



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

**Nagar and Newasa Taluka, Ahmednagar District,
Maharashtra**

(Part-II)

मध्य क्षेत्र, नागपुर

Central Region, Nagpur

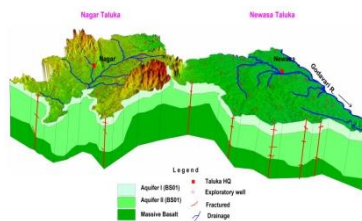
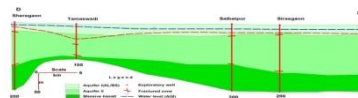
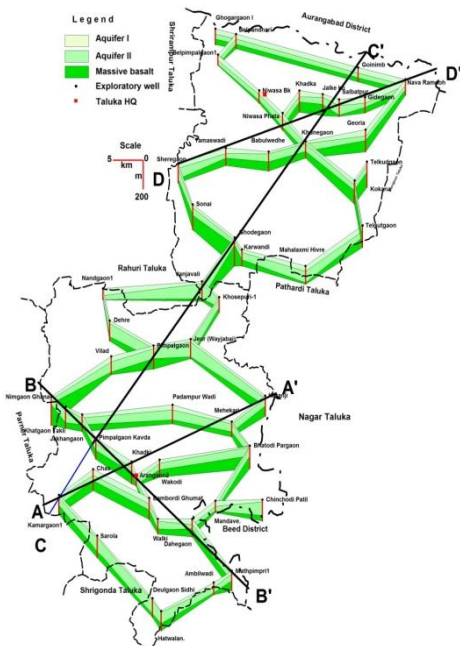
भारत सरकार
Government of India
जल संसाधन, नदी विकास एवं गंगा संरक्षण मंत्रालय
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केन्द्रीय भूमिजल बोर्ड
CENTRAL GROUND WATER BOARD



जल बचत जल संचय

Brief Report on Aquifer Maps and Ground Water Management Plan

जलभृत नक्शे तथा भूजल प्रबंधन योजना पर संक्षिप्त रिपोर्ट



**NAGAR &
NEWASA** Talukas,
AHMEDNAGAR
District,
MAHARASHTRA
नगर तथा नेवासा
तालुका, जिला
अहमदनगर, महाराष्ट्र

मध्य क्षेत्र, नागपुर/ Central Region, Nagpur
मार्च / March 2017

**BRIEF REPORT ON AQUIFER MAPS AND GROUND WATER
MANAGEMENT PLANS, NAGAR & NEWASA TALUKAS,
AHMEDNAGAR DISTRICT, MAHARASHTRA STATE**

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MANAGEMENT PLANS, NAGAR & NEWASA TALUKAS,
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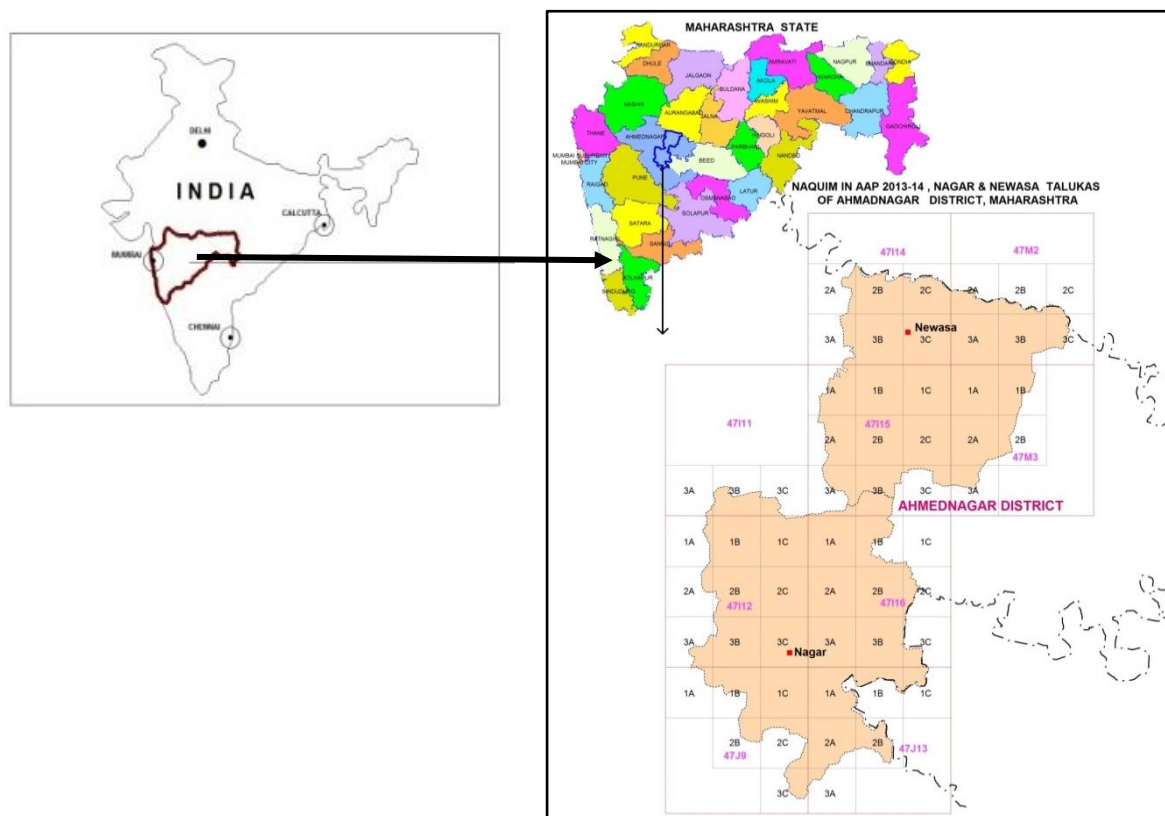
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BRIEF REPORT ON AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS, **NAGAR & NEWASA TALUKAS**, **AHMEDNAGAR DISTRICT** MAHARASHTRA STATE

1 INTRODUCTION

In XIIth 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, in 12th plan Central Ground Water Board has taken up NAQUIM in prioritised areas covering Over-exploited, Critical and Semi-Critical talukas. Hence, Nagar and Newasa, Semi-Critical talukas of Ahmednagar district, covering an area of 2749.40 sq. km have been taken up in the year 2013-14 to carry out detailed hydrogeological investigation. The index map of the study area is presented below.

