



## 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

## **AQUIFER MAPPING REPORT**

**Kopargaon, Rahta, Sangamner and Shrirampur  
Talukas, Ahmadnagar District, Maharashtra  
(Part-II)**

मध्य क्षेत्र, नागपुर  
Central Region, Nagpur

भारत सरकार

Government of India

जल संसाधन, नदी विकास एवं गंगा संरक्षण मंत्रालय

Ministry of Water Resources, River Development &

Ganga Rejuvenation

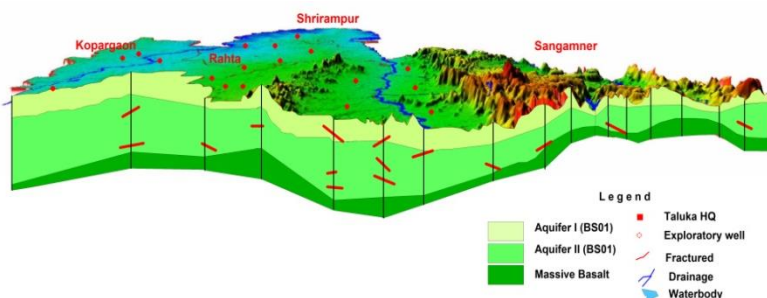
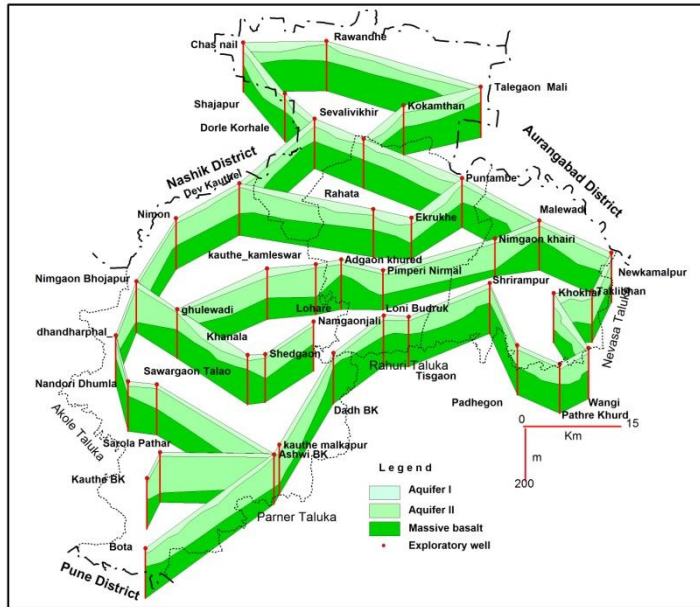
केन्द्रीय भूमि जल बोर्ड

CENTRAL GROUND WATER BOARD



जल बचत जल संचय

# जलभृत नकशे तथा भूजल प्रबंधन योजना Aquifer Maps and Ground Water Management Plan



कोपरगांव, राहटा,  
संगमनेर व श्रीरामपुर  
तालुका, अहमदनगर  
जिला, महाराष्ट्र

**Kopargaoon, Rahta,  
Sangamner and  
Shrirampur  
Talukas,  
Ahmadnagar  
District,  
Maharashtra**

मध्य क्षेत्र, नागपुर / Central Region, Nagpur

जून 2016 / June 2016

**AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS  
OF KOPARGAON, RAHTA, SANGAMNER AND SHRIRAMPUR  
TALUKAS, AHMADNAGAR DISTRICT,  
MAHARASHTRA STATE**

---

**CONTRIBUTORS'**

**Principal Authors**

J. R. Verma : Scientist-D

**Supervision & Guidance**

D. Subba Rao : Regional Director

Dr. P. K. Jain : Supdtg. Hydrogeologist

**Hydrogeology, GIS maps and Management Plan**

J. R. Verma : Scientist-D

Rahul R. Shende : Assistant Hydrogeologist

**Groundwater Exploration**

D. Joshi : Scientist-D

M. R. K. Reddy : Scientist-D

Vijesh V. K. : Scientist-B

**Geophysics**

P. Narendra : Scientist-D

**Chemical Analysis**

Dr. Devsharan Verma : Scientist B

Dr R.K.Sharma : Scientist B

T. Dinesh Kumar : Assistant Chemist

**AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS  
OF KOPARGAON, RAHTA, SANGAMNER AND SHRIRAMPUR  
TALUKAS, AHMADNAGAR DISTRICT,  
MAHARASHTRA STATE**

---

**CONTENTS**

1	BRIEF INTRODUCTION .....	1
2	SALIENT FEATURES .....	2
3	AQUIFER DISPOSITION .....	4
4	GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES .....	7
5	GROUND WATER RESOURCE ENHANCEMENT AND PROPOSED MANAGEMENT INTERVENTIONS .	
5.1	Resource Enhancement by Supply Side Interventions.....	9
5.2	Resource Enhancement by Demand Side Interventions.....	10
5.3	Resource Enhancement by Alternate Sources .....	10
5.4	Probable Benefits .....	11
5.5	Regulatory Measures .....	11
6	SUM UP .....	12

# AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS OF KOPARGAON, RAHTA, SANGAMNER AND SHRIRAMPUR TALUKAS, AHMADNAGAR 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 toposheet 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 Over-exploited, Critical and Semi-Critical talukas and prioritised stress areas. Hence, water stress area i.e., Kopergaon, Rahta, Sangamner and Shrirampur talukas of Ahmadnagar district has been taken up to carry out detailed hydrogeological investigation covering an area of 3723.50 sq.km. in the year 2014-15. The index map of the study area is presented below- **Fig 1.1**.

