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

Nargund Taluk, Gadag District, Karnataka

दक्षिण पश्चिमी क्षेत्र, बैंगलोर

South Western Region,Bengaluru

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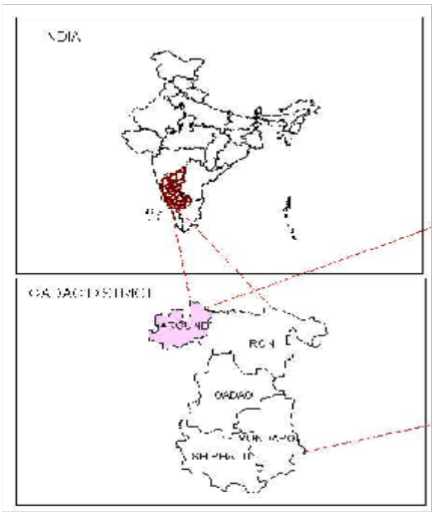
Government of India
Ministry of Water Resources, River Development
& Ganga Rejuvenation
Central Ground Water Board

NARGUND TALUK AQUIFER MAPS AND MANAGEMENT PLANS, GADAG DISTRICT, KARNATAKA STATE



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March 2017

NARGUND TALUK AQUIFER MAPS AND MANAGEMENT PLANS,

GADAG DISTRICT, KARNATAKA STATE

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NARGUND TALUK AQUIFER MAPS AND MANAGEMENT PLANS,

GADAG DISTRICT, KARNATAKA STATE

1. SALIENT INFORMATION

Name of the taluk : **NARGUND**
District : Gadag
State :Karnataka
Area : 454 q.km.
Population : Total 1,00,623 (2011), Urban : 36,291, Rural: 64,332
Decadal Growth rate 8.37 %
Annual Normal Rainfall : 577 mm

1.1 Agriculture & Irrigation

The taluk is predominantly an agriculture based and cultivable land is the backbone of its economy. The taluk main economical activities of the populace is agriculture. The principal food crops are Maize, Jowar,Bajra, Wheat & Pulse varieties. Fruit & Vegetables are grown in 1956 Ha in the area. Net area sown in the taluk is being 33205 Ha and total sown is 49549 Ha. The commercial crops Cotton and Sugacane accounted for an area of 13504 Ha and the total oil seed grown in 5476 Ha of area. The figures 1 & 2 show the location and Drainage map of Nargund taluk respectively.

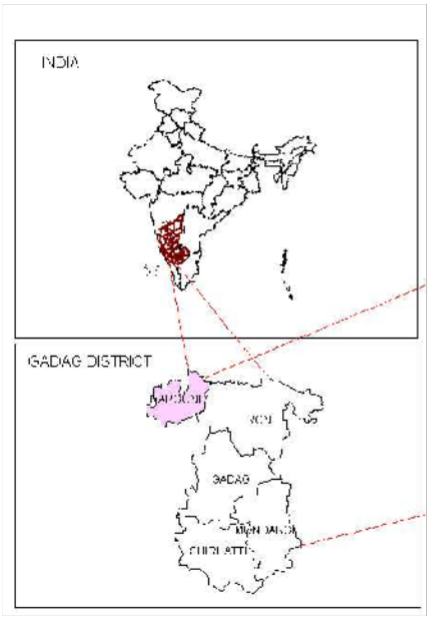

Fig 1. Location map of Nargund Taluk, Gadag district

The main sources of irrigation are tanks, canals and wells and most of the irrigation wells have been energised. The Right Bank Canal of Malaprabha Project irrigates the entire taluk. The other sources of irrigation are ground water which has been extracted through bore

wells and river water by lift irrigation practices.

The surface water and ground water (BW) irrigation are predominant as they are accounted for 36317 &1184 Ha respectively .The gross irrigated accounted for about 40601 Ha which include 3545 Ha of irrigation from other sources (source: District at a glance 2014-15).