Location Map

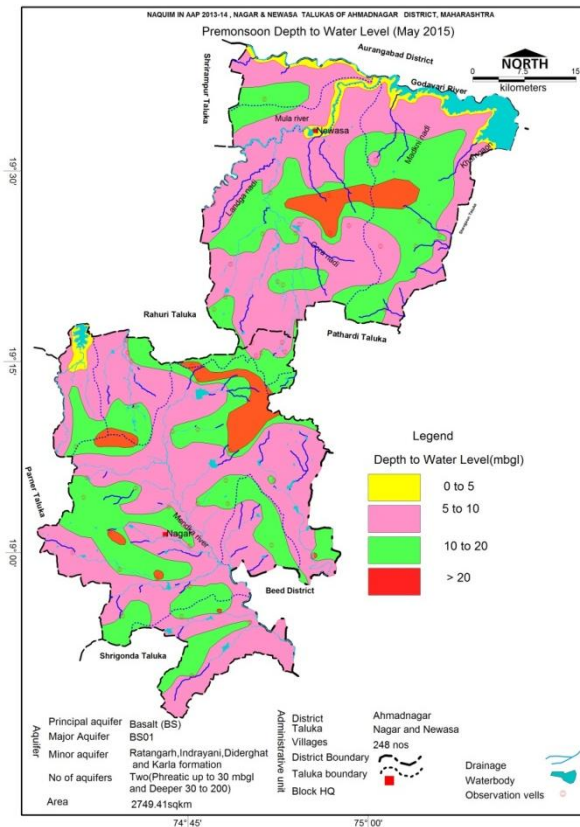


2 SALIENT FEATURES

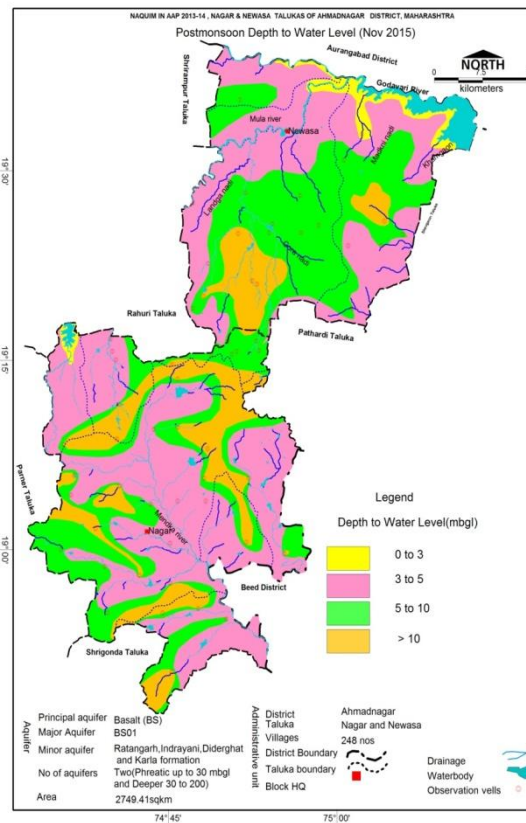
	NAGAR	NEWASA
Area (sq.km.)	1394.25	1355.16
Population (no.'s)	6,84,044	3,57,829
Rainfall (mm)		
i. Normal Annual Rainfall	623.10 mm	563.70 mm
ii. Rainfall Trend (mm/yr)	Falling@0.56 mm/yr	Falling @0.66 mm /yr
iii. Current Rainfall (2015)	415.5 (30% deficient)	457.00 (19% deficient)
Agriculture (sq.km.)		
i. Principal Crops	Cereals (1138.12), Pulses (29.13), Sugarcane (21.80) Vegetables (6.69)	Sugarcane (346.47), Cereals (798.25) Pulses (98.33) Vegetables (24.30)
ii. Cultivable Area	1202.33	1276.61
iii. Net Sown Area	1149.15	1080.66
Irrigation Sources		
i. Ground water (sq.km.)	175.98	324.09
ii. GW drip irrigation (sq.km)	59.65	30.11
iii. Surface Water (sq.km.)	Nil	118.87
Data Utilised		
i. Key Observation Wells	30	30
ii. Exploratory & Observation Wells	32	34
iii. Pz	5	1
iv. VES	43	52
v. GWQ sampling locations	33	18
Existing / Future Water Demands (MCM)		
Domestic	3.25 / 6.45 (2025)	3.46 / 6.23 (2025)
Industrial	-	-
Irrigation	105.73 / 112.19	165.57 / 193.59

Water Level Behaviour		
Pre-monsoon 2015 WL (m bgl)	8.56 to 23.45	4.85 to 23.75
Post-monsoon 2015 WL (m bgl)	4.65 to 19.97	1.00 to 10.40
Pre-monsoon WL Trend (m /yr)	Rise – upto 0.15 Fall – upto 0.77	Rise – upto 0.30 Fall – upto 0.64

