Draft Report

केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga Rejuvenation

Government of India

Report on

AQUIFER MAPPING AND MANAGEMENT PLAN

Ron Taluk, Gadag District, Karnataka

दक्षिण पश्चिमी क्षेत्र, बैंगलोर

South Western Region,Bengaluru

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Government of India
Ministry of Water Resources, River Development
& Ganga Rejuvenation
Central Ground Water Board

RON TALUK AQUIFER MAPS AND MANAGEMENT PLANS,

GADAG DISTRICT, KARNATAKA STATE

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RON TALUK AQUIFER MAPS AND MANAGEMENT PLANS,

GADAG DISTRICT, KARNATAKA STATE

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GADAG DISTRICT, KARNATAKA.

1. SALIENT INFORMATION

Name of the taluk : **RON**
District : Gadag **State**
: Karnataka
Area : 1,292 sq.km.
Population : Total 2,64,123 (2011), Urban : 72,360, Rural: 1,91,763
Decadal Growth rate : 6.45 %
Annual Normal Rainfall : 692 mm

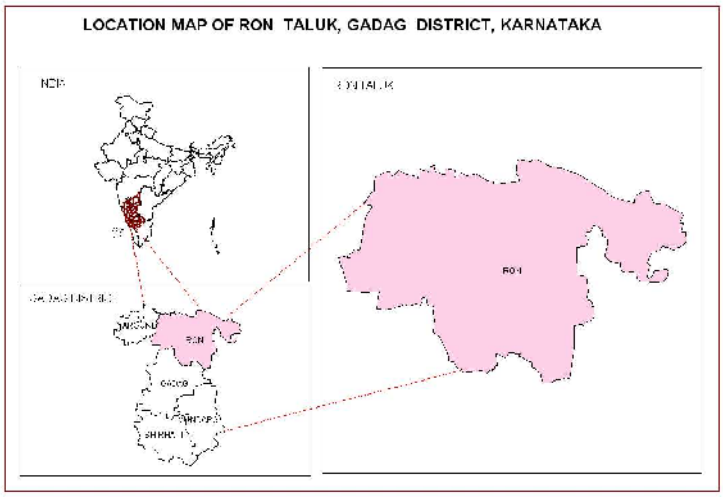

Fig 1. Location map of Ron Taluk, Gadag district.

1.1 Agriculture & irrigation

The principal crops Jowar, Maize, Bajra, Paddy,Wheat,the pulses are Tur,Gram are commonly grown in the area. Net area sown in the taluk is being 119388 Ha and the forest covers an area of about 276 Sq.km. The Malaprabha Project provides irrigation facility to certain areas of Ron taluk and adjoining areas.The ground water (BW) irrigation are predominant compared to surface water in the taluk. Irrigation carriedout by both surface and groundwater resources in an area ,with the net area of 349 Ha by canal&tanks & net/gross irrigated area of 12595 Ha by TW/GW. The net area under both the SW&GW irrigation accounts for about 15659 Ha/gross of 15997 Ha (source: District at a glance 2014-15). The total area under vegetable & fruit crops accounted for 15831 Ha,Cereal 33541 Ha and total oil seeds 26564 Ha.Commercial crops like cotton-20779 Ha, & Sugar cane-208 Ha grown in the area. The Right Bank Canal of Malaprabha Project located in neighbouring Savadatti taluk of Belgaum district irrigates cover a portion of Ron taluk. The other sources are bore wells and lift irrigation.