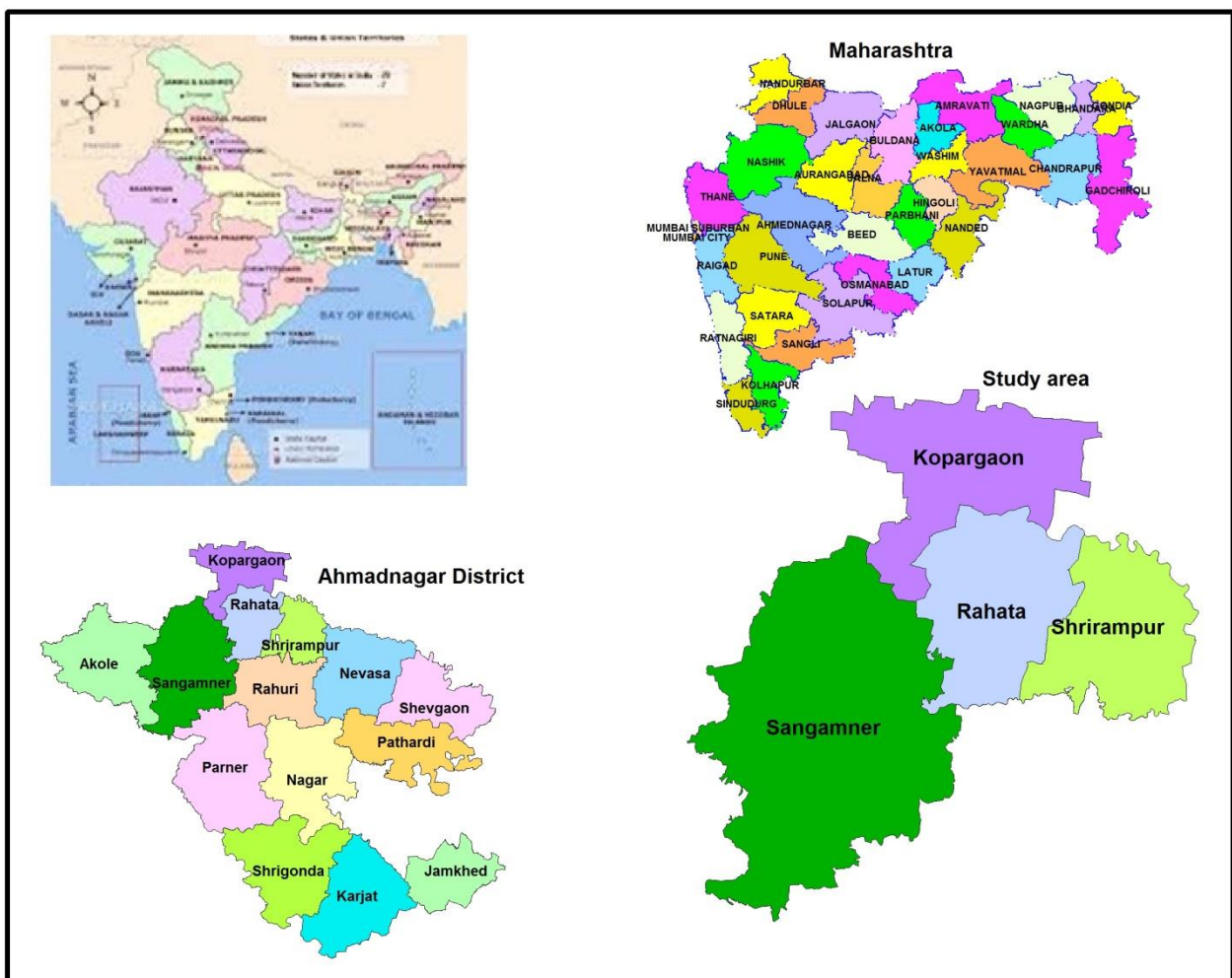
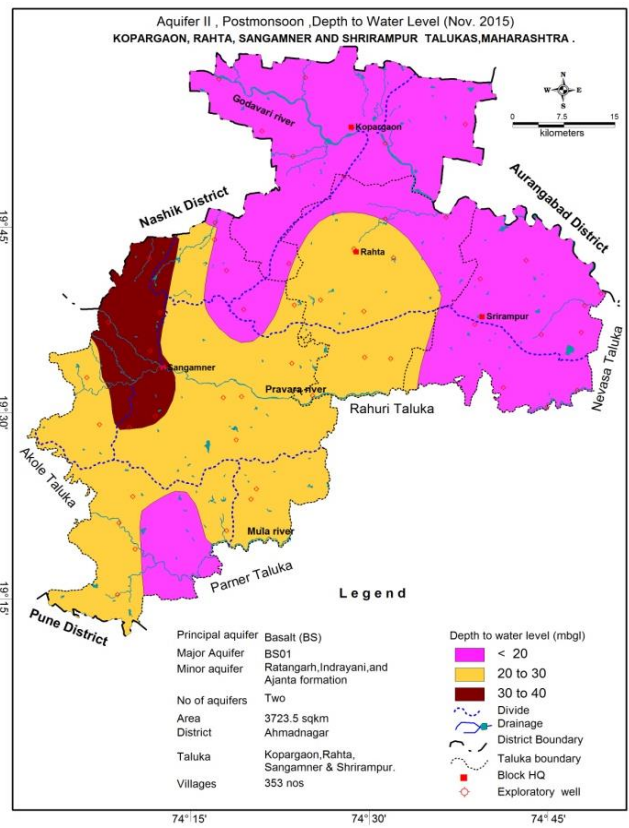
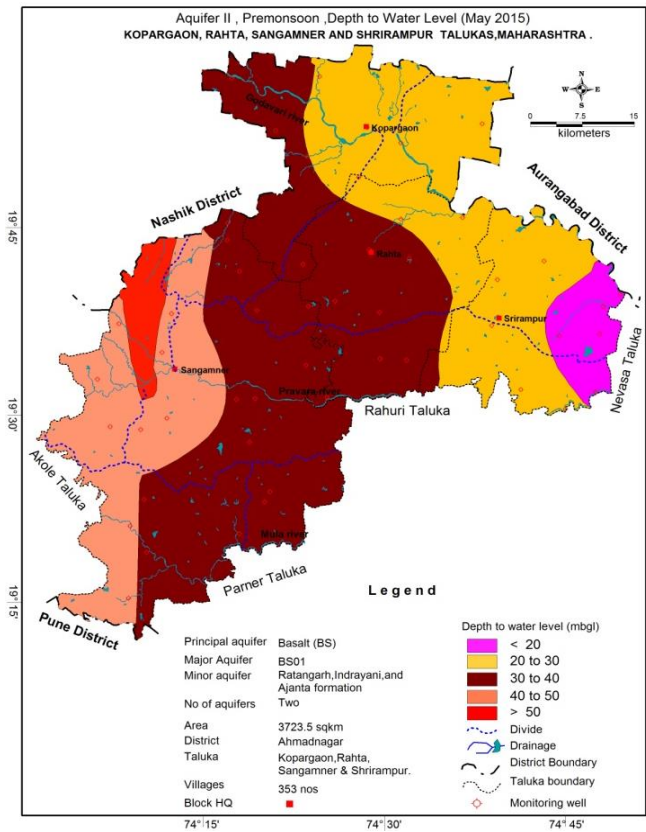
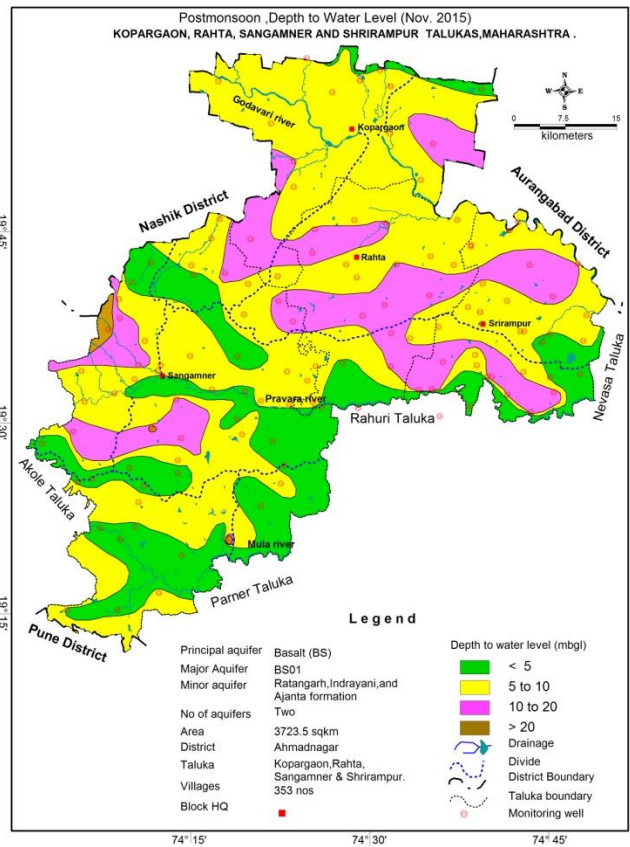
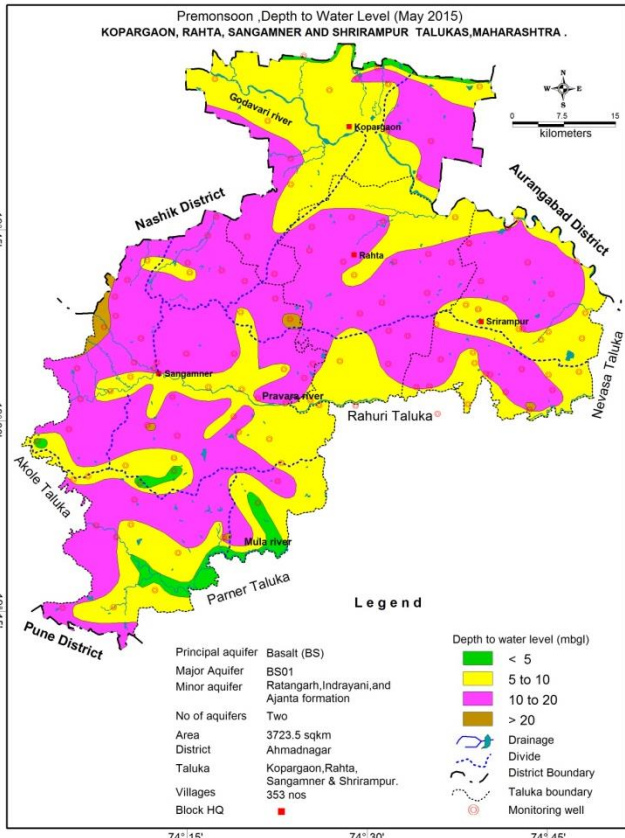