Pre-monsoon 2015

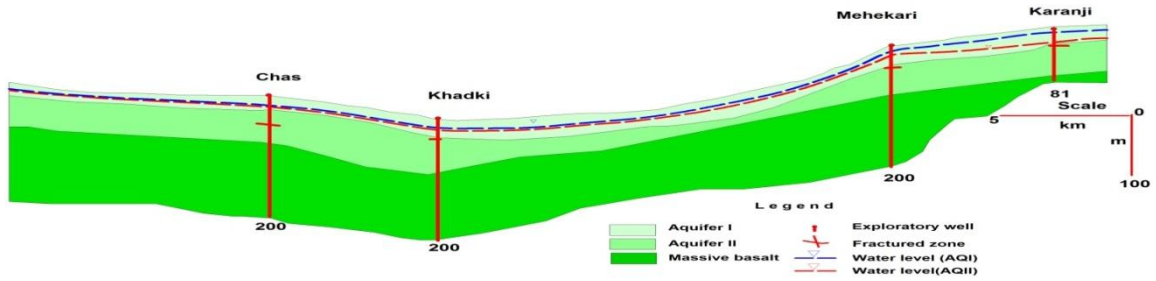


Post-monsoon 2015

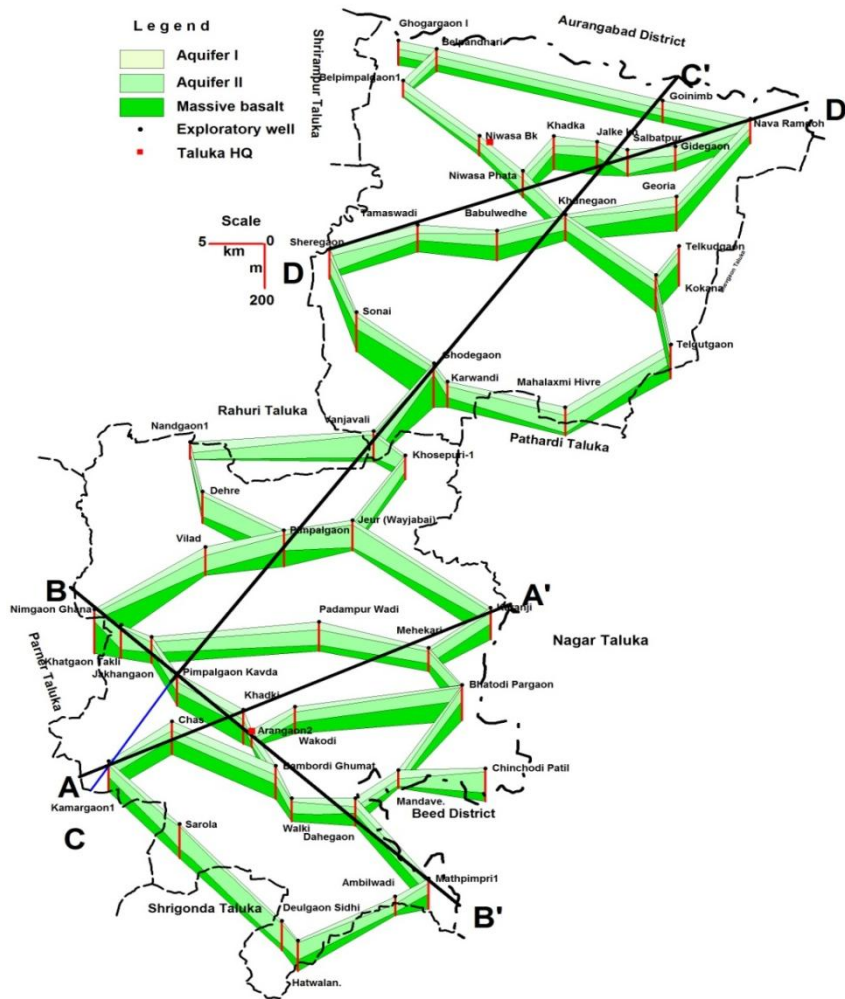


3 AQUIFER DISPOSITION

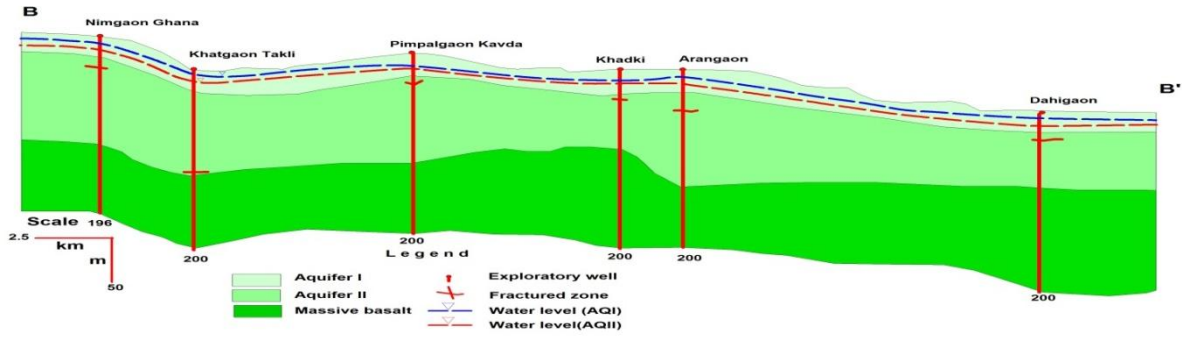
	NAGAR	NEWASA
3-D Aquifer Disposition	Aquifer: Basalt; 1. Aquifer I - Weathered/Fractured Basalt: 5 to 35 m, 2. Aquifer II - Jointed/Fractured Basalt: 30 to 162 m	



