



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 MAPS AND GROUND WATER MANAGEMENT PLAN

Chopda, Raver & Yaval Talukas

Jalgaon District, Maharashtra

(Part-II)

मध्य क्षेत्र, नागपुर

Central Region, Nagpur

भारत सरकार

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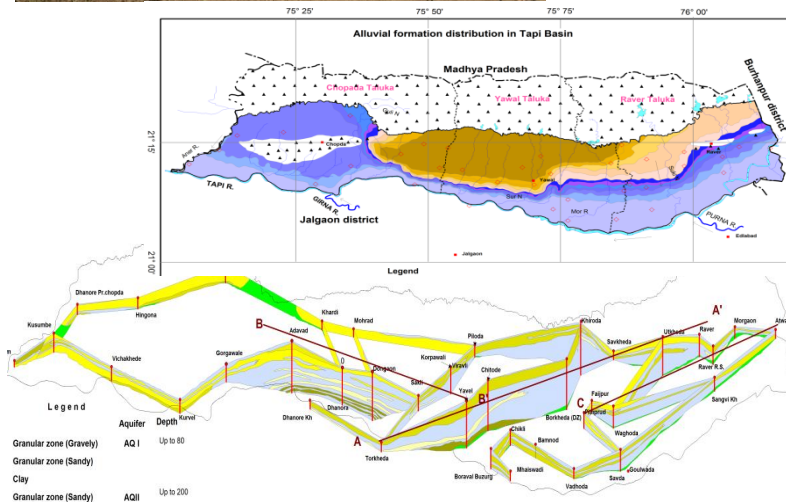
CENTRAL GROUND WATER BOARD



जल बचत जल संचय

Aquifer Maps and Ground Water Management Plan

जलभृत नक्शे तथा भूजल प्रबंधन योजना



**CHOPDA, RAVER
& YAVAL Talukas,
JALGAON District,
Maharashtra**

**चोपड़ा, रावेर तथा
यावल तालुका, जिला
जलगांव, महाराष्ट्र**

मध्य क्षेत्र, नागपुर/ Central Region, Nagpur

जून / February 2017

PART-II

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS, CHOPDA, RAVER AND YAVAL TALUKAS, JALGAON DISTRICT MAHARASHTRA STATE

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**AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS,
CHOPDA, RAVER AND YAVAL TALUKAS, JALGAON DISTRICT
MAHARASHTRA STATE**

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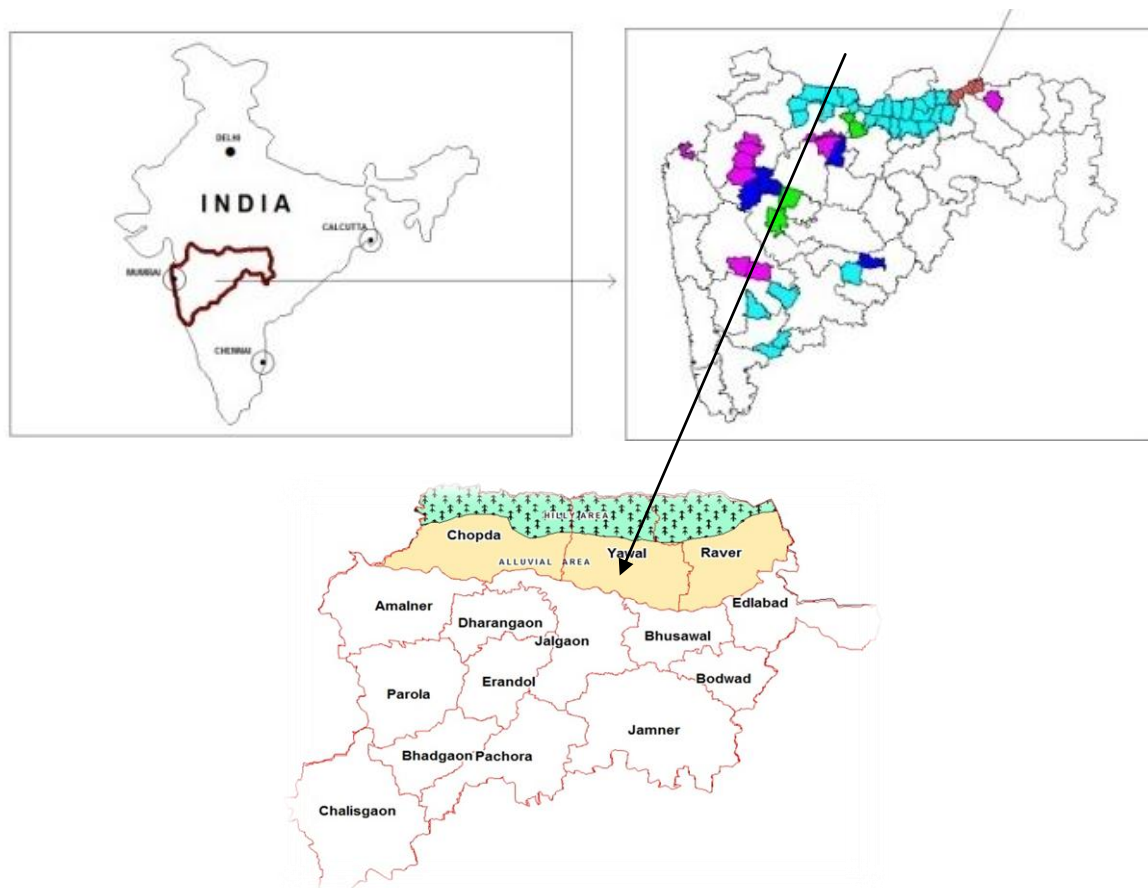
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AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS, CHOPDA, RAVER AND YAVAL TALUKAS, JALGAON DISTRICT MAHARASHTRA STATE