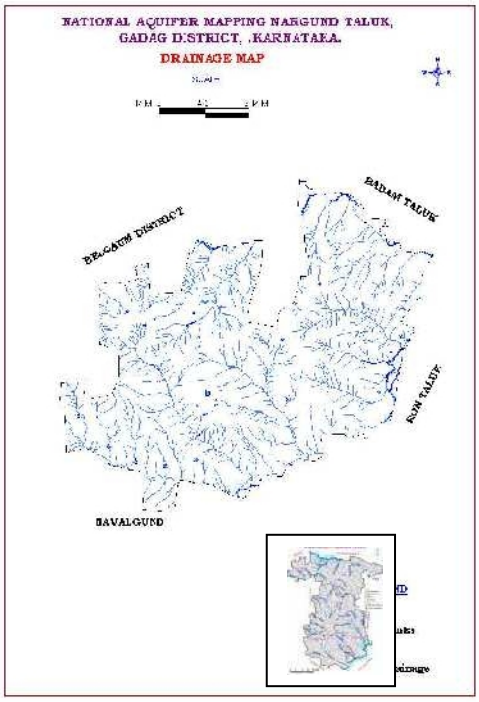

Fig 2. Nargund Taluk Drainage map

1.2 Groundwater availability and extraction

1.2 a. Groundwater availability

It is estimated a net annual ground water of 2690 ham in the dynamic zone and the total resources in the both dynamic and static+deeper fractured aquifer down to 200 mbgl estimated as 5828 Ham available annually in the taluk (table 1). In all the gross draft of 1961

Ham is accounted in the taluk, which resulted an overall 73 % of the resources used, viz,. Irrigation draft 1845 ham and domestic & industrial water supply as 116 Ham. On the basis of ground water development, the taluk is categorised as Semi critical (SC), as on 31 March 2013. The source of groundwater is precipitation and the recharges available from surface water irrigation practices in the taluk. In general, groundwater is abstracted through bore wells down to the depth of 200 mbgl with sporadic dug well developments during post monsoon periods. The ground water development mainly done 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.

Table 1. Dynamaic ground water resources of (March 2013) of Nargund taluk

Dynamaic Ground water resources of Nargund taluk as on March 2013							
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
2690	1845	116	1961	237	802	73	Semi-critical

1.2b Water level behaviour

Depth to Water level (DTW) during the pre-monsoon period-May observed 10->20 mbgl, during November it is recorded between 5.00 to 20 mbgl during the Post- monsoon period as depicted in figure 3 & 4 respectively.