Fig 1.1 Index map of the Study area

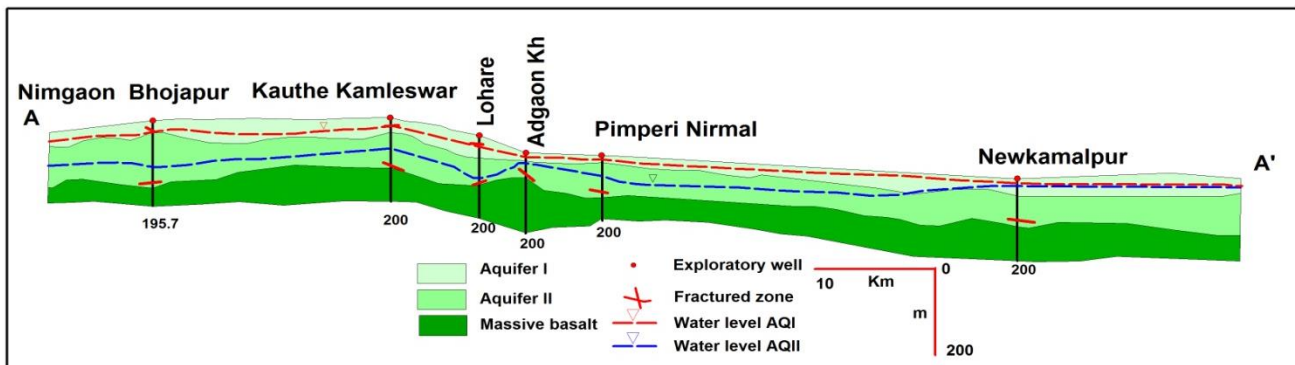
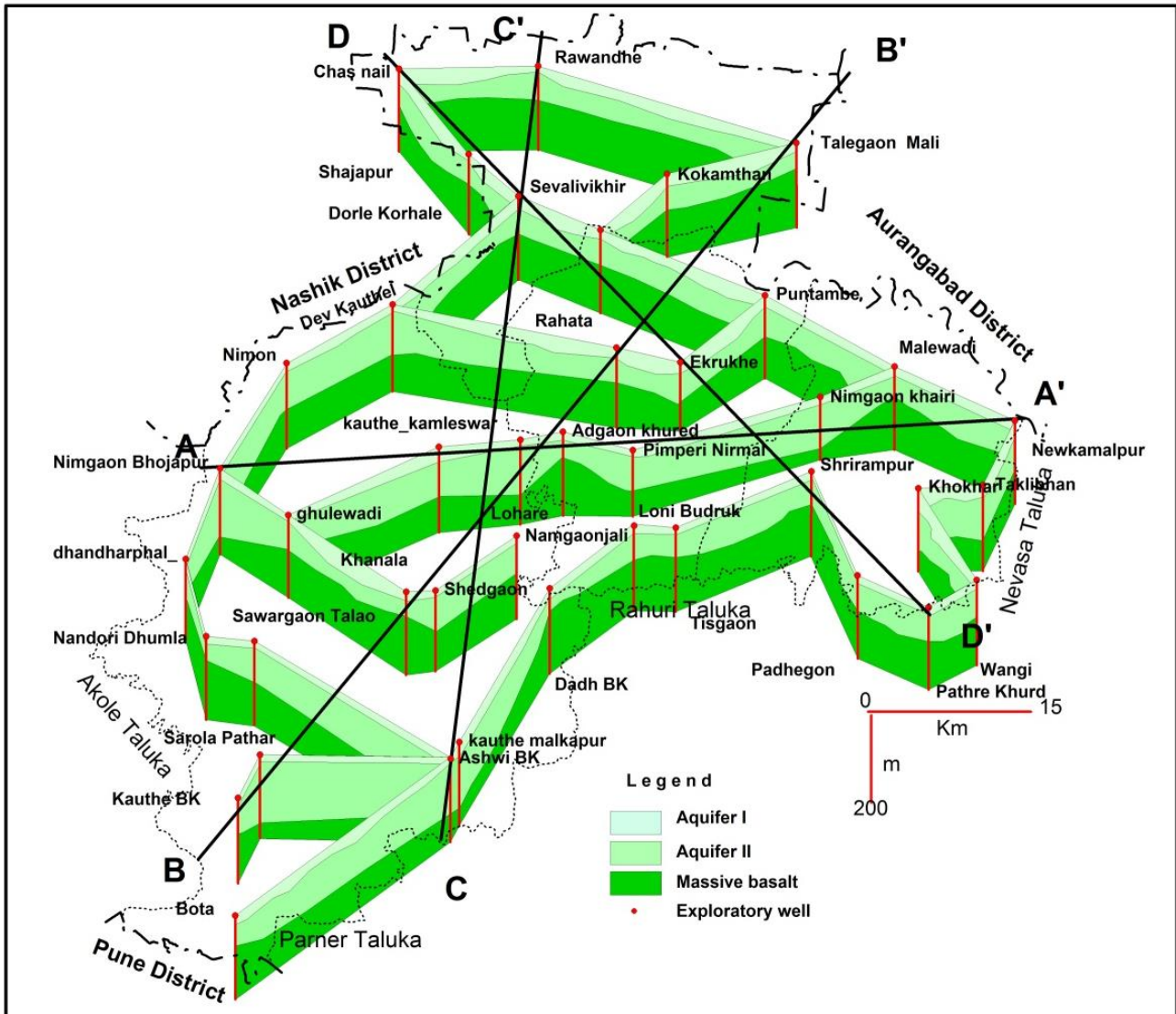
## 2 SALIENT FEATURES