1 BRIEF INTRODUCTION

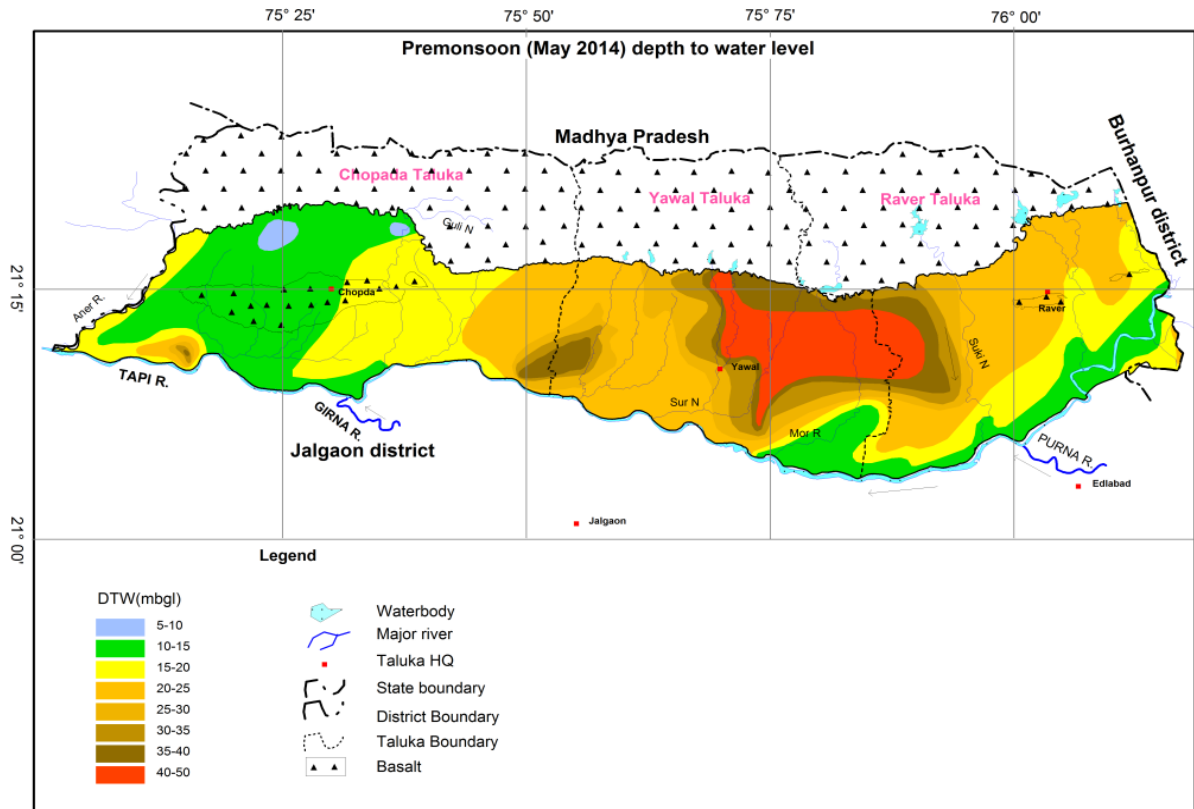
In XII five year plan (2012-17), National Aquifer Mapping (NAQUIM) has been introduced to carry out detailed hydrogeological investigation on topo-sheet scale (1:50,000). Keeping in view the current demand vis-à-vis supply and futuristic requirement of water, Central Ground Water Board has taken up NAQUIM in prioritised areas covering Over-exploited, Critical, Semi-Critical and water stressed talukas. Hence, Over-Exploited and water stressed talukas of Jalgaon district has been taken up to carry out detailed hydrogeological investigation in Raver (OE), Yaval (OE) and Chopda (safe) talukas, by covering an area of 3038 sq.km. in the year 2015-16. The index map of the study area is presented below.