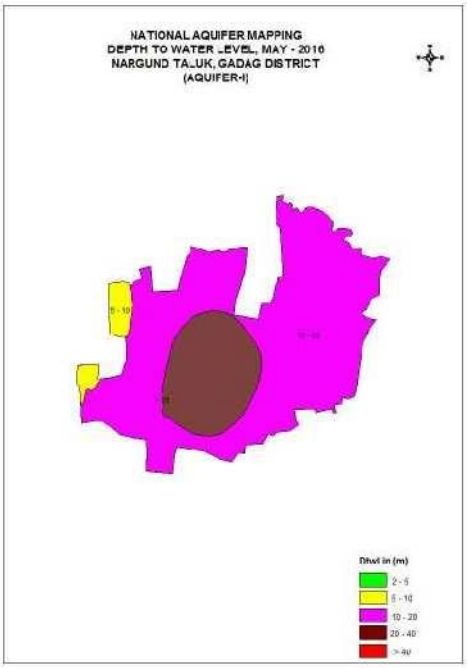

Fig 3. Pre-monsoon Depth to water level, Aq-I

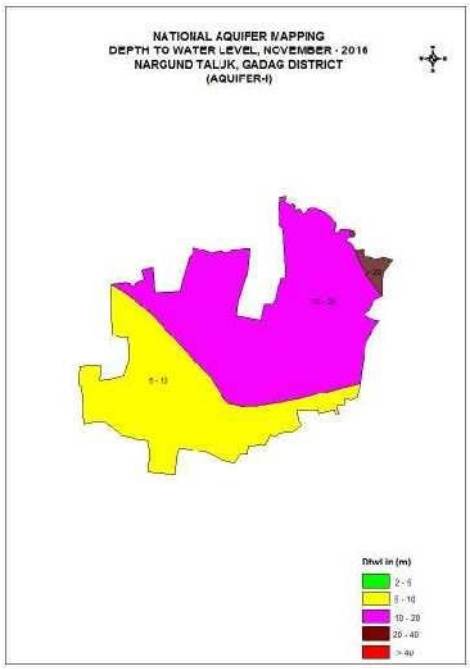

Fig 4. Post-monsoon Depth to water level, Aq-I

The annual seasonal fluctuation of water level registered between < 2.0- 4.0 m and there are pockets where a –ve fluctuation/fall of water level up to 2.00 m and more

recorded in both the zones (Aq-I & Aq-II) the water level as shown in figure 5 & 8 respectively. The water level recorded in the bore wells during pre-monsoon period ranged from 20.00 to >40.00 mbgl are shown in figure 6 & 7.

