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HARAPANAHALLI TALUK AQUIFER MAPS AND MANAGEMENT PLANS, DAVANAGERE DISTRICT, KARNATAKA STATE

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HARAPANAHALLI TALUK AQUIFER MAPS AND MANAGEMENT PLANS

DAVANAGERE DISTRICT, KARNATAKA STATE

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DAVANAGERE DISTRICT, KARNATAKA STATE

1. SALIENT INFORMATION

- **Name of the Block** : **HARAPANAHALLI**
- **Area** : 1,443 sq. km.
- **District** : Davanagere
- **State** : Karnataka
- **Population** : Total 3,02,003 (2011)
- **Urban** : 47039,
- **Rural** : 254964,
- **Growth rate** : 12.36%.
- **Annual Normal Rainfall** : 717 mm, Monsoon 419 mm

1-a . Agriculture & irrigation

The main economical activities of the populace is agriculture as no major industry exists. The principal crops Maize, Jowar, Ragi, Sunflower, Groundnut and Cotton are grown in an area of about 916.75 Sq.km sown in the taluk.

The total sown area accounted for an area of 1079 Sq.km including an area of 45 Sq.km put under vegetables and fruit crops and oilseeds in about 57 Sq.km and commercial crops like Cotton,Sugar cane,Tobacco and mulberry also grown in an area of about 115 Sq.km. Out of the total area sown, about 260 Sq.km receives Irrigation from various water sources (source: District at a glance 2013-14, as detailed in table no.1. which accounts for about 26 % of net shown area. An area of about 222 Sq.km covers the forest as indicated in figure 1.

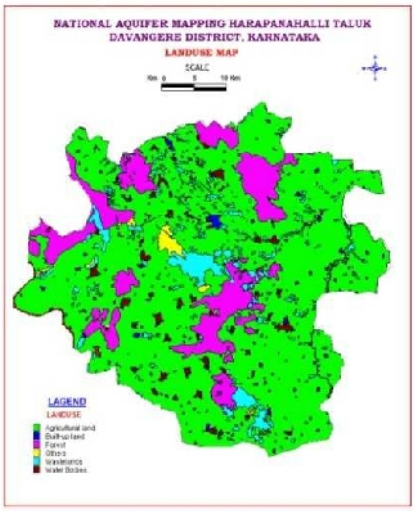

Fig 1. Land use map, Harapanahalli taluk

Table 1. Source wise Irrigated Area (ha), Harapanahalli Taluk

Irrigation Sources	Nos.	Net Area	Gross Area
Canals*	19	2961	3800
Tanks	43	430	430
Wells	595	150	150
Bore wells	6376	21584	31788
Lift Irrigation	74	890	890
Others	0	0	0
Total		26015	37058

1.2. Groundwater availability and extraction

1.2-a. Ground water resources

It is estimated that a net annual ground water resources of 9774 ham available in the taluk. The gross draft towards Irrigation (10346 Ham) and Domestic & Industrial water supply (824 ham) estimated to be 11170 Ham and thus results in overall development of 114 %. The area is categorised as over exploited (OE), as recorded in 2013. The drinking water supply to the populace is made through a battery of Bore wells/Ground water abstraction structures by various schemes of GoK.

1.2-b. Water level behaviour

The water level during Pre-monsoon period-May month occur in the range from 2.00 mbgl to >10.00 mbgl as depicted in figure 2 and that of Post- monsoon period (November) recorded less than 2.00 mbgl to 10.00 mbgl except few pocket with deeper water level as more than 10 mbgl as depicted in figure 3. Annual water level fluctuation recorded about 4 m fall in the northern region and rise in the southern region as up to 4 m as depicted in figure 4. The deeper fractured aquifer zone registered post-monsoon water level as deep as 40.00 mbgl.