Location Map



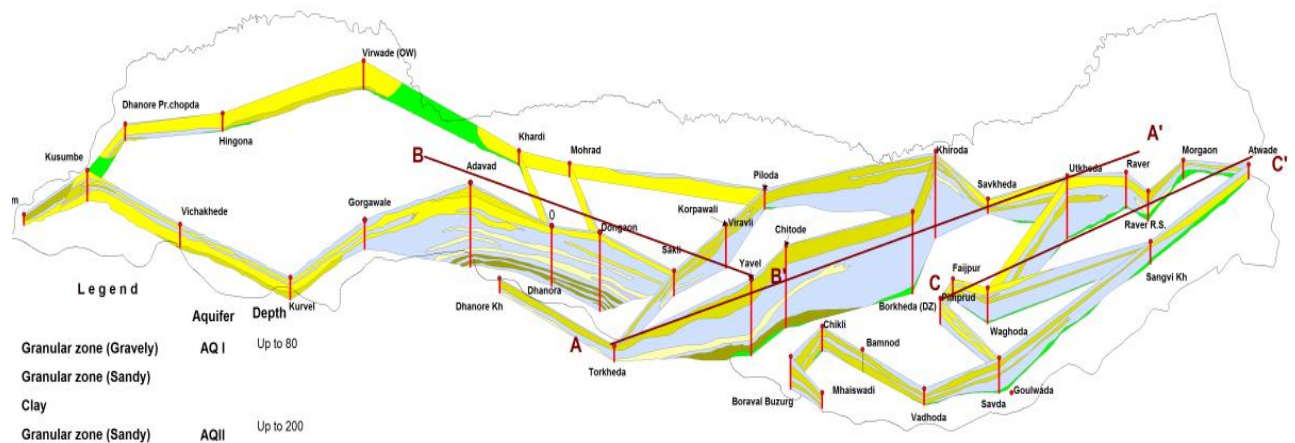
2 SALIENT FEATURES

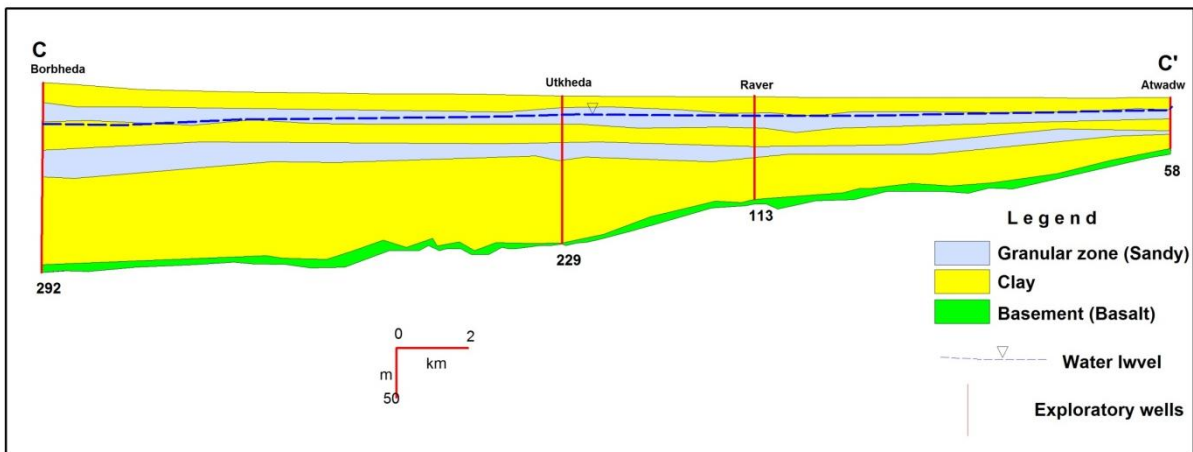
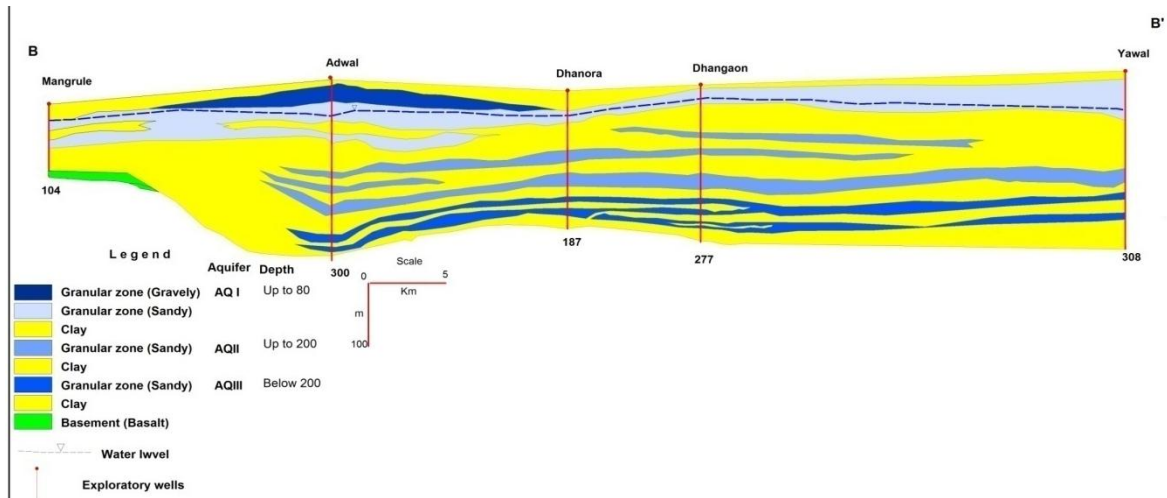
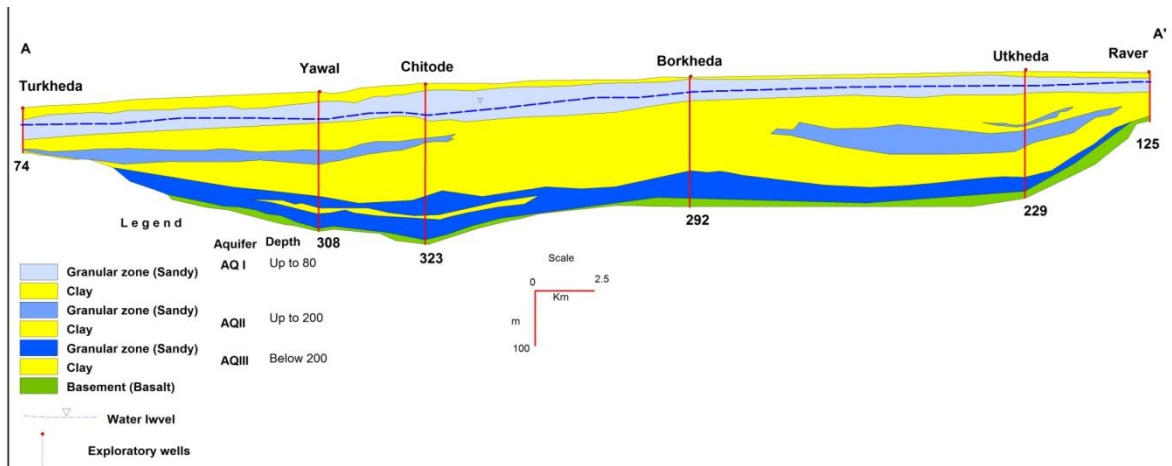
	CHOPDA	RAVER	YAVAL
Area (sq.km.)	1142.65	980.66	913.51
Population (no.'s)	3,12,815	3,12,082	3,72,242
Rainfall (mm)			
i. Normal Annual Rainfall	762.50	770.20	783.80
ii. Rainfall Trend (mm/yr)	Falling@0.11 mm /yr	-	Falling@0.40 mm /yr
iii. Current Rainfall (2015)	500.00 (34% deficient)	476.50 (38% deficient)	475.50 (39% deficient)
Agriculture (sq.km.)			
i. Principal Crops	Banana (134.30), Cereals (131.56), Pulses (112.08) Cotton (309.98) Sugarcane (44.33)	Banana (148.72), Cereals (149.53) Pulses (52.28) Sugarcane (6.54)	Banana (139.29), Cereals (58.30) Pulses (96.40) Sugarcane (24.84)
ii. Cultivable Area	707.92	637.63	612.16
iii. Net Sown Area	620.64	610.62	535.24
Irrigation Sources			
i. Ground water (sq.km.)	292.44	259.48	155.60
ii. GW drip irrigation (sq.km)	205.46	207.58	104.30
iii. Surface Water (sq.km.)	133.11	29.20	110.60
Data Utilised			
i. GW Monitoring Wells (Shallow Aquifer)	13	14	16
ii. Exploratory & Observation Wells	14	16	21
iii. VES	4	11	14
iv. GWQ sampling locations (Shallow Aquifer)	11	12	7
v. Irrigation Dept. Tubewells/Borewells for WL & GWQ of Deeper Aquifer	28	12	20
Existing / Future Water Scope (MCM)			
Domestic	3.45 / 6.28 (2025)	2.74 / 3.35 (2025)	2.17 / 2.99 (2025)
Industrial	-	-	-
Irrigation	89.42 / 121.11	121.06 / No Scope	90.63 / No Scope
Water Level Behaviour			
2014 Premonsoon WL (m bgl)	7.45 to 40.00	6.50 to 43.60	12.60 to 53.07
2014 Postmonsoon WL (m bgl)	1.60 to 30.60	3.00 to 32.40	9.70 to 51.80
Premonsoon WL Trend (2005-14) (m /yr)	Rise – upto 0.28 Fall – upto 0.26	Rise – upto 0.50 Fall – upto 0.66	Rise – upto 0.68 Fall – upto 0.60