PARTICULARS	KOPARGAON	RAHTA	SANGAMNER	SHRIRAMPUR
District	Ahmadnagar	Ahmadnagar	Ahmadnagar	Ahmadnagar
State	Maharashtra	Maharashtra	Maharashtra	Maharashtra
Area (sq.km.)	666.43	654.48	1819.43	583.16
Population (no.'s)(2011)				
Rural/Urban	237179/65273	262146/58339	400275/87664	198218/89282
Total	302452	320485	487939	287500
<b>Rainfall (mm)</b>				
I. Normal Annual Rainfall	485.9 mm	481 mm	477.5 mm	590.2 mm
II. Current Rainfall (2014)	274 (-23 % deficient)	367.8 (-24 % deficient)	385.5 (-19 % deficient)	383.5 (-35 % deficient)
III. Rainfall Trend (mm/yr)				
2006 to 15	-28.79	-28.79	-16.75	-36.48
1901 to 2015	-0.55 (1901 to 2015)	0.21 (1998 to 2015)	2.67(1901 to 2015)	0.69(1958 to 2015)
<b>Agriculture (sq.km.)</b>				
i. Principal Crops	Sugarcane (32.52), Onion (55.27), Cotton (51.62) , Wheat (84.45), Jawar (234.04) Bajari (88.45)	Sugarcane (33.14), Onion (13.93), Cotton (10.73) , Wheat (67.94), Jawar (254.67) Bajari (102.21)	Sugarcane (92.82), Onion (59.47), Cotton (11.41) , Wheat (47.54), Jawar (86.97) Bajari (533.78)	Sugarcane (23.02), Onion (13.15), Cotton (30.6) , Wheat (54.49), Jawar (156.51) Bajari (84.61)
ii. Cultivable Area	999.96	716.24	1244.07	692.86
iii. Net Sown Area	866.41	696.79	1041.04	662.16
iv. Forest	0.00	0.00	11.4	0.00
<b>Irrigation Sources (sq.km.)</b>				
i. Ground water	5	52.92	72.26	56.23
ii. Surface Water	124.92	51.19	117.7	44.37
<b>Data Utilised</b>				
i. Key Observation Wells	20	19	58	32
ii. GW exploration	9 EW+ 4 OW + 4 Pz	10 EW+ 3 OW + 3 Pz	23 EW+ 1 OW +3 Pz	9 EW+ 1 OW + 5Pz
iii. VES	0	2	0	4
iv. GWQ sampling locations	9 for Aquifer-I 7 for Aquifer-II	11 for Aquifer-I 9 for Aquifer-II	60 for Aquifer-I 7 for Aquifer-II	31 for Aquifer-I 17 for Aquifer-II
<b>Existing / Future Water Demands (MCM)</b>				
Domestic & Industrial	3.61/ 6.88(2025)	1.74/ 3.03(2025)	6.29/ 8.54(2025)	2.68/ 5.51(2025)
Irrigation	83.5 / 9.00	93.43 / Nil	156.57 / Nil	73.99 / 11.51
<b>Water Level Behaviour</b>				
<b>Aquifer I</b>				
Pre-monsoon WL (m bgl)	3.2 to 17.00	5.15 to 18.27	3.0 to 30.55	2.6 to 20.02
Post-monsoon WL (m bgl)	2.15 to 14.7	4.7 to 16.4	1.6 to 26.7	2.2 to 19.2
Pre-monsoon WL Trend -Rise	0.17 to 0.19 m/year	0.115 m/year	0.125 to 0.15 m/year	0.05 to 0.29 m/year
Pre-monsoon WL Trend-Fall	-0.1 to 0.67 m/year	-0.023 to -0.3 m/year	-0.01 to -0.51 m/year	-0.1 to 0.65 m/year
Post-monsoon WL Trend -Rise	0.162 m/year	.07 to 0.68 m/year	0.01 to 0.32 m/year	0.2 to 0.5 m/year
Post-monsoon WL Trend -Fall	-0.1 to -0.625 m/year	-02 to -0.41 m/year	-0.01 to -0.63m/year	-0.11 to -0.5m/year
<b>Aquifer II</b>				
Pre-monsoon WL (Aq-II) m bgl	10.0 to 62.5	12 to 52	11 to 78	7 to 30.52
Post-monsoon WL (Aq-II) m bgl	3.5 to 39.0	5.00 to 41.00	4.25 to 41.0	2.5 to 18.0

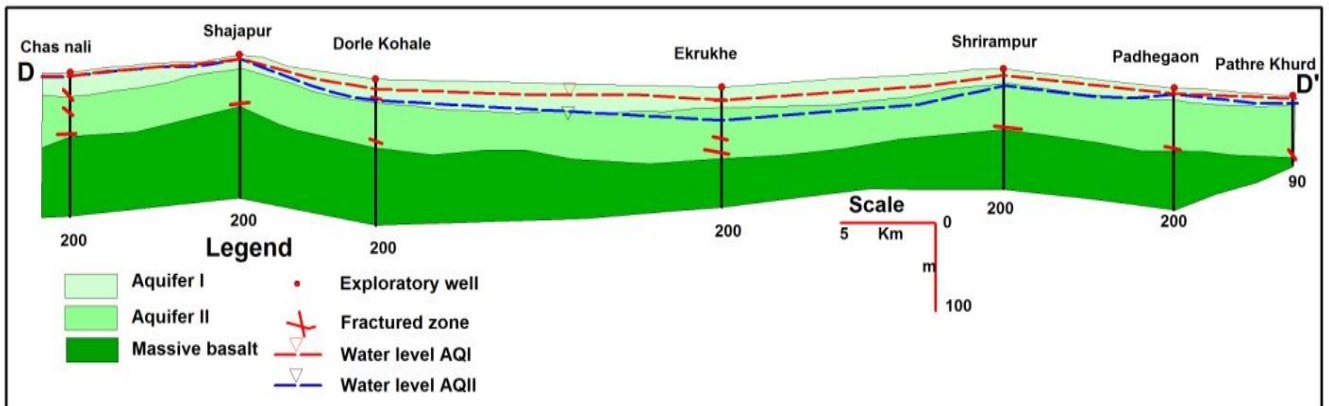
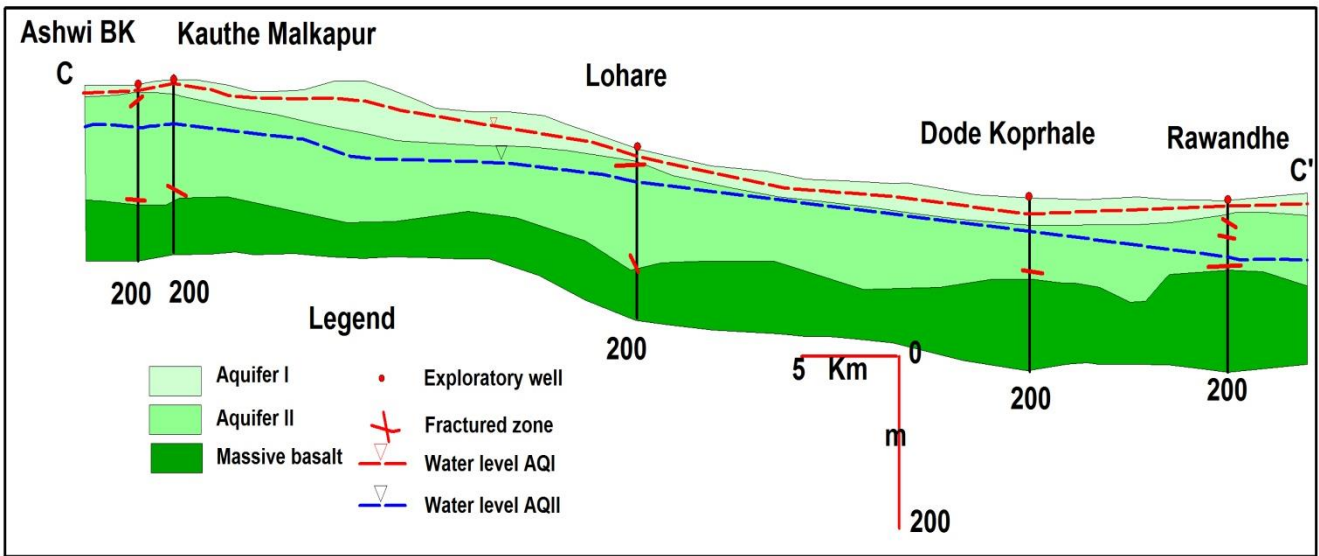
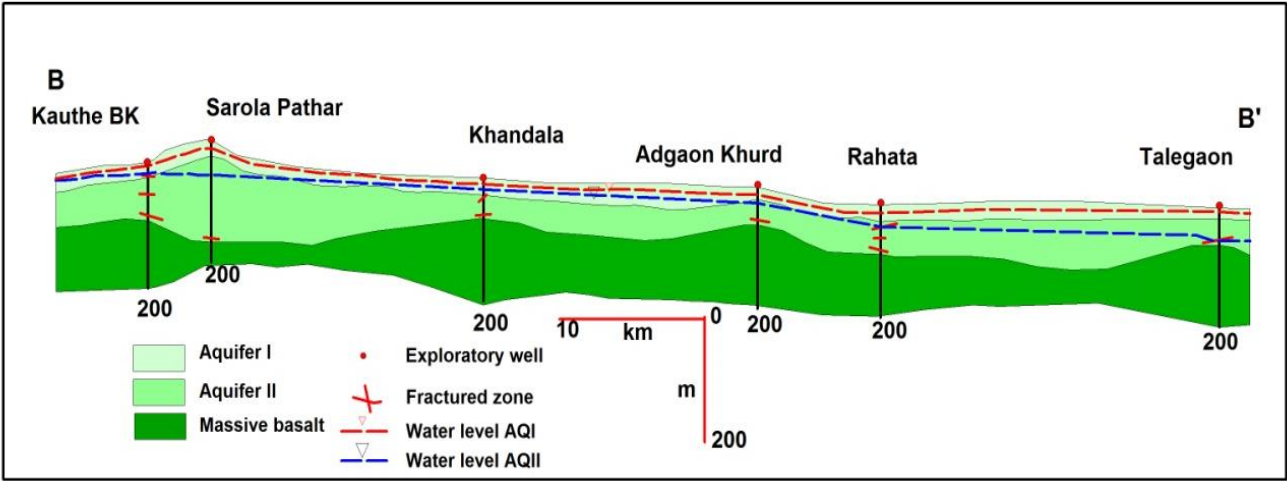


