AMRELI DISTRICT AT A GLANCE

Sl. No.	Items	Statistic
1	General Information	
	(i) Geographical Area	7397 sq. km.
	(ii) Administrative Division (as on 31/3/2012) Number of Taluka Number of Village	 11 616
	(iii) Populations (As per 2011 Census)	1513614
	(iv) Average Annual Rainfall (2011)	689mm
2	GEOMORPHOLOGY Major Physiographic Units (i) Formed by quaternary formation (II) Formed by Deccan trap	 Alluvial plain valley fill coastal plain coastal ridge Pedemount Zone Pediment Dissected hilly terrain Pediblain Denundation hill
	Major Drainages	Shetrunji River
3	LAND USE (1)Forest area (2) Net area sown (3) Total Cropped area (4)Cropping Intensity	 360 SQ. K.M. 550400hq. 595500hq 108.19%
4	MAJOR SOIL TYPES Medium black soil, coastal alluvial soil, Rocky soil and Alkaline soil.	
5	IRRIGATION BY GROUND WATER (Source : Statistical abstract Gujarat 2011) Dugwells Total No. of Wells including tubewells Net area irrigated by dug wells Gross area irrigated by dug wells	 54146 61192 165600ha. 199000ha.
6	NUMBERS OF GROUND WATER MONITORING WELLS OF CGW B (As on 31-3-2012) Number of Dug wells Number of piezometers	 43 16
7	PREDOMIN ANT GEOLOGICAL FORMATIONS	Deccan Trap Supratrappean Gag beds Milialete lime stone , Alluvira

<table>
<tr><th>Sl. No.</th><th>ITEMS</th><th>Statistic</th></tr>
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Major Water Bearing formation s : Deccan trap, Miliolite, lime stone & Alluvium
Depth to water level during 2012
Pre monsoon (1.68 to 34.85 mbgl)
Past Monsoon (1.55 to 37.50 mbgl)
Long term water level trend in 10 yrs. (2003-2012)
Pre monsoon : Rise (0.010 to 2.01m/yr)
Fall (0.11 to 2.74m/yr)
Post monsoon : Rise (0.011 to 2.56m/yr)
Fall (0.01 to 2.21m /yr)</td><td></td></tr>
<tr><td>9</td><td>GROUND WATER EXPLORATIO N BY CGWB
(As on 31-03-2012)
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<table>
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<tr><td>Electrical conductivity us/cm at 25C</td><td>295</td><td>13410</td></tr>
<tr><td>Ph</td><td>7.60</td><td>8.83</td></tr>
<tr><td>Chloride (ppm)</td><td>21</td><td>3728</td></tr>
<tr><td>Nitrate (ppm)</td><td>5</td><td>540</td></tr>
<tr><td>Total hardness (ppm)</td><td>70</td><td>1600</td></tr>
<tr><td>Fluoride mg/lit.</td><td>0.10</td><td>4.70</td></tr>
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<tr><td>11</td><td>DYNAMIC GROUND WATER RESOURCES (2011)
Annual Replenisible Ground water Resources
Annual Ground water Draft
Projected Demand for Domestic and industrial uses up to 2025
Stage of Ground water Development</td><td>
80835.82 (mcm)
49411.00(mcm)
3532.00(mcm)
64.34%</td></tr>
<tr><td>12</td><td>AWARENESS AND TRAINING ACTIVITY.
Mass Awareness programmes & training activities organized
Date
Place
No. of Participants</td><td>
Not organized</td></tr>
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Project under technical guidance of CGWB (Numbers)</td><td>
None
None</td></tr>
<tr><td>14</td><td>GROUND WATER CONTROL AND REGULATION
Number of OE Blocks
Number of Critical Blocks
Number of Blocks Notified</td><td>
None
None
None</td></tr>
</table>

1.0 INTRODUCTION :-

Amreli district covers an area of 7397 sq. km., lies in the south Central part of the Saurashtra Peninsula and is one of the most important district of the Saurashtra. Amreli district is situated between north latitudes 20 45' & 22 05' and east longitude 70 40' & 71 45'. It is bounded by Rajkot district in the north Junagarh district in the west and south west Bhavnagar district in the east and Arabian sea in t he south.

1.1 ADMINISTRATIVE DIVISION :-

Administratively the district is divided In to eleven talukas, I.e. Amreli, Dhari, Rajula, Khamba, Jagrabad, Kunkavav, Babra, Lathi, Lilia and Kundla. Amreli is the district head quarters. There are 10 towns and 616 villages in the district. Administrative map of Amreli district is given in fig-1.