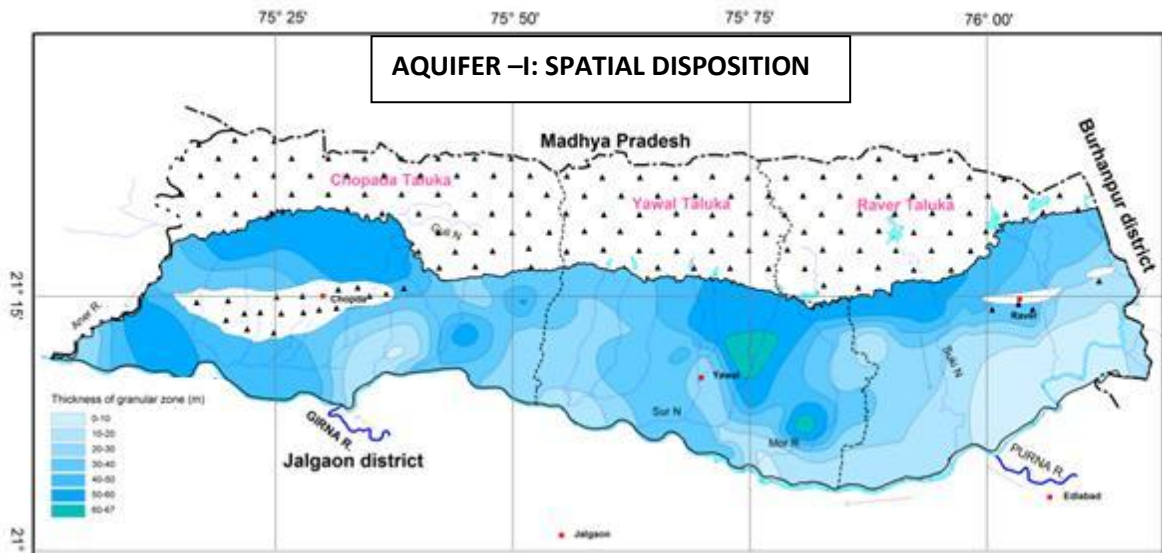


3 AQUIFER DISPOSITION

	CHOPDA	RAVER	YAVAL
3-D Aquifer Disposition	<p>Aquifer: Alluvium comprising of alternate layers of sand and clay. Aquifer –I: upto 80 m; Aquifer –II: 80 to 200m; Aquifer –III: 200 to 330 m (explored depth)</p> <p>Aquifer: Basalt as Inlier; Aquifer I - Weathered/Fractured Basalt: 10 to 25 m, Aquifer II - Jointed/Fractured Basalt: 18 to 153 m</p>		