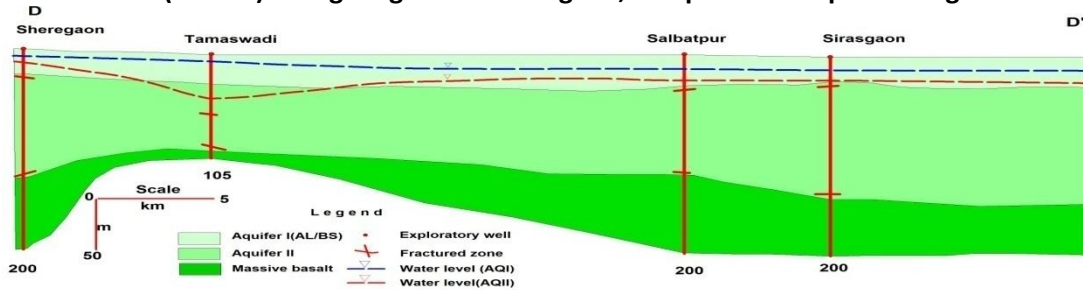
Section – A-A' (SW-NE): Chas to Karanji



Fence Diagram

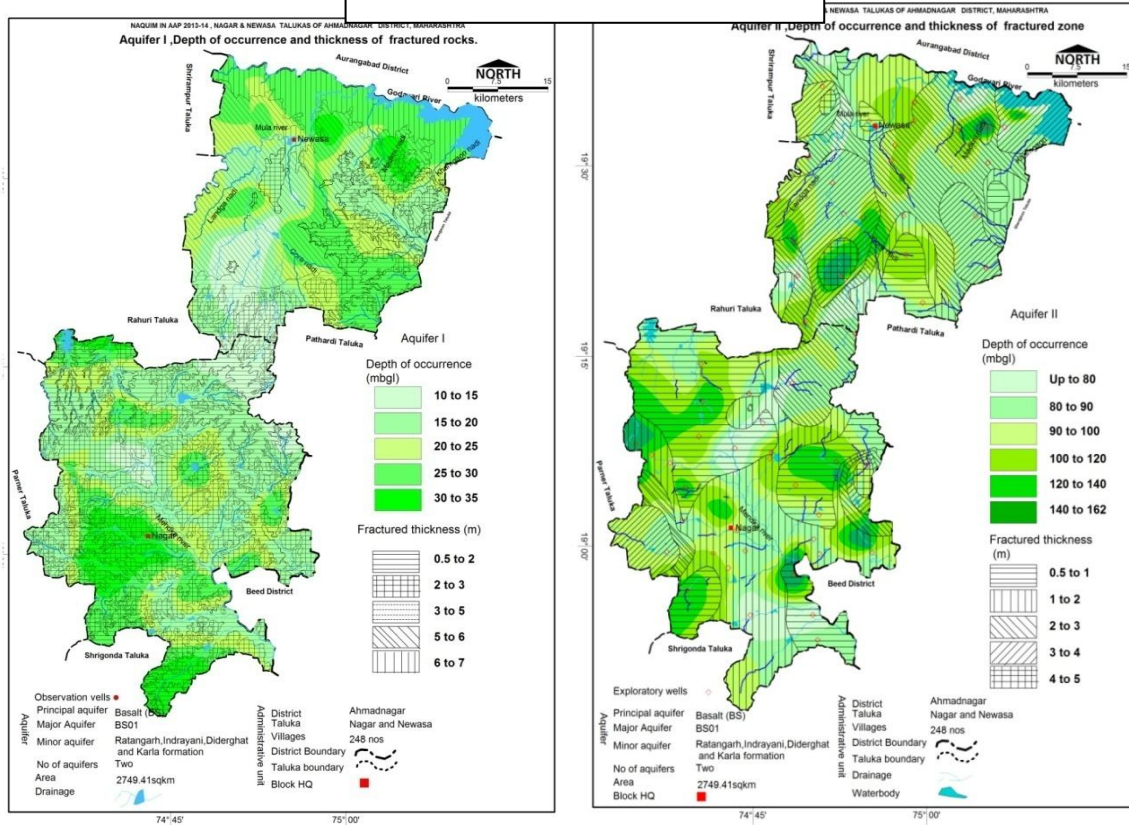


Section – BB' (SW-NE): Nimgaon Ghana to Dahigaon, GW potential is poor along this section

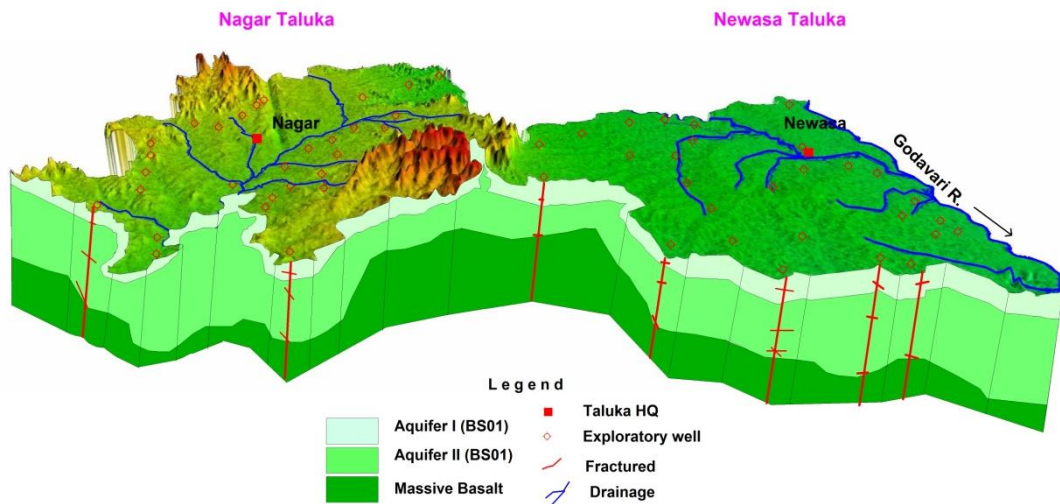


Section – D-D' (NW-SE): Sheregaon to Sirasgaon, more fractures observed at Tamswadi., Q= 7.9lps