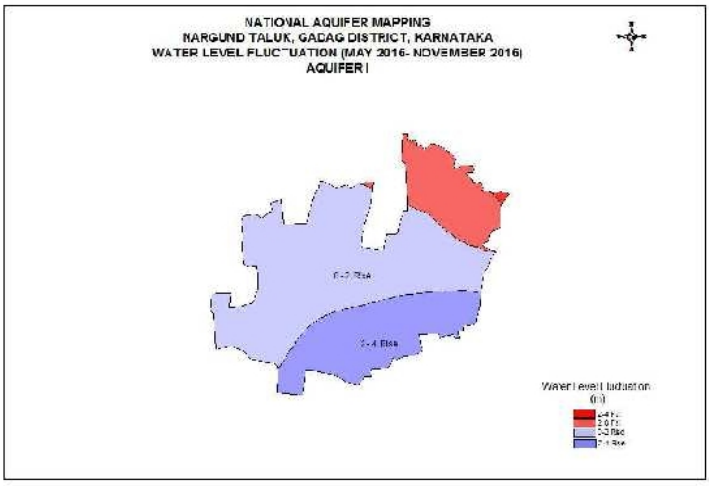

Fig 5. Water level fluctuation map, Aq-I

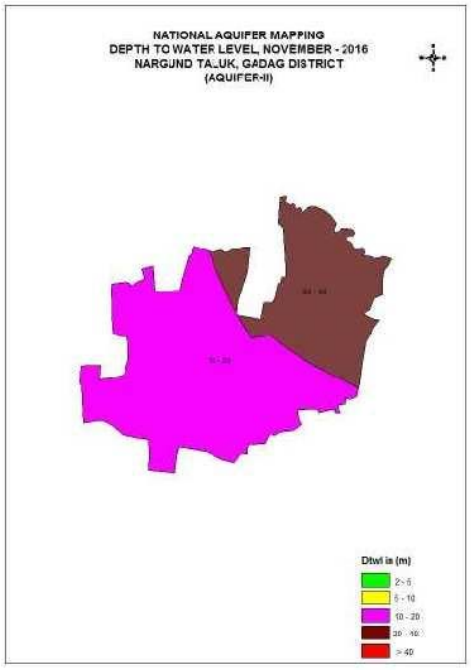

Fig 6. Pre-monsoon Depth to water level, Aq-II

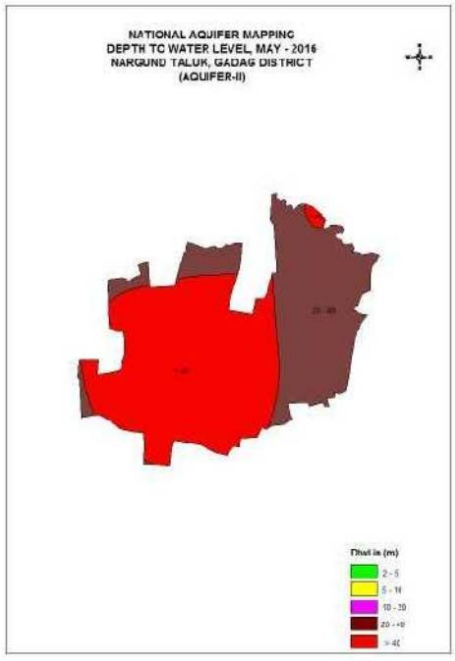

Fig 7. Post-monsoon Depth to water level, Aq-II

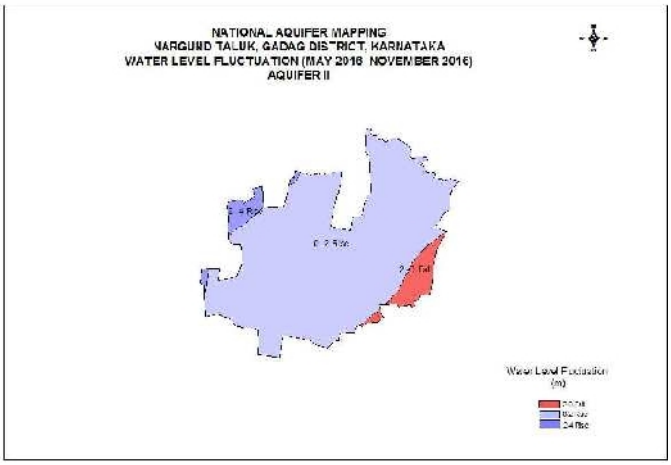

Fig 8. Water level fluctuation map, Aq-II

2. AQUIFER DISPOSITION

The major rock in the taluk are gneisses and granites covers the eastern parts, the sandstone, Quartzite and shale of Kaladgi formation occurs in western parts as depicted in figure 9, The above rock formations form the main water bearing formations in the Nargund taluk. Weathered zone occurs 10.00 to 17.00 m thick, the bore wells studied indicates the presence of potential fracture between 50 - 100 mbgl. It is observed that the fracture occurrence in the bore wells reduces with depth. The soil cover extends up to 1.80 m b.g.l. Average being 1.10 mbgl.

The constant rate of infiltration in sandy to clayey residuum ranges between 0.5 to 4.5cm/hr.

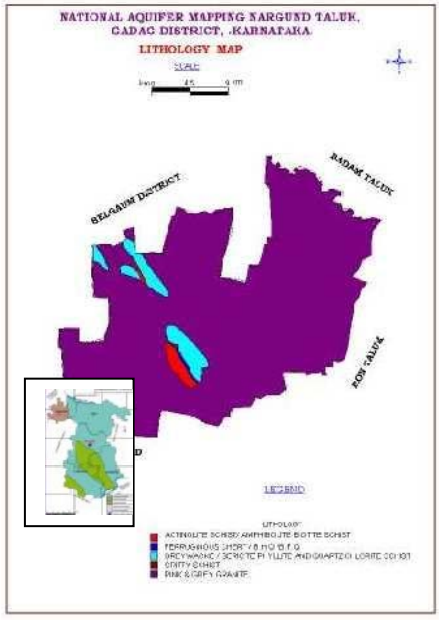

Fig 9. Geology map

Ground water 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 to 94.93 m^2/day. The discharge of these wells were recorded almost nil to 6.60 lps.

3. GROUNDWATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

3-a. Aquifer wise Groundwater availability

It is estimated a net annual ground water of 2690 ham in the dynamic zone and the total resources in the both dynamic and static+deeper fractured aquifer down to 200 mbgl estimated as 5828 Ham available annually in the taluk (table 2). An area of 398 sq.km identified suitable area for artificial recharge in the above said area, it is estimated 49.75 MCM of storage potential of aquifer material available for augmenting the ground water resources artificially.