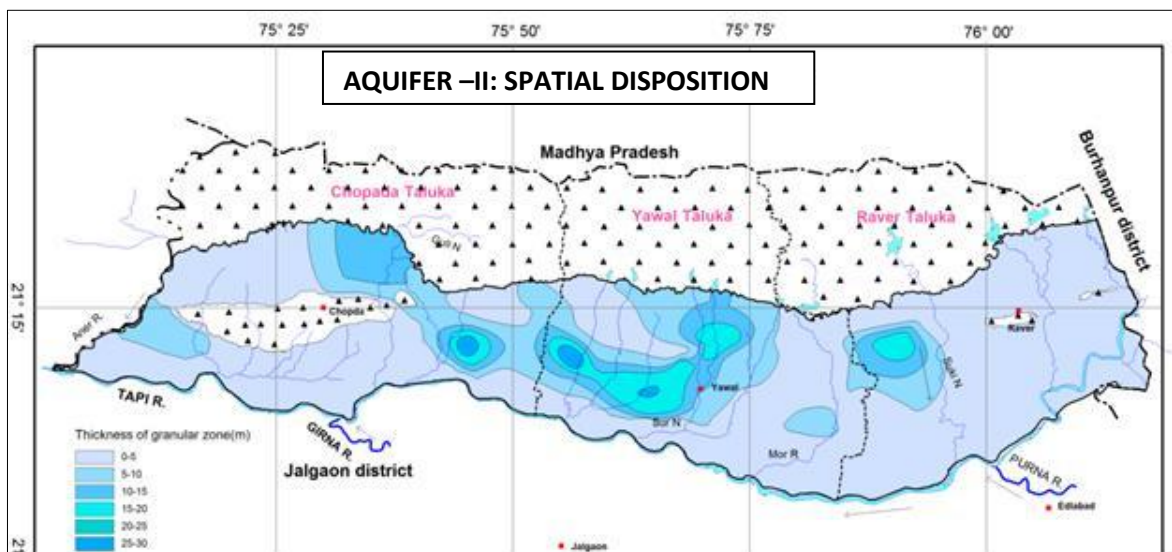


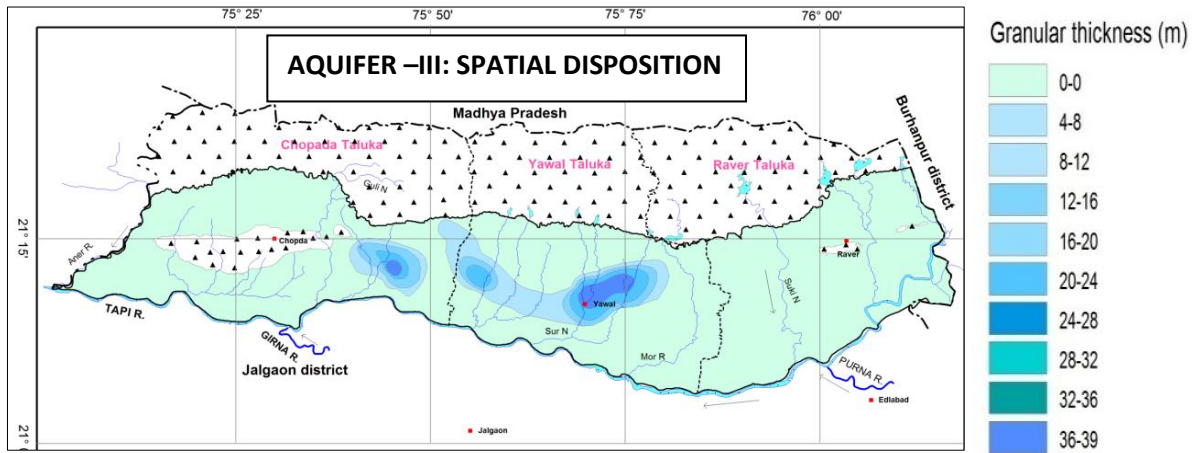




Aquifer –I Depth Range	Upto 80 m
Granular thickness	2 to 67 m
Yield range	50 to 400 m ³ /day
Water level	15 to 50 m
Quality	Mainly Potable. High EC & Nitrate in eastern parts of Raver
Aquifer Parameters	Transmissivity- 54 to 2525 m ² /day, Storativity- 1.26 x 10 ⁻³ to 1.86 x 10 ⁻³
GW Resource	324.33 MCM Dynamic + Instorage 2.84 = Total - 327.17 MCM

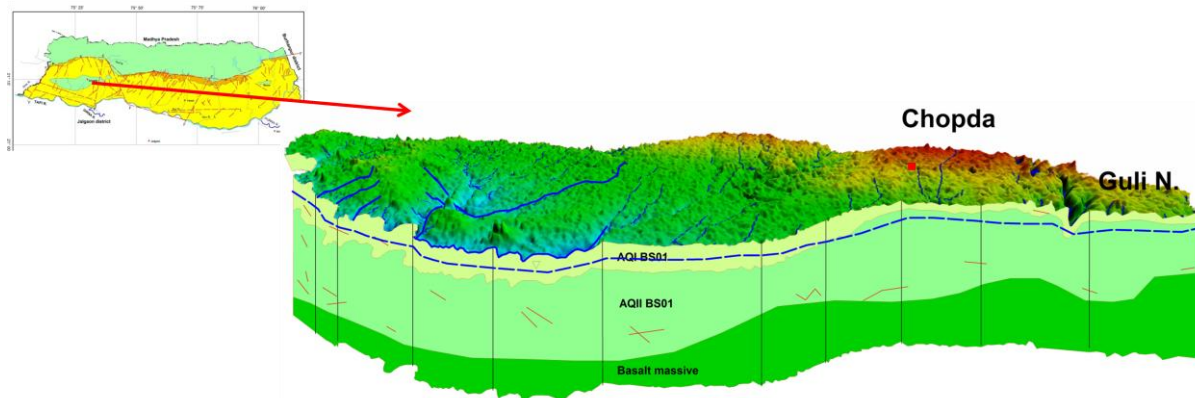
Aquifer –II Depth Range	80 – 200 m
Granular thickness	2 to 30 m
Yield range	200 to 400 m ³ /day
Water level	10 to 45 m
Quality	Potable
Aquifer Parameters	Transmissivity- 5.40 m ² /day, Storativity- 1.05 x 10 ⁻⁴
GW Resource	34.53 MCM





Aquifer –III	
Depth Range	> 200 m (explored down to 330 m)
Granular thickness	4 to 40 m
Yield range	200 to 400 m ³ /day
Water level	10 to 35 m
Quality	Potable
GW Resource	8.61 MCM

