above said techniques, will definitely contribute in ground water resource enhancement in the long run.

### 5.2 Change in cropping pattern

Farmers are facing problem of groundwater for agriculture and they have to change their cropping pattern and water economy irrigation practices like drip irrigation and sprinkler irrigation which are not much in vogue. If they also adopt the water use efficient irrigation practices like mulching-plastic sheeting spread on the ground around plants to prevent excessive evaporation or erosion, there will be additional saving in water. Therefore, encouragement from government and other sector is essential for achieving full target of water use efficiency in the taluk. Water intensive crops like paddy are grown extensively which should be discouraged and this will improve the groundwater availability (**Table 15**).

**Table 15: Improvement in GW availability due to saving by adopting water use efficiency**

| Taluk | Cumulative annual ground water availability after implementing of AR structures & irrigation development schemes | Existing gross ground water draft for all uses | Stage of ground water development after implementing AR structures | Saving due to adopting WUE measures | Cumulative annual ground water availability | Expected improvement in stage of ground water development after the implementation of the project | Expected improvement in overall stage of ground water development |
|---|---|---|---|---|---|---|---|
| | Ham | Ham | % | Ham | Ham | % | **%** |
| Raichur | 12653 | 5895 | 47 | 1624 | 14277 | 41 | 6 |

### 5.3 Additional area of irrigation

Bringing additional area under irrigation may not be practical with a long-term resource management point of view as the taluk is already semi-critical with 72% of groundwater development. Hence artificial recharge projects may be implemented which will improve the ground water scenario.

### 5.4 Regulation and Control

Raichur taluk has been categorized as **Semi Critical**, since the Stage of ground water development is 72% (GEC March 2017). Hence, ground water recharge component needs to be made mandatory in projects related to further development of ground water and to save the situation from deteriorating further.

### 5.5 Other interventions proposed:

Remedial measures need to be adopted in the areas affected by nitrate. People should be educated about the prevention of groundwater pollution through awareness programme and trainings. Planners and stakeholders are required to be trained. Regular water quality monitoring mechanism is to be implemented with regular dissemination of data among the allied State and Central government departments. Periodical maintenance of artificial recharge structures should also be incorporated in the Recharge Plan.

### 5.6 Summary

The summary of Management plan of Raichur taluk is given in **Table 16**.

**Table 16: Summary of Management plan of Raichur taluk**

| | |
|---|---|
| Raichur taluk is "Semi critical" and present stage of GW Development (2017) % | 75 |
| Net Annual Ground Water Availability (MCM) | 81.97 |
| Existing Gross Ground Water Draft for all uses (MCM) | 58.95 |
| Total GW Resources (Dynamic & Static up to the depth of 200 m bgl) (MCM) | 386.98 |
| Expected additional recharge from monsoon surplus runoff (MCM) | 35.54 |
| Expected Recharge from Artificial Recharge methods (MCM) | 20 |
| Change in Stage of GW development (%) | 47 |
| Expected Saving due to adopting WUE measures (MCM) | 16.24 |
| Change in Stage of GW development (%) | 41 |