AQUIFER –I: SPATIAL DISPOSITION



3-D Aquifer Disposition

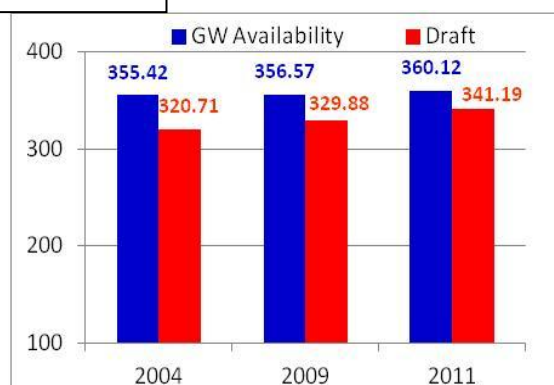
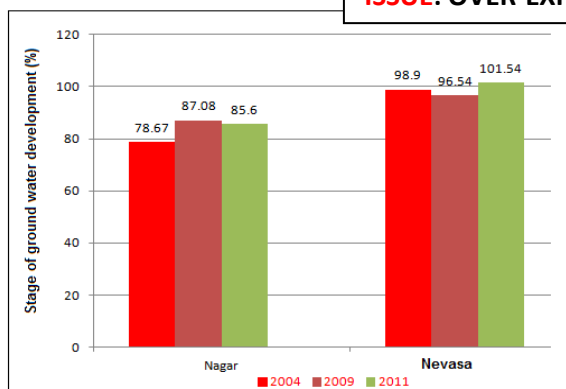


Type of Aquifer	Formation	Depth range (mbgl)	SWL (mbgl)	Thickness (m)	Fractures encountered (m bgl)	Yield	Sustainability	Transmissivity ² (m ² /day)	Sy/S	Suitability for drinking/irrigation
Aquifer-I	Deccan Trap-Weathered/Fractured Basalt	5-35	4.85 to 23.00	0.5 to 7.00	5 to 35	10-100 m ³ /day	upto 3 hours	-	0.02	Yes for both (except Nitrate and high EC affected villages for drinking)
Aquifer-II	Jointed/Fractured Basalt	30-162	4.40 to 47.00	0.5 to 5.00	35 to 162	50-300 lpm	upto 4 hours	5 to 150	2.0 x 10 ⁻³ to 2.47 x 10 ⁻⁴	Yes for both

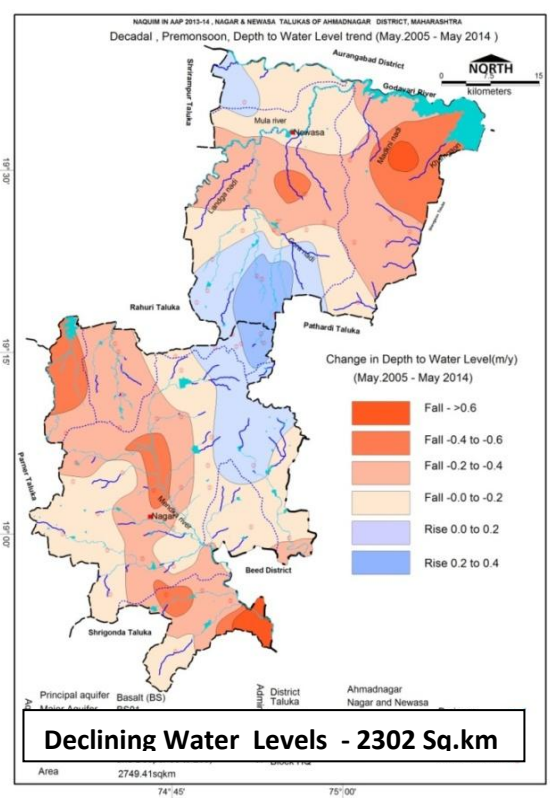
4 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

	Nagar	Newasa
Aquifer wise Ground Water Resource availability and Extraction		
Ground Water Resource (MCM) Aquifer –I: upto 35 m		
Availability	146.41	196.17
Withdrawal	108.98	169.03
Ground Water Resource (MCM) Aquifer –II: 35 to 162 m		
Availability	4.43	9.38
Withdrawal	-	-
Present Category	Safe but Water Stressed	Semi-Critical
Ground Water Related Issues		
Low Rainfall and Droughts Period 2005-2014 Period 1901-2015	RF- 569 mm RF- 623.10 mm	RF- 531 mm RF- 563.70 mm
Moderate Droughts	25 years (22% of years)	19 years (17% of years)
Severe Droughts	5 years (4% of years)	6 years (5% of years)
Rainfall Trend	Falling@0.56 mm/yr	Falling@0.66 mm/yr
GW based irrigation of cash crops	Sugarcane – 21.80 sq.km	Sugarcane – 63.85 sq.km
Over Exploitation	Draft and Stage of GW Development has increased from 78.67 % in 2004 to 85.60 % in 2011	Draft and Stage of GW Development has increased from 98.90% in 2004 to 101.54 % in 2011
Declining Water Levels	Pre-monsoon water level trend is falling upto 0.60 m/yr in 1226 Sq.km. (88% of area)	Pre-monsoon water level trend is falling upto 0.60 m/yr in 1057 Sq.km. (78% of area)
Limited Aquifer Thickness	Aquifer-I: 0.5 to 5 m, Aquifer-II: 0.50 to 4 m	Aquifer-I: 0.5 to 7 m, Aquifer-II: 0.50 to 5 m
Low Sustainability of wells	DW : upto 2 hrs BW : 1-2 hrs	-