Table 2. Availability of total Fresh ground water resources

Annual Replenishable Ground Water Resources (gross) 'ham'	Fresh In-Storage Ground Water Resources 'ham'		Total Availability of Fresh Ground Water Resources 'ham'
	Phreatic zone	Fractured zone	Dynamic + Phreatic + Fractured
2855	**2427**	**547**	**5828**

3-b. Chemical quality & Contamination

The ground water quality in general is alkaline in nature. The quality deterioration due to Nitrate contamination prevailing in localised pockets inferred owing to poorly maintained domestic, Irrigation drainage and waste disposal network system. The area with higher fluoride concentration in grounds water observed about 1.0 mg/l and more in few pockets is attributed to occurrence of fluorite bearing minerals in the aquifer material and their susceptibility to chemical decomposition.

4. GROUNDWATER RESOURCE ENHANCEMENT

Non-committed monsoon run-off

In order to improve groundwater resources especially in the supply management areas, it is proposed to develop the non-committed monsoon run-off of 4.00 MCM available in the area. This can be developed through an area of 398 Sq.km identified suitable area for artificial recharge in the estimated 49.75 MCM of storage potential occur in aquifer material. Considering the estimated storage potential aquifer it has been proposed to develop the area trough 25 Check Dams, 2 No of Percolation tanks and 3 No of Point Recharge

Structure. A total of around 2.280 MCM recharge is anticipated from the above structures,viz.CD-1.489/PT-0.755/PRS-0.036 MCM, as indicated in Table.3.

Table 3. Development of surplus run-off for Ground water recharge

Taluk Area (sq km)	Surplus water Resource Available (MCM)	No. of Check Dams Feasible	No. of Percolation tanks Feasible	No. of Point Recharge Structures Feasible	Total Cost including impact asessment (lakhs)	Total Rechage (MCM)	Cost Benefit Rs in Rs/cub m of harvested water	Expected Rise of water Level (m)
437	4.02	25	2	3	97.01	2.28	4.26	0.286

5. **DEMAND SIDE INTERVENTION**

5-a. Alternate water resources

Transfer surplus surface water from the west flowing rivers under 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 water deprived drought affected districts of the state. The proposed transfer of surface water expected to recharge/enhance the availability of groundwater resources by 7349 Ham in the taluk.

5-b. Other intervention proposed with Regulation & Control measures

The ground water Regulation & Control measures as envisaged in the KA state GW authority implemented would enable 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 prevailing in the taluk results in groundwater resource scarcity. (3) High degree of dependence on the groundwater resources leads to decline in water level & depletion of ground water resources and higher cost involvement in developing deeper aquifers (4) Incidence of water related health issues due to water Quality deterioration by Fluoride and Nitrate concentration.

5-c. Drainage line treatment, Rain water harvesting and other conservation practices

Developing 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 have been suggested 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 up comfortable ground water resources scenario and improved economical status.

5-d Outcome of AMP

The above mentioned AMP expected to have cumulative amount of groundwater resources to the tune of 10266.981 Ham. With the prevailing resource draft scenario of 73 % development it is anticipated a phenomenal shift from the existing semi critical category to a safe category with 19.1 % development. Also, there is enough scope to develop the resources systematically with active participation of stake holders and thus bring about thee sustainable development of Ground water resources in the taluk as detailed in Table 4.

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

Net Annual Ground water availability (Ham')	Cumulative Annual ground water availability after developing Recharge structures (recharge 227.981 (Ham)	Cumulative Annual ground water availability after new Irrigation schemes (Inter basin transfer 7349 Ham)	Existing gross ground water draft for all uses 'Ham'	Existing stage of ground water development Prior to implementation of AMP in %	Expected improvement in stage of ground water development after the implementation of AMP in %
2690	**2917.981**	**10266.981**	**1961**	**73**	**19.1**