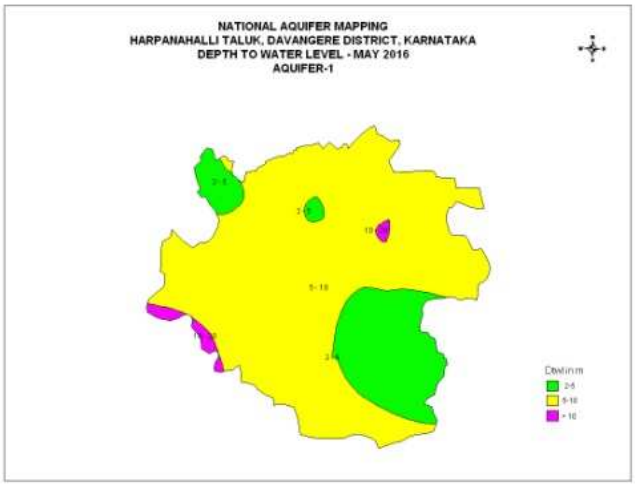

Fig 2. Pre-monsoon Depth to Water level map, Harapanahalli taluk

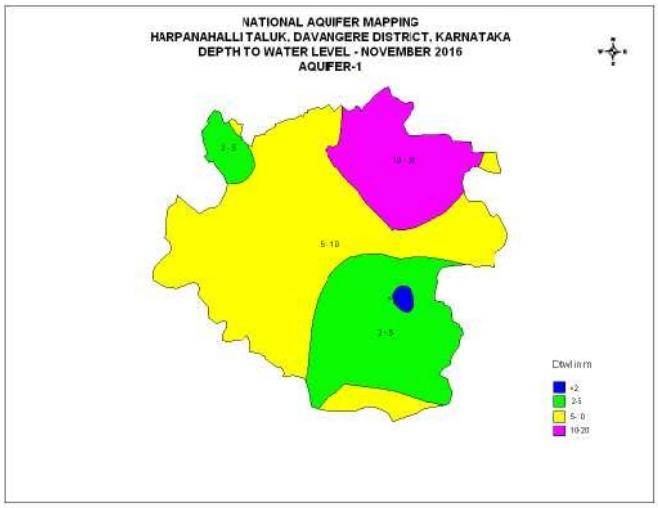

Fig 3. Post-monsoon Depth to Water level map, Harapanahalli taluk

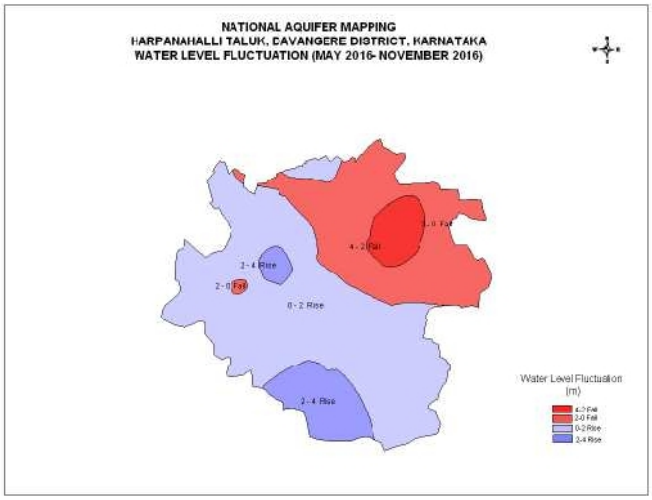

Fig 4. Annual Water level fluctuation map, Harapanahalli taluk

2. AQUIFER DISPOSITION

The taluk area covered by Gneiss and Schistose rocks and they form a main water bearing formations. It has been established that the presence of weathered layer in the thickness range of 2-15 m and at places it is found occur 20 m and more. The potential aquifer zones occurring in an area of 1382 Sq.km found having space further ground water development down to 200 m, which includes a part of weathered and fractured zones with expected storage potential of 110.56 and 516.868 MCM.

Weathered zone occurs > 5.00 to 25.7mbgl thick, figure 5. The groundwater potential aquifers zones in bore wells encountered between 41 and 190 mbgl depth with the yield ranged from >1 to 10 lps. At places the yield observed to the maximum of 18 lps. The aquifer transmissivity estimated between 5 and 16 m^2/day.