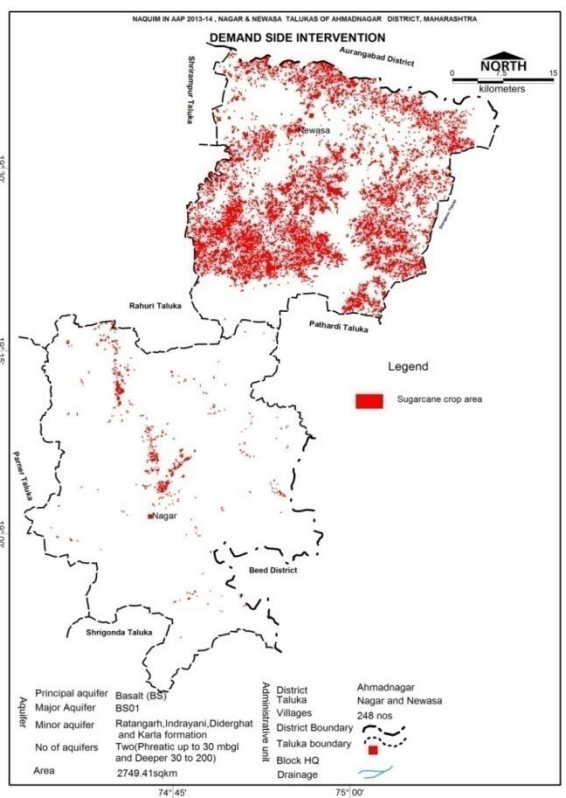
ISSUE: OVER-EXPLOITATION



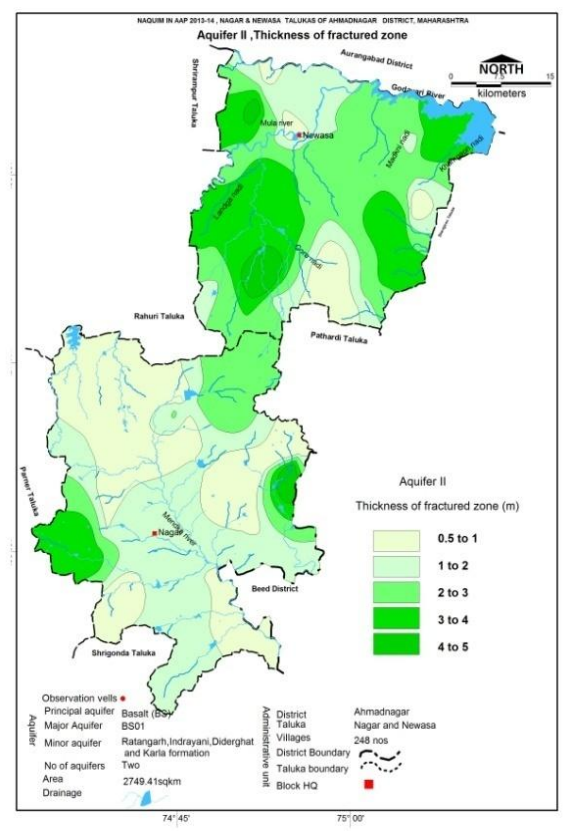
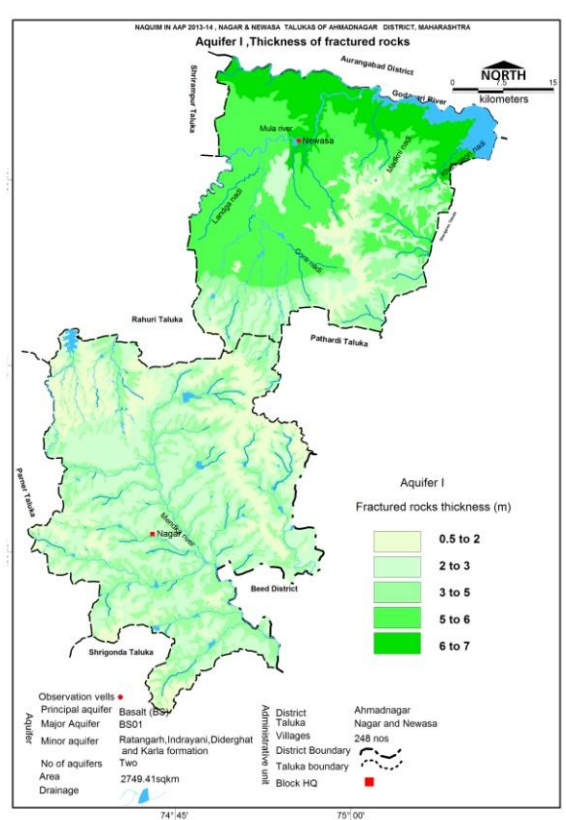
ISSUE: DECLINING WATER LEVEL TRENDS



ISSUE: WATER INTENSIVE SUGARCANE CROP

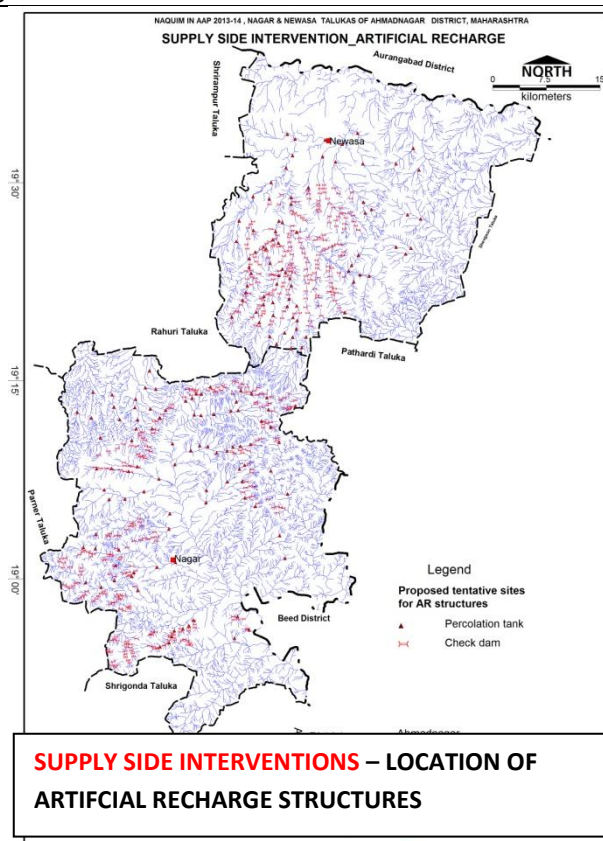


ISSUE: Limited Aquifer Thickness in both the aquifers, Aquifer-I: 0.5 to 7 m, Aquifer-II: 0.50