3-D Aquifer Disposition - Basalt

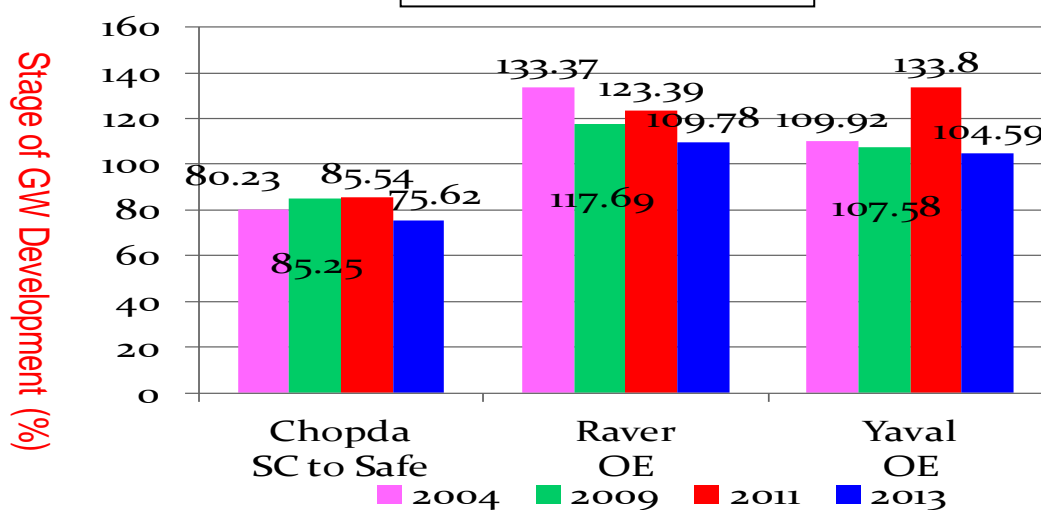


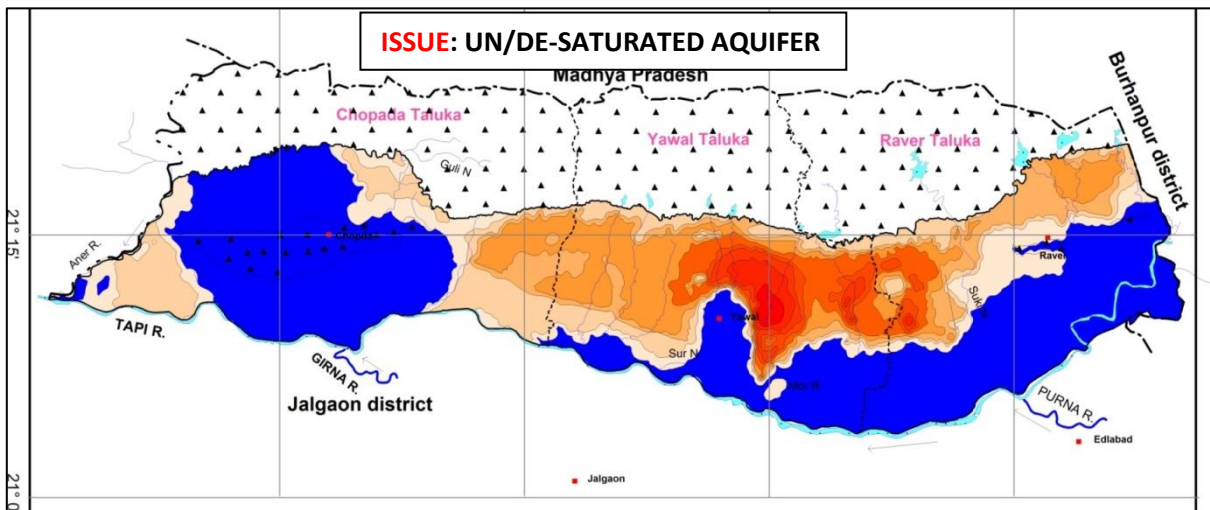
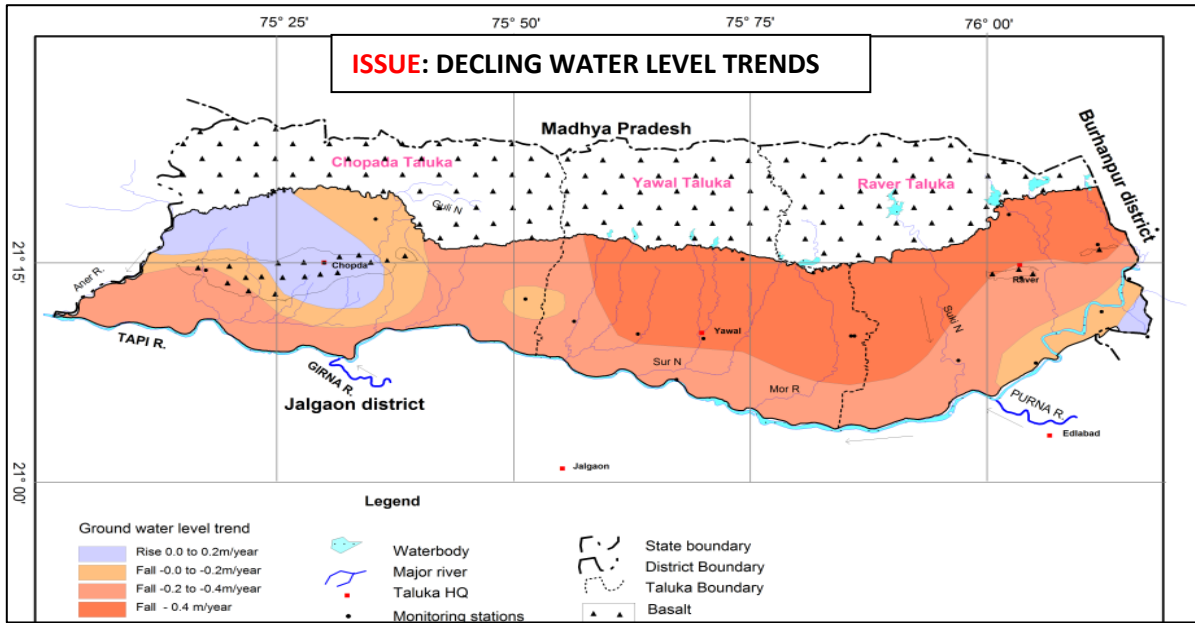
Type of Aquifer	Formation	Depth range (mbgl)	SWL (mbgl)	Thick-ness (m)	Yield (lpm)	Sustaina-bility	Aquifer parameter (Transmissivity – m ² /day)	Sy/S	Suitability for drinking/ irrigation
Aquifer-I	Weathered/Fra ctured Basalt	10-25	7.50 to 18.50	0.5 to 4.00	15-150	1 to 2 Hours – recurring	-	0.02	Yes for both
Aquifer-II	Jointed/Fractur ed Basalt	18-153	5.40 to 19.75	0 to 3	22 - 356	1 to 5 hours	360.05 to 562.81	3.47 x 10 ⁻³ to 3.96 x 10 ⁻⁴	Yes for both

4 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

	CHOPDA	RAVER	YAVAL
Aquifer wise Ground Water Resource availability and Extraction			
Ground Water Resource (MCM) Aquifer –I: upto 80 m			
Availability	122.82	112.78	88.73
Withdrawal	92.87	112.78	88.73
Ground Water Resource (MCM) Aquifer –II: 80 to 200 m			
Availability	6.38	15.25	12.90
Withdrawal	0	11.02	4.14
Ground Water Resource (MCM) Aquifer –III: 200 to 330 m			
Availability	2.59	0	6.02
Present Category	Safe	Over Exploited	Over Exploited
Ground Water Related Issues			
Over Exploitation	Stage of GW Development has increased over the period of time. Overdraft for irrigation purpose.		
Deeper Water Levels	Deeper Water Levels (DTW> 20 m) – Area 1051sq km		
Declining Water Levels	Declining Water Levels area – 1492 sq.km (Falling Trend > 0.20 m/yr)		
Un/De-saturated Granular Thickness	Un/De-saturated area below 5 m depth 1039sq km.		
GW based irrigation of cash crops like banana	Major area (422 sq.km) under cash crop – banana and sugarcane in 75.35 sq.km (water intensive crop).		
Micro Irrigation	100% drip irrigation in banana through GW, thus further scope of implementing WUE in banana crop is NIL. Major area of other crops also under drip irrigation. Total area under GW based drip irrigation is 517.34 sq.km.		