### 3 AQUIFER DISPOSITION

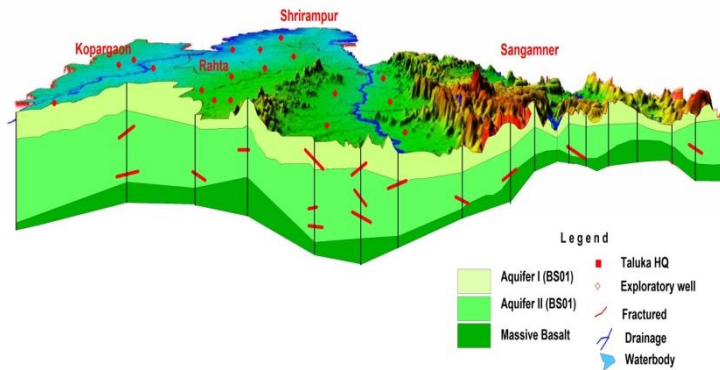
<p><b>2-D and 3-D Aquifer Disposition</b></p>	<p><b>Aquifer: Basalt; Aquifer I - Weathered/Fractured Basalt: Depth range- 10 to 32 m and thickness of 3 to 10 m.</b>  <b>Aquifer II - Jointed/Fractured Basalt: Depth range - 32 to 165 m, Thickness 0.5 to 6 m</b></p>
---	---





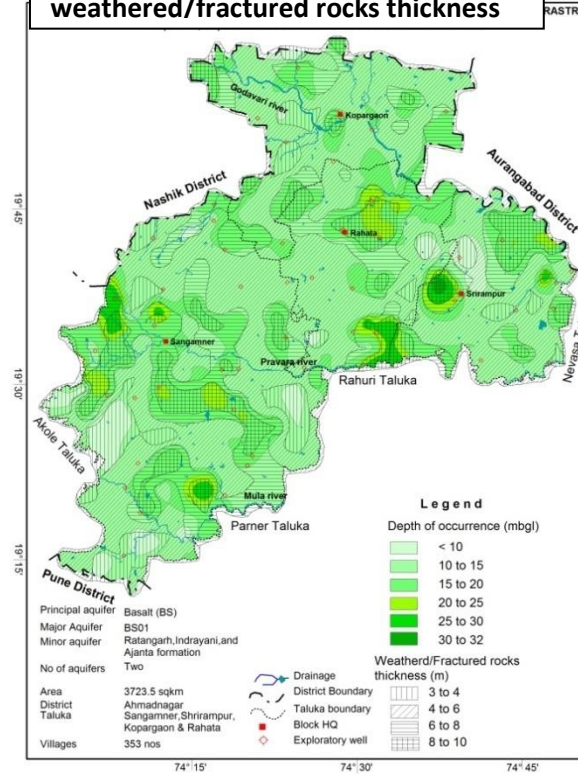


### 3-D Aquifer Disposition



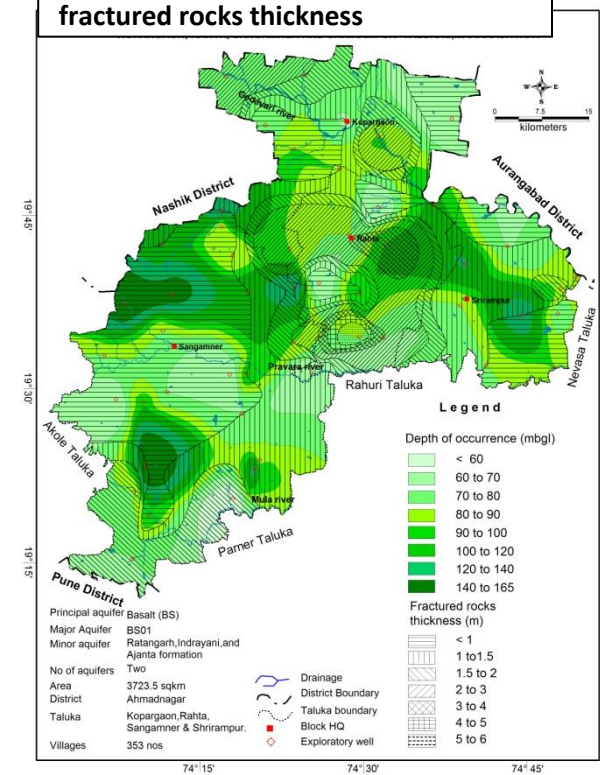
- Legend**
- Taluka HQ
  - Exploratory well
  - Fractured
  - Drainage
  - Waterbody
  - Aquifer I (BS01)
  - Aquifer II (BS01)
  - Massive Basalt

### Aquifer- I, Depth of occurrence & weathered/fractured rocks thickness



- Legend**
- Depth of occurrence (mbgl)
- < 10
  - 10 to 15
  - 15 to 20
  - 20 to 25
  - 25 to 30
  - 30 to 32
- Weathered/Fractured rocks thickness (m)
- 3 to 4
  - 4 to 6
  - 6 to 8
  - 8 to 10

### Aquifer-II, Depth of occurrence & fractured rocks thickness



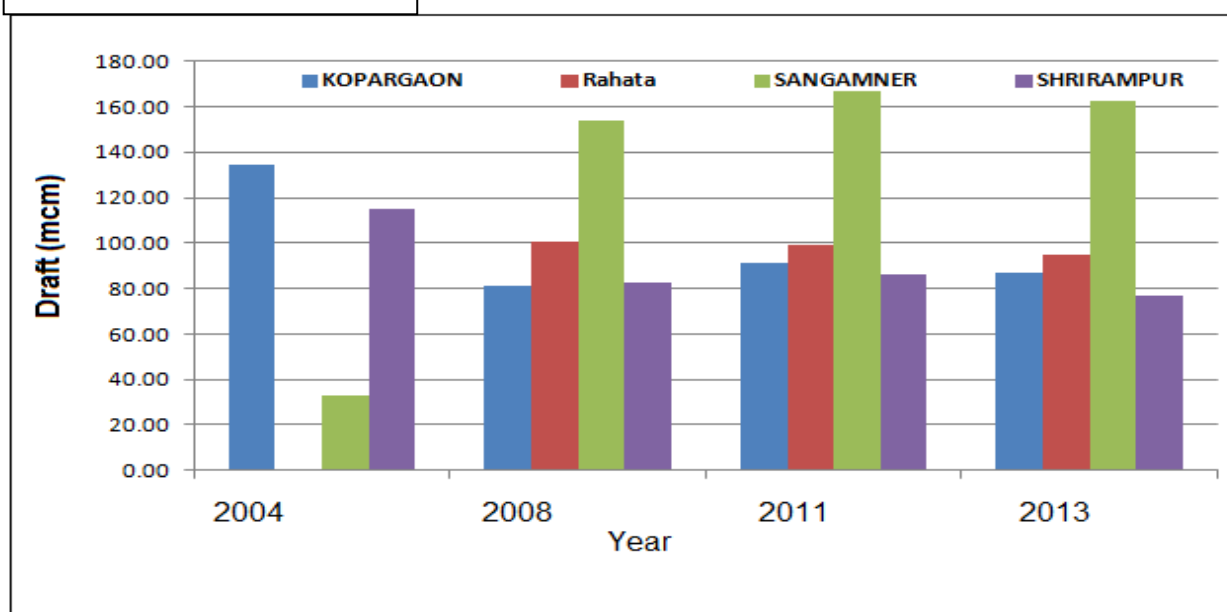
- Legend**
- Depth of occurrence (mbgl)
- < 60
  - 60 to 70
  - 70 to 80
  - 80 to 90
  - 90 to 100
  - 100 to 120
  - 120 to 140
  - 140 to 165
- Fractured rocks thickness (m)
- < 1
  - 1 to 1.5
  - 1.5 to 2
  - 2 to 3
  - 3 to 4
  - 4 to 5
  - 5 to 6