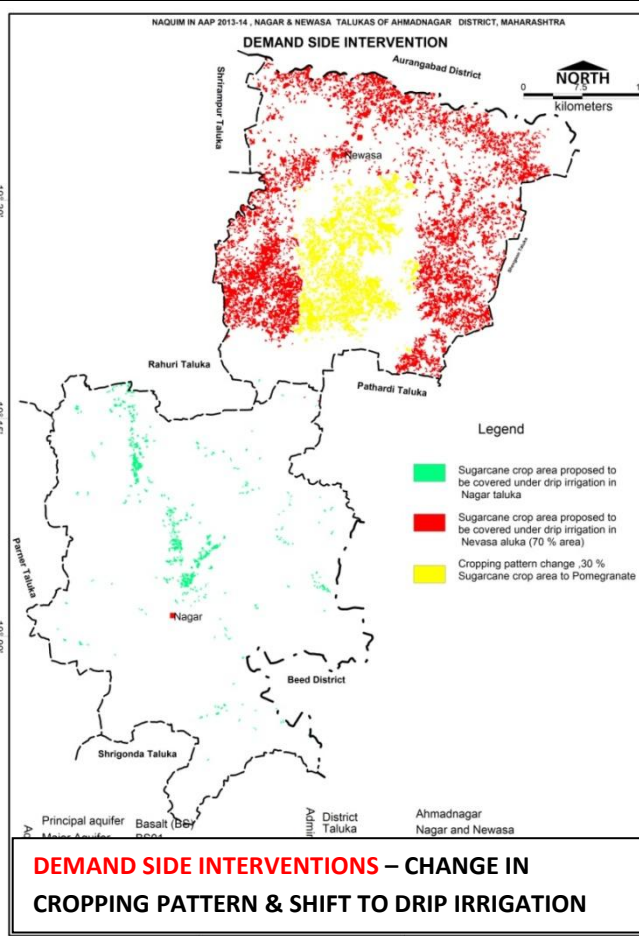
5 GROUND WATER RESOURCE ENHANCEMENT AND PROPOSED MANAGEMENT INTERVENTIONS

	NAGAR	NEWASA	TOTAL
5.1 Resource Enhancement by Supply Side Interventions			
Recharge Potential (MCM)	46.71	37.89	84.60
Surface water requirement @ 75% efficiency (MCM)	62.28	50.51	112.79
Availability of Surplus surface runoff (MCM)	26.97	21.88	48.85
Proposed Artificial Recharge Structures			
Percolation Tanks TANK (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	94	79	173
Check Dam DAM (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)	270	200	470
Volume of Water expected to be recharged @ 75% efficiency (MCM)	20.227	16.41	36.53
Estimated Expenditure (Rs. in Cr.)	222.00	178.50	400.50
Proposed RTRWH			
Households to be covered	25%	25%	
Total RWH potential (MCM)	1.27	0.58	1.85
Rainwater harvested / recharged @ 80% runoff co-efficient	1.02	0.47	1.49
Estimated Expenditure (Rs. in Cr.)	54.28	27.30	81.58
RTRWH Economically not viable & Not Recommended. Total estimated Cost of RTRWH would be 81.58 Cr. For Harvesting 1.49 MCM of Rain Water.			



5.2 Resource Enhancement by Demand Side Interventions

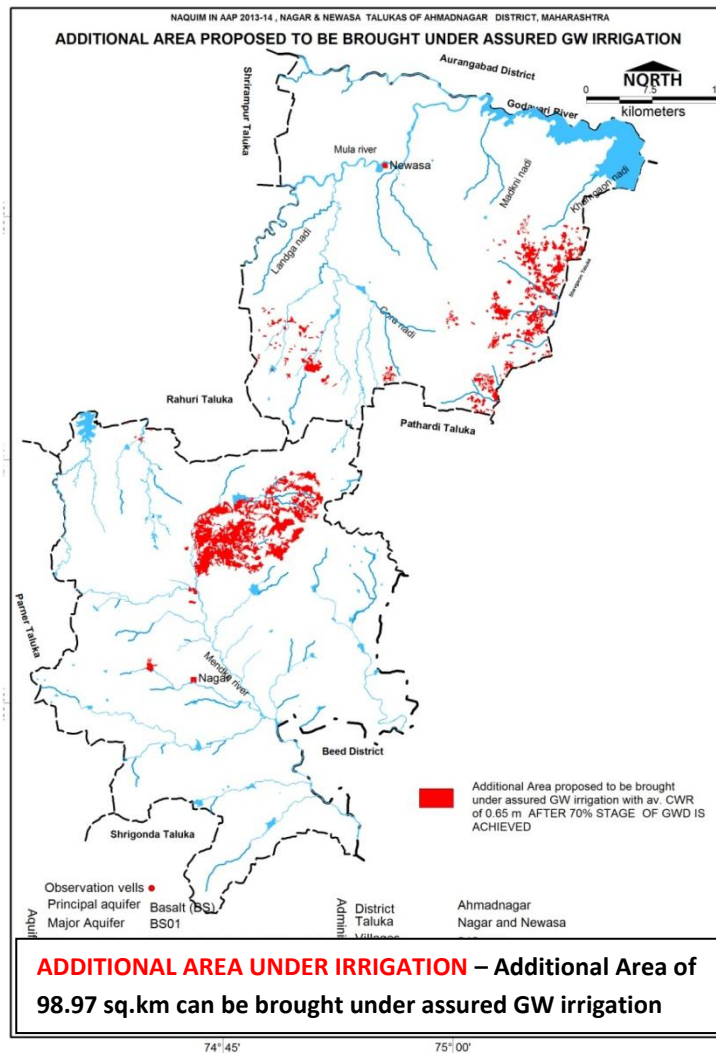
	NAGAR	NEWASA	TOTAL
Change in Cropping Pattern (sq.km.)	None	30% area under sugarcane to Pomegranate (19.16 Sq. Km.)	19.16
Volume of Water expected to be conserved (MCM). Sugarcane requirement - 2.45 m, Pomegranate with Drip - 0.8 m, WUE - 1.65 m		31.61	31.61
Estimated Expenditure (Rs. in Cr.) @ Rs. 30,000/- per acre for drip		14.20	14.20
Micro irrigation techniques			
Sugarcane crop area respectively proposed to be covered under Drip (sq.km.)	21.8 (100%)	44.70 (70%)	66.50
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m	12.43	25.48	37.90
Estimated Expenditure (Rs. in Cr.) @ Rs. 60,000/- per acre	32.32	66.26	98.59