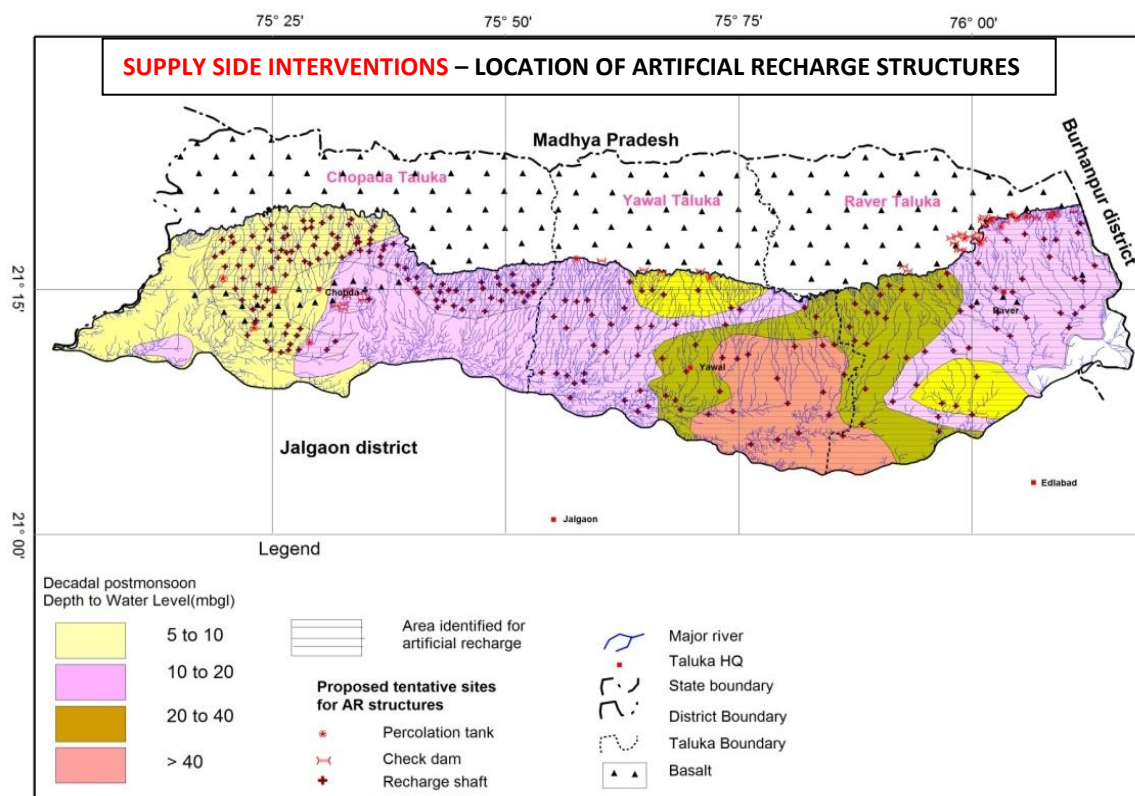
ISSUE: OVER-EXPLOITATION



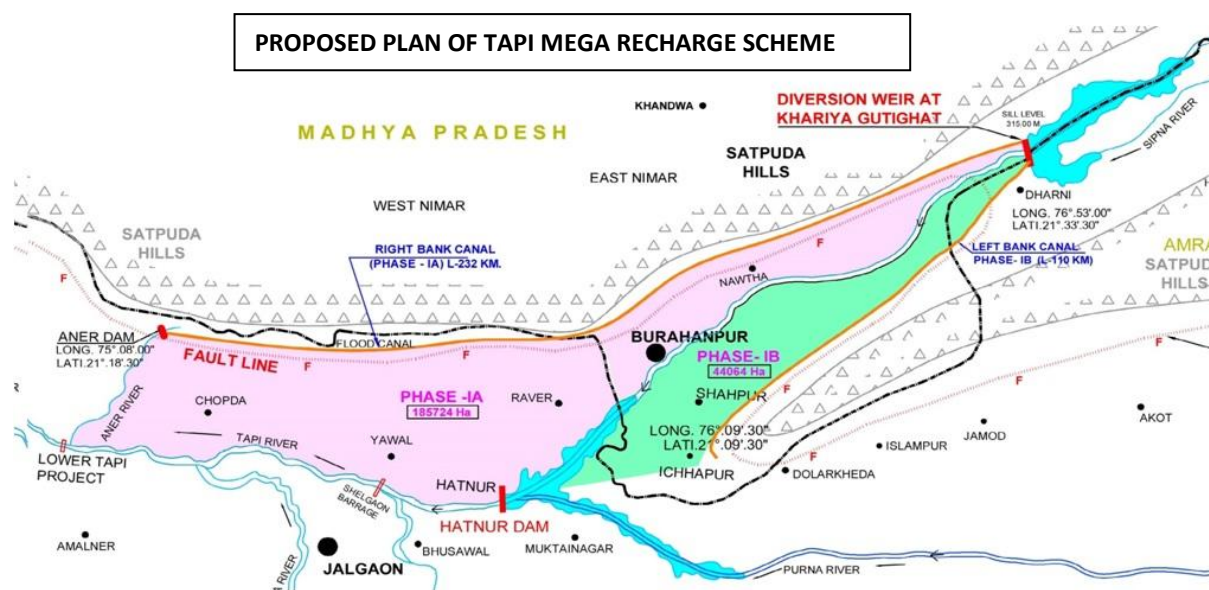


5 GROUND WATER RESOURCE ENHANCEMENT AND PROPOSED MANAGEMENT INTERVENTIONS

	CHOPDA	RAVER	YAVAL	TOTAL
5.1 Resource Enhancement by Supply Side Interventions				
Recharge Potential	283.65	294.22	583.02	1160.89
Surface water requirement @ 75% efficiency	377.25	391.31	775.39	1543.95
Availability of Surplus surface runoff	9.15	12.20	12.80	34.15
Proposed Artificial Recharge Structures				
PT	21	31	30	82
CD	30	12	0	42
RS	68	95	114	277
Volume of Water expected to be recharged @ 75% efficiency (MCM)	6.89	9.20	9.63	25.72
Estimated Expenditure	42.20	52.48	47.85	142.53
Proposed RTRWH				
Households to be covered	12987	13725	12156	38868
Total RWH potential	0.47	0.51	0.45	1.43
Rainwater harvested / recharged @ 80% runoff co-efficient	0.38	0.41	0.36	1.15
Estimated Expenditure (Rs. in Cr.)	19.48	20.59	18.23	58.30
RTRWH Economically not viable & Not Recommended. Total estimated Cost of RTRWH would be- 58.30 Cr. For Harvesting 1.14 MCM of Rain Water.				



	CHOPDA	RAVER	YAVAL	TOTAL
5.2 Resource Enhancement by Demand Side Interventions				
Change in Cropping Pattern	None	None	None	-
Micro irrigation techniques	Negligible scope	Negligible scope	Negligible scope	-
Resource Enhancement by Alternate Sources				
Alternative surface water sources - Tapi Mega Recharge Scheme	101.74	87.18	89.21	278.13
Quantum of water recharged-Tapi MRS	76.31	65.39	66.91	208.61



5.3 Probable Benefits

	CHOPDA	RAVER	YAVAL	TOTAL
Additional GW resources available after implementing above measures	83.19	74.58	76.54	234.31
Total resources required to bring stage of GWD upto 70%	6.90	44.50	30.69	82.44
Additional GW resources available after implementing above measures and mitigating the GAP TO BRING STAGE OF GWD UPTO 70% AND	76.30	29.73	45.85	151.87
Area proposed to be brought under assured GW irrigation (sq.km.) OR	117.38	45.74	70.54	233.65

5.4 Regulatory Measures

	CHOPDA	RAVER	YAVAL
Regulatory Measures	Regulation of wells below 80 m	Regulation of wells below 80 m	Regulation of wells below 80 m

6 SUM UP

A thorough study was carried out based on data gap analysis, data generated in-house, data acquired from State Govt. departments and GIS maps prepared for various themes. All the available data was brought on GIS platform and an integrated approach was adopted for preparation of aquifer maps and aquifer management plans of Chopda (OE), Raver (OE) and Yaval (OE) taluka of Jalgaon district.

The study area is spanning over 3038 sq.km, out of which 1081 sq.km is hilly area. Geologically the area is occupied by Bazada (97 sq.km.), Alluvium (1777 sq.km.) and Basalt (83 sq.km.). The stage of ground water development is 75.62% in Chopda, 109.78% in Raver and 104.59% in Yaval taluka. The area has witnessed ground water depletion and over exploitation over a period of time. The deeper water levels of more than 20 m bgl has been observed in about 1051 sq.km areas and declining water level trend of more than 0.20 m/yr. has been observed in 1492 sq.km. This has been due to cultivation