Aquifer dispositions from Rockworks output is given in figure 5.

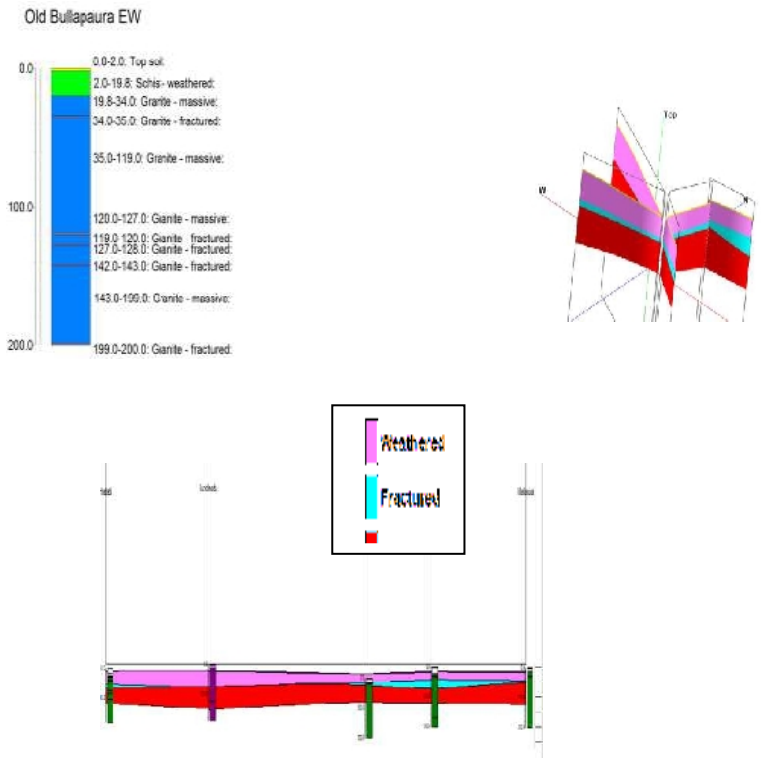

Fig 5. Weathered zone and fractured zone (sections) from Rockworks output

3. GROUNDWATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

3-a . Aquifer wise Groundwater availability

An area of 1382 Sq.km found having space further ground water development by artificially recharging the groundwater regime. In the above area the weathered and fractured zones available expected to have 110.56 and 516.868 MCM of storage potential respectively, estimated down to 200 m deep. A net annual ground water resources of 9774 ham available in the dynamic zone which is being periodically estimated for formulating various developmental scheme in the area.

3-b. Chemical quality &Contamination

It is observed that the nitrate concentration in the ground water results owing to the in-efficient domestic and irrigation drainage network and waste disposal system. The presence of fluoride more than 1.5 mg/l in the ground water attributed to the decomposition of fluorite mineral in the host rock/aquifer material as shown in figure 6.