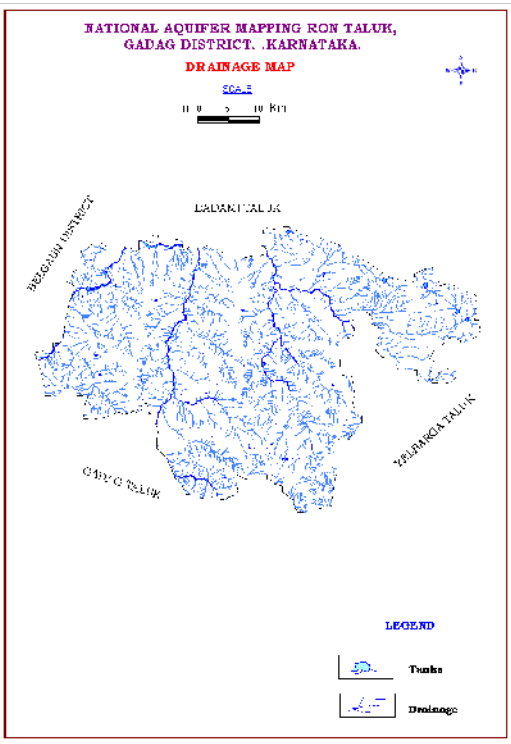

Fig 2. Drainage map

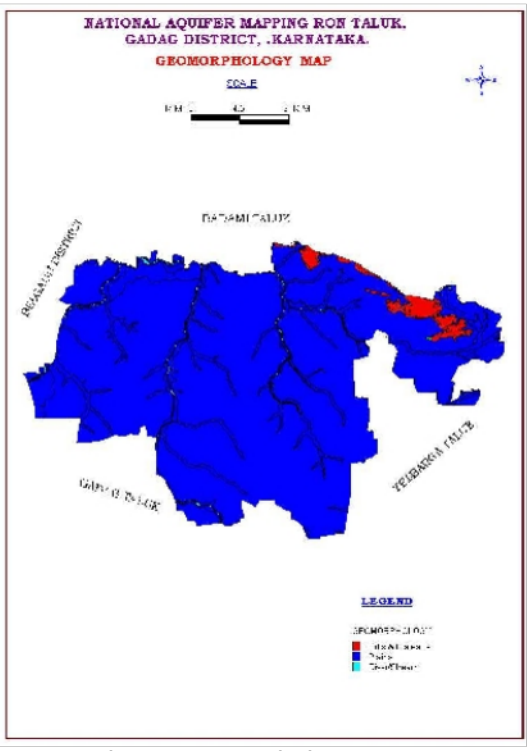

Fig 3. Geomorphology map

1.2 Groundwater availability and extraction

The main source of ground water in the taluk is precipitation and the recharge available through surface water irrigation practiced in the command areas of the taluk. It is estimated that around 16712 Ham of fresh Ground Water Resources available in the area including Static groundwater resources available below the zone of fluctuation. Out of the total resources an amount of 6226 Ham get replenished annually. In all the gross draft of 7362 Ham is accounted towards various usage in the taluk, which results an overall 118 % of the resources drawn from the irrigation draft 6857 ham and domestic & industrial water supply as 505 Ham. The influence of geomorphological land forms in the region observed to have a remarkable effect on the groundwater recharge. The ground water development is made by bore wells as the dug wells zones are less potential and could not sustain for pumping. In general the Bore wells sustain for 2 to 4 hours of pumping. On the basis of ground water development, the taluk is categorised as over exploited (OE), as on 31 March 2013 as shown in table 1.

1.3 Water level behaviour

Depth to Water level (DTW) during the pre-monsoon period-May observed 2.00 to 40.00 mbgl, and is 5.00 to 40.00 mbgl recorded during November-the Post- monsoon period as depicted in figure 4 & 5 respectively. The water level in the deeper zones/fractured aquifer zones in most part of the district recorded > 40.00 mbgl during pre-monsoon period and during post-monsoon it recorded between 10-20 mbgl with isolated deeper level as up to 40 mbgl as shown in figure

6 & 7. The long term declining trend of water level observed in the station located at Kotbal village is depicted as in figure 8.