of water intensive cash crop like banana (422 sq.km), sugarcane (76 sq.km) and are completely dependent on ground water irrigation. The increasing allurements towards cash crops and decreasing availability of water have compelled the farmers to shift from traditional irrigation methods to micro irrigation techniques like drip irrigation. At present the area under drip irrigation is 517.34 sq.km. (73%) out of the total ground water irrigated area of 707.52 sq.km., thus further scope for introducing the drip irrigation in ground water irrigated area is minimal.

Ground water management plan has been prepared with the objective of bringing the current stage of ground water development down to 70% so that the taluka/block comes under Safe category by adopting both supply side and demand side interventions. The typical / in vogue supply side interventions like artificial recharge / water conservation structures have limitations, as the increase in recharge vis-à-vis the total annual replenishable recharge will be only 5.61% in Chopda taluka, 8.15% in Raver taluka and 10.85% in Yaval taluka. In Chopda taluka, these supply side interventions will contribute entire quantum of water required to bring the stage of ground water development down to 70%. However, in Raver and Yaval talukas only 20% and 31% of the total requirement of ground water resources required to bring the stage of ground water development down to 70% will be met. Thus the objective of the management plan, to bring down the stage of development towards Safe category will not be achieved by regular/in-vogue intervention measures.

In these areas, the Task Force constituted by Govt. of India, MoWR, RD & GR has recommended the Tapi Mega Recharge Scheme and major part of the area falls in these 3 talukas of Jalgaon district. The alternate surface water source is available by proposing the diversion weir on Tapi River at Khariya Gutli Ghat (MP). The quantum of ground water recharged from Tapi Mega Recharge Scheme in Chopda taluka will be 76.31 MCM, 65.39MCM in Raver taluka and 66.91 MCM in Yaval taluka.

The probable benefits of the proposed management plan after implementing above measures will help in bringing the stage of ground water development down to 70% in all the 3 talukas. Further ground water resources of 76.30 MCM in Chopda taluka; 29.73 MCM in Raver taluka and 45.85 MCM in Yaval taluka will be available for utilization. This will be able to bring about 117.38 sq.km area under assured irrigation in Chopda taluka; 45.74 sq.km. in Raver taluka and 70.54 sq.km. in Yaval taluka.

These interventions also need to be supported by regulation of deeper aquifer and hence it is recommended to regulate/ban deeper tubewells/borewells of more than 80 m depth in these 3 talukas, so that the deeper ground water resources are protected for future generation and also

serve as ground water sanctuary in times of distress/drought. IEC activities and capacity building activities needs to be aggressively propagated to establish the institutional framework for participatory groundwater management.