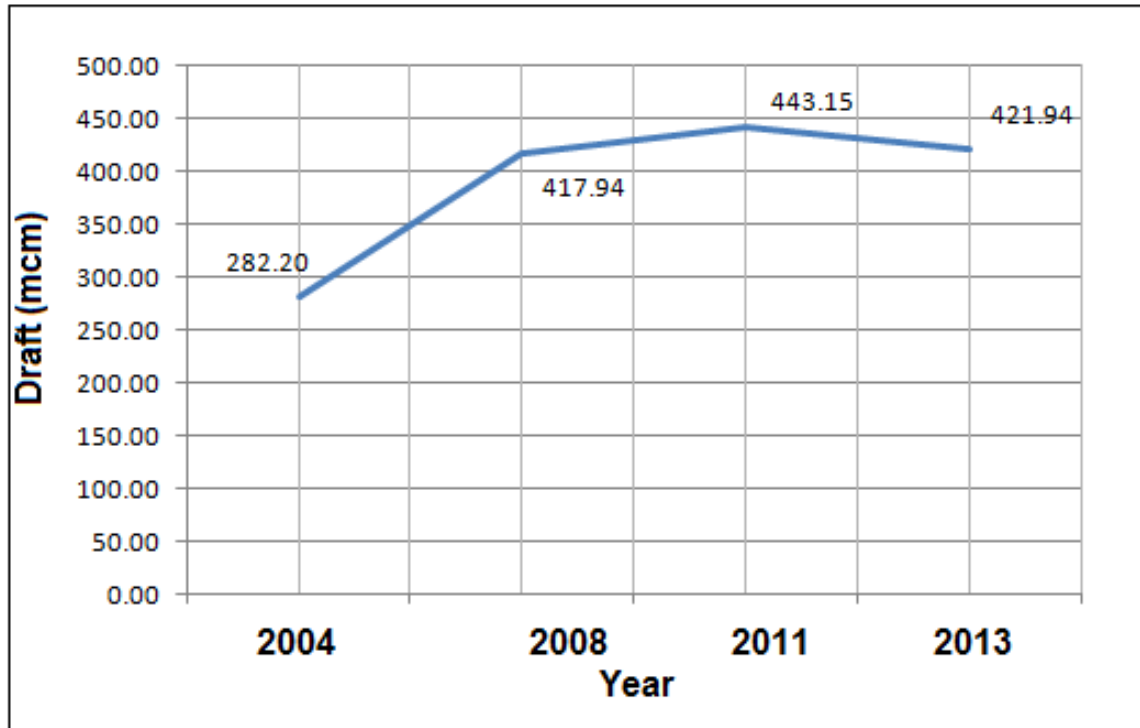
Type of Aquifer	Formation	Depth range (mbgl)	SWL (mbgl)	Thickness (m)	Fractures Zones encountered (m bgl)	Yield	Sustainability	Aquifer parameter	Sy/S	Suitability for drinking/ irrigation
Aquifer-I	Deccan Trap-Weathered/Fractured Basalt	10-32	2.6 to 30.55	3 to 10	5 to 32	10- 100 m <sup>3</sup> /day	Upto 4 Hours	K:2 to 98 m/day Sp Capacity 1 to 731 lpm/m	0.02	Yes for both (except Nitrate affected villages for drinking)
Aquifer-II	Jointed/Fractured Basalt	32-165	7 to 78	0.5 to 6	32 to 165	30 - 200 lpm	2 to 5 hours	10-300 m <sup>2</sup> /day	3.57x10 <sup>-3</sup> to 1.25 x10 <sup>-4</sup>	Yes for both

#### 4 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

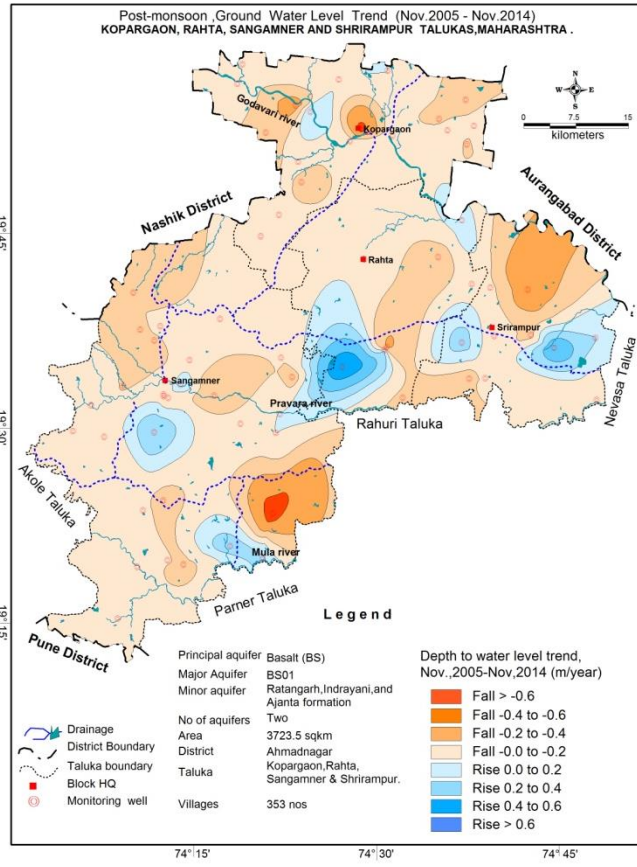
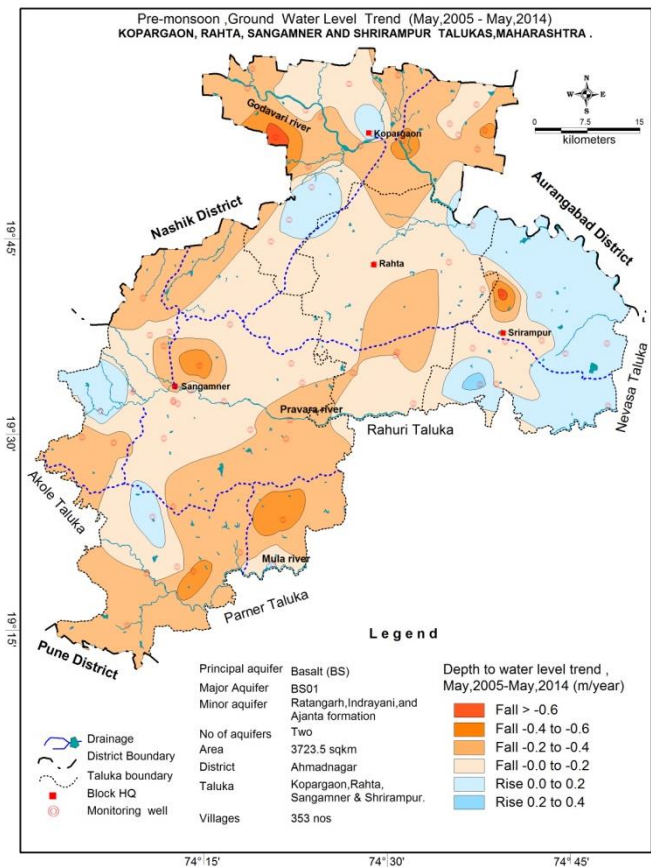
	Kopargaon	Rahta	Sangamner	Shrirampur
<b>Aquifer wise Ground Water Resource availability and Extraction</b>				
Ground Water Resource (MCM)				
<b>Aquifer –I: upto 32 m</b>				
Availability	91.00	91.95	162.61	90.57
Withdrawal	87.1	95.17	162.86	76.81
Ground Water Resource (MCM) <b>Aquifer –II: 32 to 200 m</b>				
Availability	5.63	3.29	10.23	0.14
Withdrawal	00	00	00	00
Stage of GW Development	95.72%	103.51%	100.15%	84.81%
Present Category	Semi-Critical	Over Exploited	Over Exploited	Safe
<b>Ground Water Related Issues</b>				
Over Exploitation	Stage of GW Development has increased over the period of time. Overdraft for irrigation purpose.			
Deeper Water Levels	In AQII Deeper Water Levels (DTW> 30 m) – Area 1709sq km			
Declining Water Levels	Declining Water Levels area –Pre-monsoon 1523 sq.km & Post-monsoon 964 sq.km (Falling Trend > 0.20 m/yr)			
GW based irrigation of cash crops like sugarcane	Major area (181.5sq.km) under cash crop – sugarcane (water intensive crop).			