Table 1. Dynamic Ground Water Resources of Ron taluk, (Ham)

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
6226	6857	505	7362	654	549	118	OE

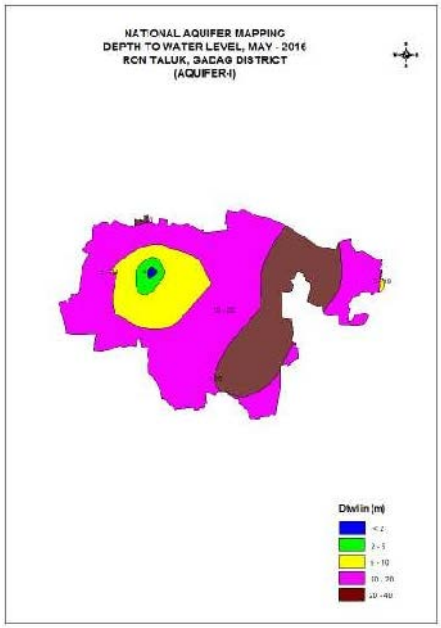

Fig 4. Pre-monsoon depth to water level (Aq-I)

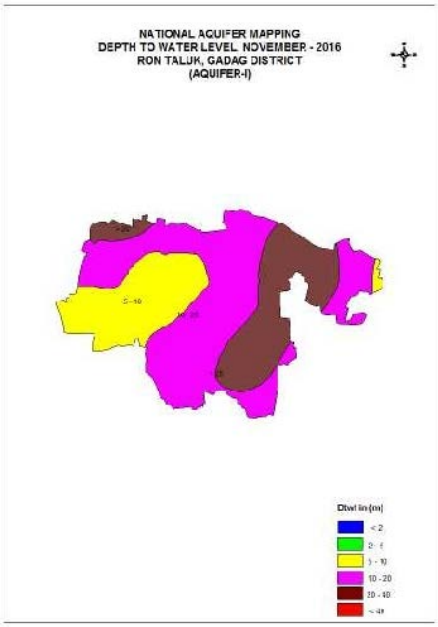

Fig 5. Post-monsoon depth to water level (Aq-I)

The annual seasonal fluctuation of water level in the shallower zones registered –ve/fall as between <1.0 - >4.0 m in N-N-Central down stream region, where Ground water development is remarkably high. Whereas the area bordering the taluk in the upstream region shows a + ve/raise in fluctuation observed up to 2.00 m except in the isolated pocket in western region where rise in water level as >4m recorded as shown in figure 9. The fluctuation in the fractured zones observed –ve /fall ranged from <1 m to 4 m except in the isolated pockets where rise in water level recorded up to 2 m , as depicted in figure 10.

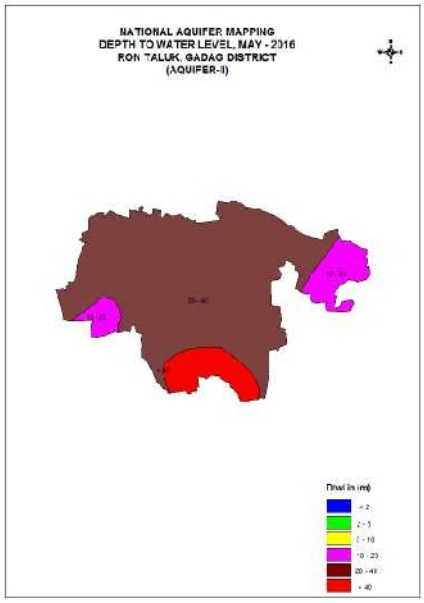

Fig 6. Pre- monsoon depth to water level(Aq-II)

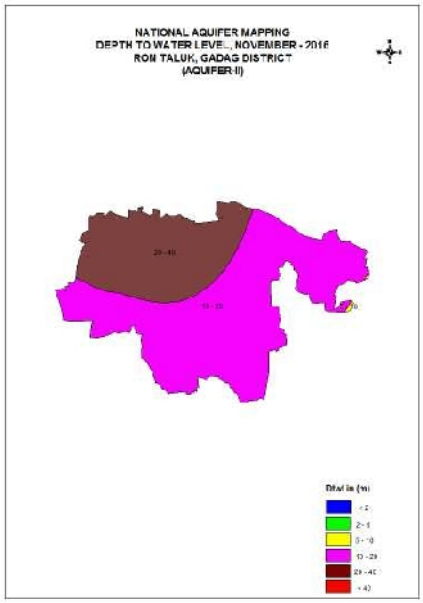

Fig 7. Post-monsoon depth to water level (Aq-II)