RESOURCE ENHANCEMENT	NAGAR	NEWASA	TOTAL
Additional GW resources available after implementing above measures (MCM)	32.60	73.43	106.03
Volume of Water Required TO BRING STAGE OF GWD UPTO 70% (MCM)	6.49	35.21	41.70
Balance GWR available for GW Development after STAGE OF GWD is brought to 70% (MCM)	26.11	38.22	64.33

5.3 Probable Benefits

	NAGAR	NEWASA	
Reduction in Stage of GW Development	Reduced from 74 % to 70%	Reduced from 86 % to 70%	
Area proposed to be brought under assured GW irrigation (sq.km.) with CWR of 0.65m	40.17	58.80	98.97
Arrest the decline in water levels of Aquifer-I, Strengthening of GW Sources, Increase Sustainability of GW sources, reduction of electricity consumption.			



5.4 Regulatory Measures

	NAGAR	NEWASA	
Regulatory Measures	Regulation of wells below 60 m, restriction on irrigation through deeper aquifer.	Regulation of wells below 60 m, restriction on irrigation through deeper aquifer.	

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 Nagar, and Newasa talukas of Ahmednagar district.

Geologically, the major part of the district is underlain by the basaltic lava flows, of the Deccan Trap and succession of 19 major flows in the elevation range of 420 to 730 m above mean sea level (amsl) have been demarcated and these flows are normally horizontally disposed over a wide stretch and give rise to table-land type of topography also known as plateau. These flows occur in layered sequence ranging in thickness from 15 to 50 m. Flows are represented by massive portion at bottom and vesicular portion at top and are separated from each other by marker bed known as bole bed. The thickness of weathering varies widely in the district from 5 to 25 m bgl. The Alluvium of Recent age also occurs as narrow stretch along the course of major rivers with limited thickness and lateral extent deposited over the Traps. The stage of ground water development is 74.44% in Nagar and 86.17 %in Newasa 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 many part of the areas and declining water level trend of more than 0.20 m/yr. has also been observed during both pre-monsoon and post-monsoon seasons. This has been due to cultivation of water intensive cash crop like sugarcane in 368 sq.km area, out of which 76 sq.km. is completely dependent on ground water irrigation. The increasing allurements towards cash crops and decreasing availability of water have compelled some of the farmers to shift from traditional irrigation methods to micro irrigation techniques like drip irrigation. At present the area under drip irrigation in different crops is 89.76 sq.km, however, further scope do exist for introducing the drip irrigation in ground water irrigated area.

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 and also to enhance the area under assured irrigation. The supply side interventions by implementation of artificial recharge / water conservation structures will increase the resources by 20.22 MCM in Nagar and 16.41 MCM in Newasa taluka. These supply side interventions are not enough to bring the stage of ground water development down to 70% in Newasa taluka. Thus, demand side interventions are also proposed in Newasa taluka as well as Nagar taluka. **In Nagar taluka** if 100% area under sugarcane (21.8 Sq. Km) is brought under drip irrigation it will result in to saving of 12.43 MCM of ground water and by doing so along with supply side intervention, 32.60 MCM of additional water will be available in the taluka, out of which 6.49 MCM will be utilised towards **lowering the stage of ground water development from 74% to 70%**. The remaining **additional ground water resources to the tune of 26.11 MCM can bring an additional area of 40.17 sq km. under assured ground water irrigation** considering the crop water requirement of 0.65m.

Similarly, in **Newasa taluka** if 70% area under sugarcane (44.70 Sq. Km) is brought under drip irrigation may result in to saving of 25.48 MCM of water. Further cropping pattern change from sugarcane to Pomegranate is proposed in 30% area (19.16 Sq. Km.), this will save ground water to the tune of 31.61 MCM. Thus by implementing these demand side intervention and supply side intervention, 73.43 MCM of additional water will be available in Newasa taluka, out of which 35.21 MCM will be utilised towards **lowering the stage of ground water development from 86% to 70%**. The remaining **additional ground water resources to the tune of 38.22 MCM can bring an**

additional area of 58.80 sq km. under assured ground water irrigation considering the crop water requirement of 0.65m.

The implementation of above proposed management plan will also help in arresting or lowering the decline in water levels of Aquifer-I, Strengthening of ground water sources, increase sustainability of GW sources, reduction in electricity consumption.

These interventions also need to be supported by regulation of deeper aquifer and hence it is recommended to regulate/ban deeper bore wells of more than 60 m depth and restrict / ban on irrigation through deeper aquifer, so that the deeper ground water resources are protected for future generation for domestic supply 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.