#### ISSUE: OVER-EXPLOITATION



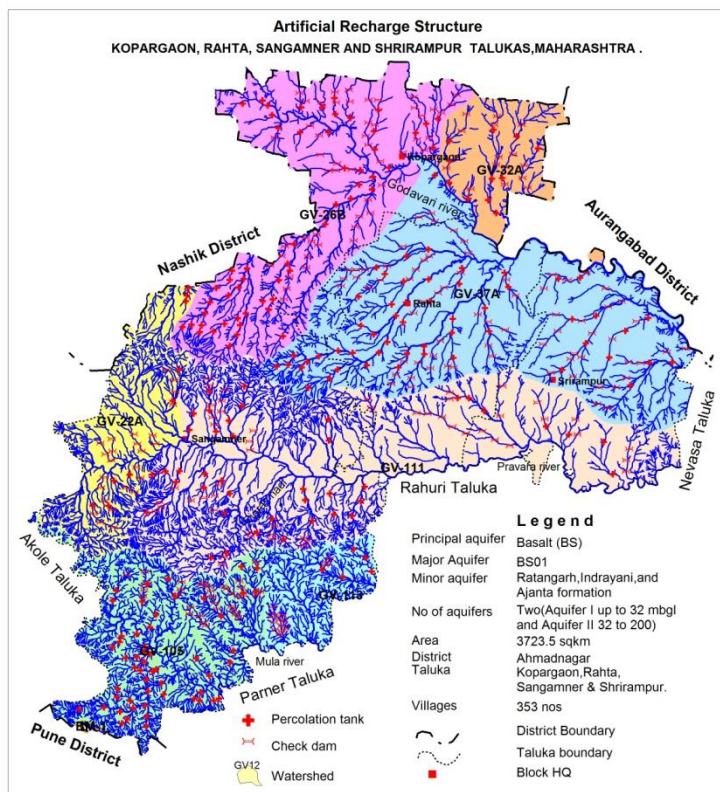


**ISSUE: DECLINING WATER LEVEL TRENDS**



## 5 GROUND WATER RESOURCE ENHANCEMENT AND PROPOSED MANAGEMENT INTERVENTIONS

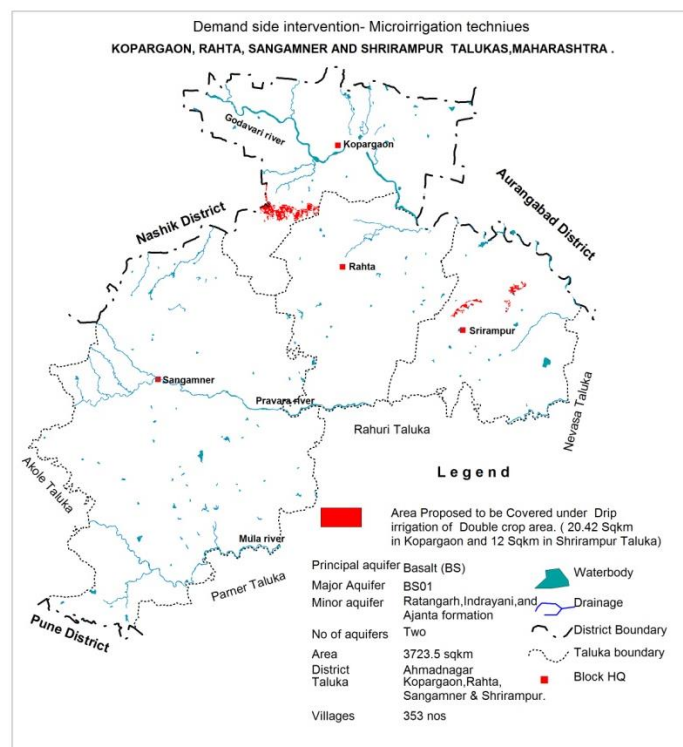
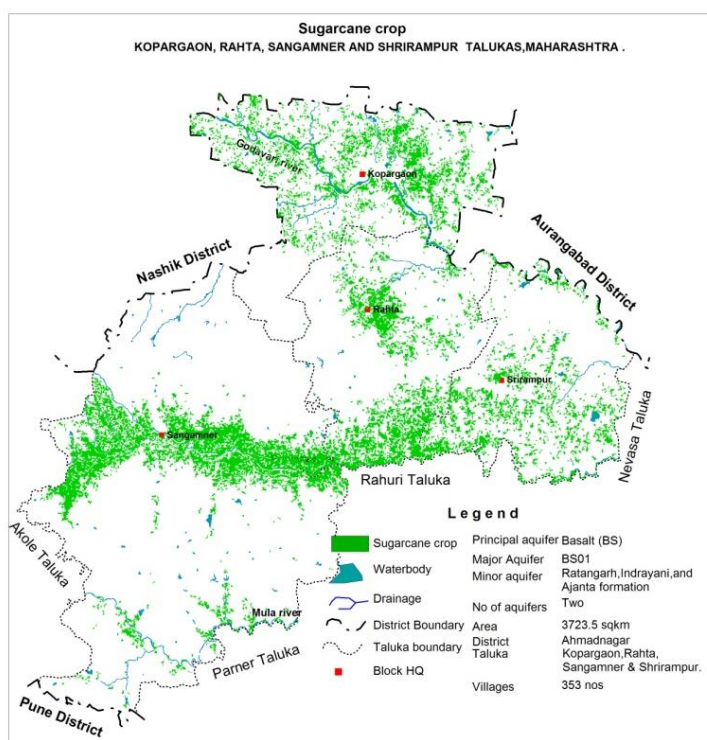
	Kopergaon	Rahta	Sangamner	Shrirampur
<b>5.1 Resource Enhancement by Supply Side Interventions</b>				
Recharge Potential	25.52	17.55	66.49	3.47
Surface water requirement @ 75% efficiency	34.02	23.41	88.65	4.63
Availability of Surplus surface runoff	14.74	10.14	38.4	2.01
Surplus runoff considered for planning	14.74	10.14	38.4	2.01
<b>Proposed Artificial Recharge Structures</b>				
PT	52	35	134	7
CD	147	101	387	20
Volume of Water expected to be recharged @ 75% efficiency (MCM)	11.11	7.52	28.81	1.5
<b>Proposed RTRWH</b>				
Households to be covered	15170	16180	23900	14730
Total RWH potential	0.43	0.42	0.62	0.38
Rainwater harvested / recharged @ 80% runoff co-efficient	0.34	0.33	0.49	0.3
Estimated Expenditure (Rs. in Cr.)	22.76	24.27	35.85	22.1
<b>RTRWH Economically not viable &amp; Not Recommended.</b> Total estimated Cost of RTRWH would be-58.30 Cr. For Harvesting 1.14 MCM of Rain Water.				
Total volume of water expected to be recharged/conserved by AR	11.11	7.52	28.81	1.5
Total Estimated Expenditure for AR	122.1	82.8	317.1	16.5