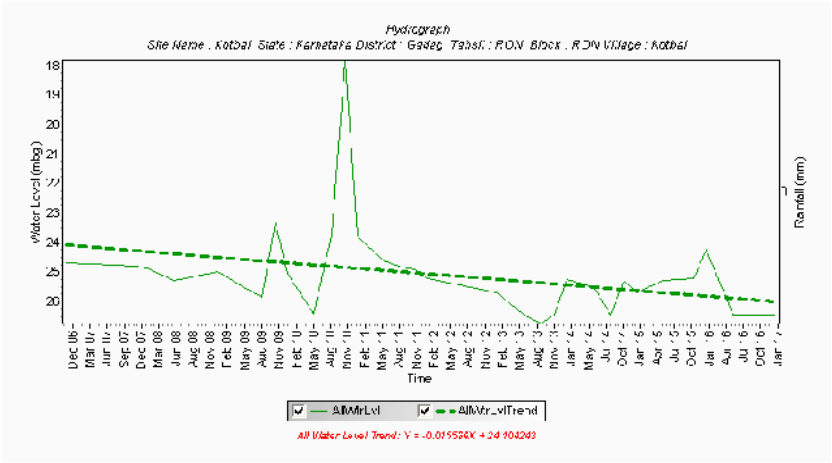

Fig 8. Long -term trend of water level (Kotbal station)

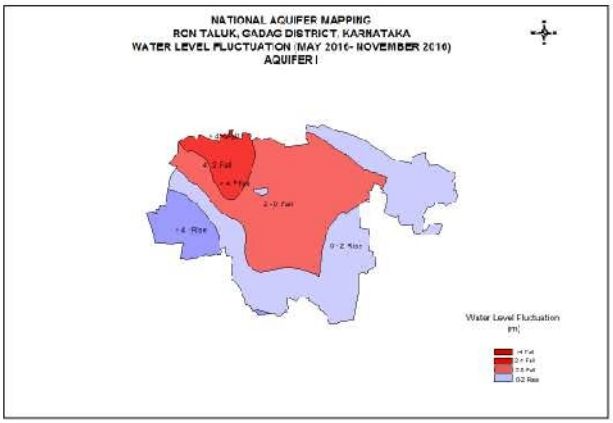

Fig 9. Water level fluctuation (Aq-I)

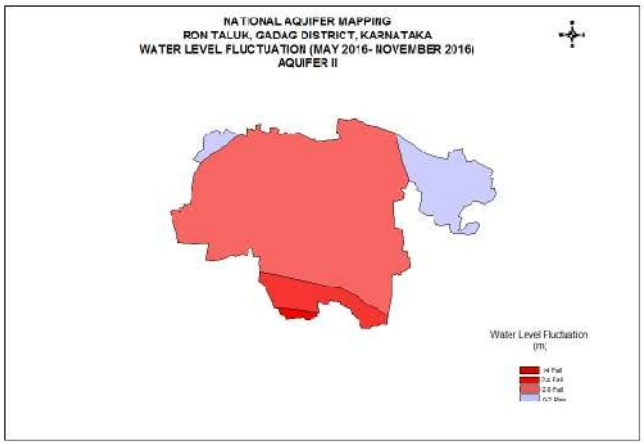

Fig 10. Water level fluctuation (Aq-II)

2. AQUIFER DISPOSITION

In general the major area of the taluk occupied by Charnockites and Gneisses, parts in the northern bordering area covered by basaltic rocks (fig 11). The above formations form the main water bearing formations. At higher depths ground water occurs under confined to semi-confined conditions in fractures and joints as well as formation contacts, its movement is controlled by the interconnectivity and geometry of the structurally week zones. Groundwater in them occurs under phreatic and semi-confined conditions.