1.2 DEMOGRAPHY :-

The population of the district according to the census of 2011 is 1513614. Which include 770651 of male and 742963 female. Distribution of Rural and Urban population is given below in the table 1.

Table : -1 Distribution of rural and urban population.

Rural Population			Urban Population		
Male	Female	Total	Male	Female	total
572526	555282	1127808	198125	187681	385806

Distribution of decadal growth rate of sex ratio and population density of the district given below in the table 2

Table :- 2 Distribution of decadal Growth rate,Sex ratio & population density of Amreli district.

Total Population	Percentage decadal growth rate of population 2001 to2011	No. of Females Per 1000 males 2001	2011	Population density= Per sq. km.	
1513614	8.59	967	964	188	205

Literacy rate in the district is also given below in table-3.

Table :-3 Literacy rate by sex for 2001 to 2011.Literacy rate

Person		Male		Female	
2001	2011	2001	2011	2001	2011
66.09	74.49	76.44	81.82	55.78	66.97

There is no tribal area in the district and the population of persons belonging to scheduled tribe is very little.

1.4 Previous Work :-

The Ground water exploration in the district were first taken by ETO under all India Ground Water Exploration programme (1956-62).three bore holes were drilled at Vadhera , donger and Dobasa villages.

Detailed & Systematic ground water exploration in parts of district was taken up between 1979 and 1984 when the area occupied by the Shetrungi river. Basin was Systematically explored . During this programme 20EW and 140.w were drilled in Amreli district.

Subsequently an exploration in draught brone villages of Amreli district was taken up during 1991-93 with a view to provide drinking water piezometers were also constructed during the period 2010-11 for periodically ground water level monitoring.

1.5. Rainfall & climate:-

General climate of the district is sub-tropical and is characterized by three well defined seasons i.e Summer – From April to June, Monsoon – from July to September, and winter- From October to March. Mean maximum daily temperatures ranges from 28 to 40C and mean minimum daily temperatures from 11 to 26 c. April and May are the hottest months. The winters are generally pleasant with minimum temperatures around 12c. The relative humidity ranges from 81% during the monsoon season to 40% during winter. Mean wind speed ranges from 188km/d during winter to more than 500km/d du ring summer and monsoon. Potential evaporate transpiration (PET) is maximum during summer months. It ranges from 4.6 mm/d during December to 10.5 mm/d during May. The average monthly PET is about 6.4 mm/d . Monthly average rainfall of 2011 is 689mm given in table-4.

Table: - 4 Monthly average rain fall in 2011 (mm)

Month	June	July	August	September	October	Total
Rain fall in (mm)	8	349	233	99	0	689

Annual average rainfall for the year 2004 to 2011 is given in the table-5.

Table-5 :- Annual average rainfall (mm)

Year	2004	2005	2006	2007	2008	2009	2010	2011
Rainfall	459	1089	823	1063	706	498	878	689

2.0 **Geomorphology and Soil Type:-**

Physiographically the Amreli district is perhaps the most elevated land in the Saurashtra Region rising to an average elevation of about 335 m AMSL. It is mainly plain except for a few isolated small hill ranges. Five small hills namely Sakarla (648 m), Rajmal (495 m), Chakrosar (442 m), Nandivala (531 m) and Lapla (471 m AMSL)are located in this part. The master slope in the district in t he northern, central and southern parts is towards south, northeast and southeast respectively. The drainage in the district is controlled by the topography and the lineaments. The major river draining the district is Shretrunji . The main tributaries of this river are Sotali, Vadi, Thebi, and Shell. The Shetrunji originates in the Dhundi hills of Gir Forest in Junagadh district and follows a northerly direction for about 50 km, then it takes a n easterly course and enters the adjoining Bhavnagar. The northern part of the district is mainly drained by two small ephemeral streams. Southern part, south of Shetrunji River basin is drained by small ephemeral streams which debauch in Arabian Sea.

Geomorphologically, the district can be dived into two major units, (A) Those formed by Quaternary/Tertiary formation (includes alluvial plain, salt flat, valley fill, coastal plain, Coastal ridge, Coastal depression and pedimount Zone. (B) Those formed by Deccan Trap (includes pediment, dissected hilly terrain, moderately dissected pediplain and denundation hill).

The Soils of Amreli district may be classified into four main categories viz. i) Medium black soils. Ii) Coastal alluvial soils. Iii) Rocky Soils. Iv) Alkaline soils.