	Kopergaon	Rahta	Sangamner	Shrirampur
<b>5.2 Resource Enhancement by Demand Side Interventions</b>				
<b>Change in Cropping Pattern</b>	None	None	None	None
<b>Micro irrigation techniques</b>				
Sugarcane crop area proposed to be covered under Drip (sq.km.)	32.52	33.14	92.82	23.04
Volume of Water expected to be saved (MCM). Surface Flooding req 2.45 m. Drip Req. – 1.62, WUE- 1.2 m	18.54	18.89	52.91	13.13
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre	48.21	49.13	137.61	34.16
Double crop proposed to be covered under Drip (sq.km.)	20.42			12.0
Volume of Water expected to be saved (MCM). Surface Flooding req 0.9 m. Drip Req. – 0.5	8.17			4.8
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre	12.62			7.41
<b>5.3 Resource Enhancement by Alternate Sources</b>				
Alternate source of water	Nil	Nil	Nil	Nil

**Sugarcane crop area proposed to be covered under Drip irrigation**

**Double crop area proposed to be covered under Drip irrigation**

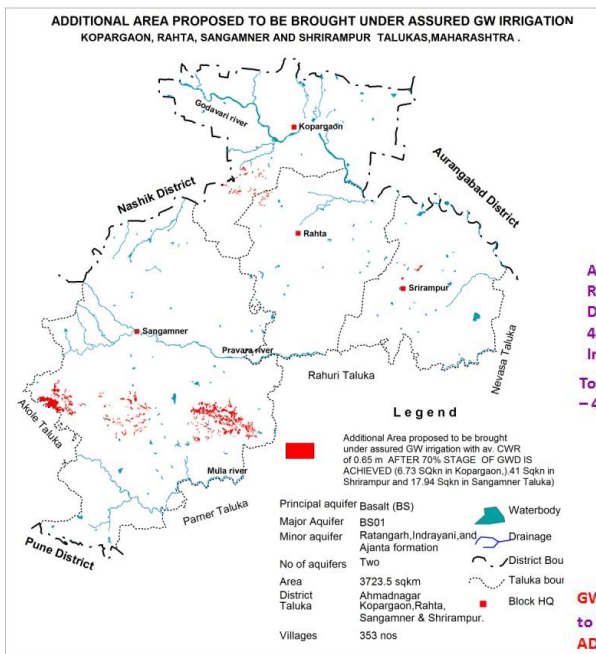


## 5.4 Probable Benefits

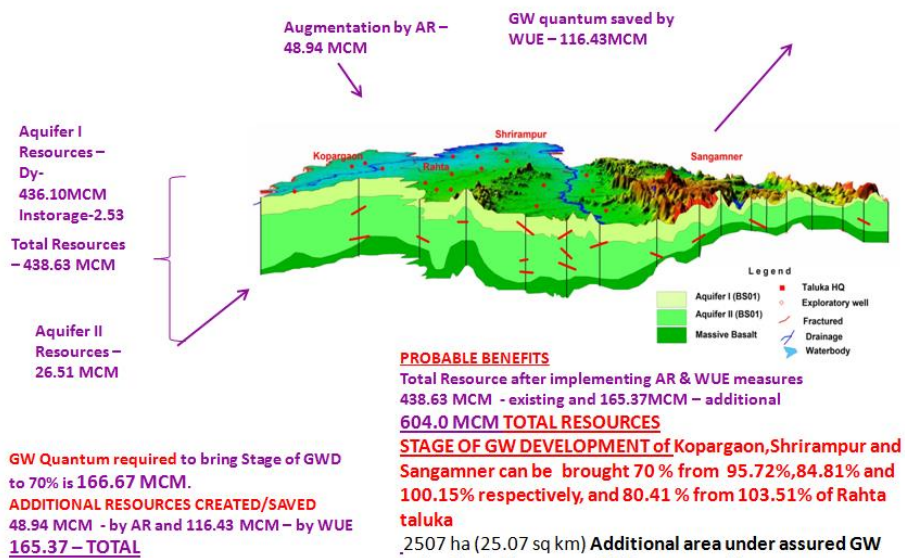
	Kopergaon	Rahta	Sangamner	Shrirampur
GW resources available after implementing above measures (Artificial recharge and micro irrigation)	37.81	26.41	81.71	19.43
Additional GW resources available after implementing above measures (MCM) and mitigating the GAP TO BRING STAGE OF GWD UPTO 70% OR	4.37	-	11.66	0.26
Stage of GW Development after intervention	70 %	80.41 %	70 %	70 %
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m	6.73	-	17.94	0.41

## 5.5 Regulatory Measures

	Kopergaon	Rahta	Sangamner	Shrirampur
Regulatory Measures	Regulation of wells below 60 m	Regulation of wells below 60 m	Regulation of wells below 60 m	Regulation of wells below 60 m



• 166.67 MCM of GW Quantum is required to be augmented / managed to bring stage of GWD @ 70%



## 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 Kopargaon, Rahta, Sangamner and Shrirampur taluka of Ahmadnagar district.

The study area is spanning over 3723.50 sq km. Geologically the area is occupied by Basalt and the stage of ground water development is 95.72 % in Kopargaon , 103.51 % in Rahta , 100.15 % in Sangamner and 84.81 % in Shrirampur taluka. The area has witnessed ground water depletion and over exploitation over a period of time. In Aquifer-I, the deeper water levels of >15 m bgl has been observed in southern and western parts of Sangamner taluka, central parts of Rahta and Shrirampur taluka, while in Aquifer –II, deeper water levels of > 40 mbgl has been observed in western part of Sangamner taluka and north-western parts of Kopargaon taluka. The declining water level trend > 0.20 m/yr. has been observed in major part of the Sangamner, Rahta, and Kopargaon taluka. This has been due to cultivation of water intensive cash crop like Sugarcane (181.0 sq.km), which are completely dependent on ground water irrigation.

Ground water management plan has been prepared with the objective of bringing the current stage of ground water development down to 70% and decline of water level may be arrested, so that the taluka comes under Safe category by adopting both, supply side and demand side interventions.

- i. As a part of supply side interventions, a total of 228 Percolation Tanks and 655 Check Dam is proposed in Kopargaon, Shrirampur, Sangamner and Rahta Taluka, which will augment ground water resources to the tune of 48.94 MCM (34.2 MCM by Percolation Tanks and 14.74 MCM by Check Dam). The total cost of implementing these interventions will be Rs. 538.5 crore.
- ii. As a part of demand side interventions, change in irrigation techniques from surface flooding to drip irrigation is also proposed to be covered in total Sugarcane crop area that will save 103.47 MCM of water resources and the total cost of implementing these interventions will be Rs 269.12 crore. Double crop of 32.42 sqkm in Kopargaon and Shrirampur taluka is proposed to be covered under drip irrigation techniques instead of flood irrigation that will save 12.97 MCM of water resources. The total cost of implementing these interventions will be Rs 20.03 crore

A total of 48.94 MCM resources will be augmented after adopting artificial recharge, whereas and 116.44 MCM will be saved after implementing drip irrigation. This will bring the stage of ground water development to 70%, in Kopargaon, Sangamner , Shrirampur and 80.41% in Rahta talukas . Additional area of 25.07 sq.km. Proposed to be brought under assured GW irrigation with av.CWR of 0.65 m.

This will probably result in arresting the decline of water levels. 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 60 m depth in these 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. Similarly IEC activities and capacity building activities needs to be aggressively propagated to establish the institutional framework for participatory groundwater management.