The wells studied reveals that the specific capacity in the range of 3.12 to 68.99 l/min/m drawdown and transmissivity range between 1.07 and 94.93 m2/day. The discharge of these wells were recorded almost nil to 6.60lps.

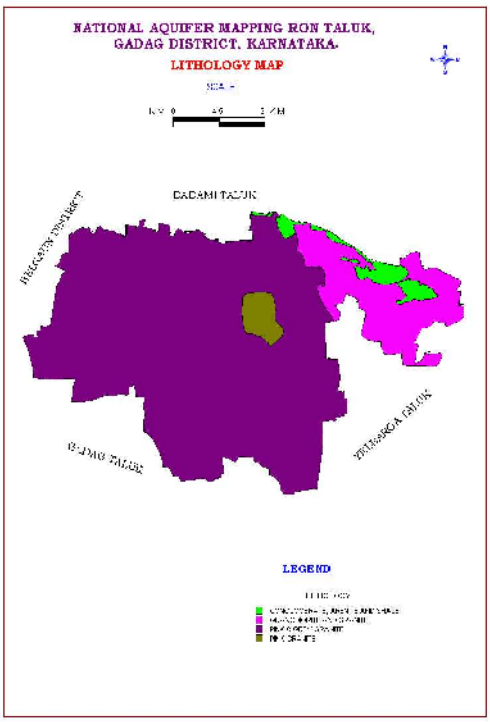

Fig 11. Lithology map

3. GROUNDWATER RESOURCE,EXTRACTION,CONTAMINATION AND OTHER ISSUES

3 a. Aquifer wise Groundwater availability

The total fresh Ground Water Resources available in the area have been estimated to be around 16712 Ham, which include, the Dynamic resources of 6824 ham in the zone of fluctuation and Static groundwater resources occurs below the zone of fluctuation (table 2). An area of 1251 Sq.km identified with an estimated 340 MCM storage potential of aquifer material available in the area, which can be developed through artificial recharge structures to facilitate to augment the ground water resources.

Table 2. Ground water Resources of Ron Taluk (Ham)

Taluk	Annual Ground Water Resources availability	Fresh In-Storage Ground Water Resources		Total Availability of Fresh Ground Water Resources
		Phreatic	Fractured	Dynamic+ Phreatic+ Fractured
Ron	6824	7455	2433	16712

3 b. Chemical quality & Contamination

Quality of water in the taluk in general is Alkaline (pH > 8.5) nature. The Fluoride concentration ranged between 1 and 2 mg/l and is recorded as 2.00 mg/l at NHS: Das-hadagal. The fluoride presence can be attributed to decomposition of fluorite bearing aquifer material. The Electrical Conductivity (EC) at places exceeds 3000 µS/cm at 25°C as EC- 3100. The Nitrate pollution in the ground water has been established in the entire taluk and is observed in low concentration ie <45 mg/l, can be attributed to leaching down of domestic and agricultural wastes disposed on un protected land.

4. GROUNDWATER RESOURCE ENHANCEMENT

Non-committed monsoon run-off

In order to improve the groundwater resources as a supply management measures, it is proposed to develop the non-committed monsoon run-off of 13.3 MCM available in the area. The development can be made through an area of 1251 Sq.km identified suitable. It is estimated a total of 340 MCM storage potential of aquifer material available for augmenting the ground water resources using the above run-off. The following artificial recharge structures have been proposed to develop the area viz. 82 Check Dams (CD), 6 No of Percolation tanks (PT) and 9 No of Point Recharge Structure (PRS). Considering all the structures and their recharge capacities a total of around 7.543 MCM (754.3 Ham) recharge is anticipated viz. CD-4.927, PT-2.497 and PRS-0.120 MCM,in the area as detailed in Table 3 and the status of ground water scenario after implementing AMP is shown in table 4.