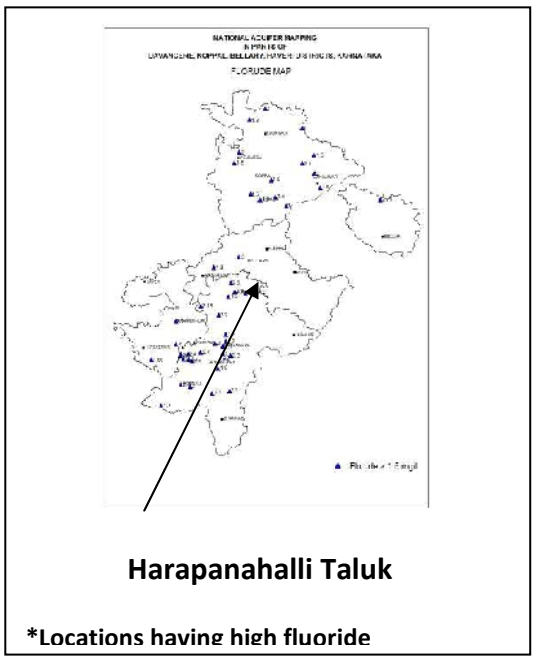

Fig 6. High fluoride villages in Harapanahalli taluk

3-c. Other Issues

The prevalence of erratic and unsystematic resources development and its utilisation, results in overall development of 114 %. The taluk is categorised as over exploited (OE), as recorded in 2013. The other main issue in the groundwater resources availability in the taluk could be ascribed the (1) Ill organised/uncontrolled withdrawal - Poor information dissemination or knowledge sharing among the population/stake holders of groundwater on the nature and occurrence of potential aquifer system in the taluk (2) Depleting phreatic aquifer, decline in water level, decline in water level, quality deterioration - High degree of dependence on the groundwater resources results in overdraft of resources, declining water level, resource scarcity, incidence of water borne diseases due to presence of Fluoride and Nitrate in the ground water.

4. GROUNDWATER RESOURCE ENHANCEMENT

4-a. Non-committed monsoon run-off

An area of 1382 Sq.km found having changes of further ground water development by artificially recharging the groundwater regime with the estimated non-committed monsoon Run off of 20.3 MCM available in the taluk. It has been proposed to recharge the aquifer available having adequate storage potential in the weathered and fractured zones by developing 125 Check Dams (CD resource/0.03MCM*4 fillings), 8 No of Percolation tanks (PT resource/0.4MCM*1.5 fillings) and 14 No of Point Recharge Structures (PRS resource/0.015 MCM). On developing these structures a total volume of (CD-7.520, PT-3.811, PRS-0.183

MCM) of around 11.514 MCM recharge is anticipated in the ground water regime as indicated in Table 2.

Table 2. Ground water recharge through AR Structures, Harapanahalli taluk

Taluk Area (sq Km)	Area suitable for artificial recharge (sq km)	Non -Committed Monsoon Run off (MCM)	No. of Check Dams Feasible	No. of Percolation Tanks Feasible	No. of Point Recharge Structure Feasible	Total Cost including impact assessment (lakhs)	Total Recharge (MCM)	Expected Rise of water Level (m)
1443	1382	20.3	125	8	14	489.96	11.514	0.42

5. DEMAND SIDE INTERVENTION

5-a. Water use efficient practices

To strengthen the water resources availability, it is proposed to shift the normal irrigated area to practicing water use efficiency (WUE) irrigation methods so as to save groundwater to the tune of 3024 Ham of water.

5-b. Alternate water resources

5-b1. Integrated irrigation development schemes

A proposal in pipeline with the GoK to transfer surplus surface water from the west flowing river basin under ambitious Yettinahole project is projected to recharge/enhance the availability of groundwater resources by 5886 Ham.

The above measures expected to have resources availability to the tune of 19835 Ham, which include the saving trough WUE practices. With the current draft scenario 114 %, it is anticipated a resultant development stage to be kept at 66% under safe category with ample scope for the future developmental scheme as indicated in table 3.

Table 3. Improvement in ground water availability

Cumulative annual ground water availability after implementing AR structures 'Ham'	Existing gross ground water draft for all uses 'Ham'	Stage of ground water development after implementing AR structures In %	Additional potential from proposed gw recharge schemes through interbasin transfer 'Ham'	Cumulative annual ground water availability 'Ham'	Expected improvement in stage of ground water development after the implementation of the project in %	Expected improvement in overall stage of ground water development in %
10925	**11170**	**102**	**5886**	**16811**	**66**	**36**

5.-c. Regulation & Control/Other intervention proposed

It is proposed to develop the micro watersheds by drainage line treatment, reclamation of small gullies. The crop diversification and suitable changes in the water use practices in both domestic & irrigation sectors. Rain water harvesting in massive scale would improve the local availability and cost effectiveness in getting fresh water. The effective implementation of ground water development schemes and training programmes would bring the area under self sufficient and improve the water resources status.

The quality deterioration could be prevented by installation of efficient domestic and irrigation drainage network system.

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