Table 3. Supply side management measures proposed utilising surplus Monsoon Run off

Surplus water Resource Available (MCM)	No. of Check Dams Feasible	No. of Percolation Feasible	No. of Point Recharge Structure Feasible	Total Cost including impact assesment (lakhs)	Total Rechage (MCM)	Cost Benefit Rs in Rs/cub m of harvested water	Expected Rise of water Level (m)
13.31	82	6	9	320.9721	7.542887	4.255296	0.301474

4. Status of Ground water Resources scenario on implementation of AMP

Annual Ground water availability (Net amount in ' Ham')	Annual ground water availability after developing Recharge structures, 'Ham'	Annual ground water availability after new Irrigation schemes in Ham	Annual ground water availability after practicing irrigation WUE measures in 'Ham'	Existing gross ground water draft for all uses 'Ham'	Existing stage of ground water development in %	Expected improvement in stage of ground water development after the implementation of AMP in %	Expected enhancement in the stage of development in %
6226.075	6980.3637	14329.3637	15593.59	7361.71	118	47.21	4.2

5. DEMAND SIDE INTERVENTION

5.1 Water use efficient practices

In terms of demand management of water resources, it is proposed to enhance the area under water use efficient practices like micro irrigation -Drip & Sprinkler implemented in the irrigation sector. As such,it has been proposed to save the water to the tune of 1264.227 Ham.

5.2 Alternate water resources

5.2a Integrated irrigation development schemes

Integrated irrigation development schemes proposed by Shri.G.S.Paramashivaiah, Rtd, CE, Irrigation deptt., GOK envisage the 'Diversion of Surplus water of west flowing streams and East Flowing Hallas of Netravathi under Yennehole Project, to the eastern regions of the state for Ground Water Recharge and augmenting the assured Supply of Drinking Water to the Drought affected 20 districts of the state. Under the scheme 14698 ham allocation is expected for filling the irrigation tanks and in turn recharge GW regime by canal seepage and irrigation

return flow etc by 7349 Ham which result in enhanced ground water Availability to the tune of 14329.36Ham existing from 6226.075 in the taluk.

5.3 Regulation & Control measures

The ground water Regulation & Control measures could be the suitable measures to tackle the following issues like,. (1) Poor information dissemination or knowledge sharing among the population/stake holders of groundwater on the nature and occurrence of potential aquifers and its development scenario (2) Poorly organised/uncontrolled withdrawal results in groundwater resource scarcity. (3) High degree of dependence on the groundwater resources leads to decline in water level & depletion of resources in phreatic aquifer and higher cost involvement in developing deeper aquifers. (4) Quality deterioration due to increased concentration of Fluoride and Nitrate.

5.4 Drainage line treatment, Rain water harvesting and other conservation practices

It is also proposed to develop the micro watersheds by Drainage line treatment, Reclamation of small gullies, Adaptation of crop diversification and Conservation practices in domestic usage, Rain water harvesting in massive scale would be appropriate for improving the availability and sustainability of water resources in the area. Implementation of effective and participatory ground water development schemes coupled with awareness training programmes would bring the overall ground water resources scenario to a self sufficient water resources and improved economical status of the people.

5.5 Other intervention proposed

The area with higher fluoride concentration observed above 1.5 mg/l in and around the localities like Hungundi, Das-hadagalas etc, could be treated by de-fluoridisation methods for localised specific use or the supply may be made with alternate sources. Though the quality deterioration due to Nitrate contamination prevailing in localised pockets, it can be managed by blending the groundwater with surface water to lower nitrate concentrations. This approach is common employed for drinking water treatment but obviously requires a low-nitrate water source, therefore, ,it is recommended to have efficient domestic and irrigation drainage network system to prevent the further contamination.

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