Medium black Soils are very widespread and are found almost in all taluka. They are more productive and are rich in lime, magnesia and alumna and poor in phosphorous, nitrogen and organic matters. They can retain considerable moisture and are much suitable for agriculture. Certain areas in Amreli taluka known as Kharapat are poor in cultivation but this taluka, which is almost covered by medium black soils, possesses the best land along the north and South bank of Shetrunji River. **Coastal Alluvial soils** are found in coastal parts of Kodinar, Jafrabad and Rajula Talukas. While, the Kodinar taluka has productive soils, the soils in Rajula and Jafrabad talukas are less productive as they are saline. **Rocky soils** are found in parts of Babra, Kunkavav and Dhari talukas, and are unproductive**. Alkaline soils** are found in parts of Lathi. Lilia and Amreli talukas and are productive and non-productive.

3.0 **Land use and cropping pattern:-**

In the district as per the land use data available for 2006-07 the area under forest land is 360 km. The land not available for cultivation is 70300 ha and either uncultivated execluding fallow land is 66200 ha. Fallow land is about 16300 ha. Net area shown is 550400 ha, area sow n more than once is 45100 ha. And total cropped area is 595500 ha. The cropping intensity in the district is 108.19%. The net area irrigated by canals is 7700ha. The net area irrigated by different sources is 177900 ha. Percentage of net area irrigated to n et area sown is 32.32%. Gross cropped area is ab out 595500 ha. A nd gross irrigated area is 211300 ha. Percentage of gross area irrigated to gross cropped are is 35.48%. Net irrigated area is about 177900 ha. And irrigation intensity is 118.77%.

The crops are cultivated in all the two seasons. The main kharif crops are ground nut and Juwar. Wheat and pulses are rabi crops. The main crop cotton is spread over the Kharif and Rabi seasons.

4.0 **GEOLOGY:-**

Deccan Trap lava flows, supratrappeans, Gaj Beds, Miliolite limestones and recent unconsolidated deposits encountered in the district have been stratigraphically classified as in the Table 6 below, after (G.S.I.):-

Table 6:- Statigraphic classification of Geological formations in Amreli District, Gujarat.

Ern	Epoch	Formation	Lithology	Thickness
Quaternary	Recent to Sub Recent	Un consolidated Deposits	Alluviu m,loose sand, conglo merate	20 to 48
	Pleistocene	Miliolite lime stone	Lime Stones, sandy lime stone, calcareous bouldery bed	75
Erosional Unconformity				
Mesozoic Tertiary	Lower Miocene	Gaj Beds	Limestones, Marl and gypseous clay	300
Un conformity				
Mesozoic Tertiary	Eocene	Supratrappeans	Sand stone , Sand and Conglomerate	20
Un conformity				
Mesozoic Tertiary	Lower Eocene to Upper Cretaceous	Deccan Traps	Massive Basalt and amygdaloidal basalt	Not Known

5.1 Hydrogeology

Aquifer System

Hydro geologically the district can be broadly grouped under hard rocks comprising "Deccan Traps" and soft rocks comprising "tertiaries and Alluvium". Nearly 70% of the district is underlain by Decccan Traps. The Deccan trap are the most extensive aquifers in the district. Millioite limestone and Alluvium forms a potential aquifer but limited in the coastal and the central parts of the district respectively. The groundwater developments in all these formations are mainly by dugwells.

Deccan Trap

Deccan trap basalt occupies a major part of the district and forms the most important aquifer system. It generally forms a poor aquifer due to compactness and poor primary porosity. However, the upper weathered parts, which at places are up to 15-20m thick, form good aquifer. At deeper level s, the secondary porosity developed as a result of tectonic activities, in the form of joints, and fractures, shear zones, form repository of groundwater at many places. Amygdaloidal horizons within basalt also form potential aquifers at places. The dykes, both basaltic and dolerite, play an important role in occurrence and movement of groundwater. At places, the dykes are highly weathered and themselves form potential aquifers. At other places where the dykes are more compact, they act as subsurface barrier for the groundwater flow and well constructed upstream of these dykes have yield good yields.

The groundwater in basalt occurs under phreatic to confined conditions. The groundwater is mainly tapped by dug wells varying in depth from 5 to 50m. wells. About 90% of the dugwells have 2 to 3 side borewells, Each side bore wells range between 50 and 100 feet in length. These side bore wells, enhance the yield of the dugwells to greater extentas they act as conduct. The yield of dug wells and dug-cum-bored wells in basalt generally range from 100 to 500 m^3/day. During Rabi (post monsoon) season these wells sustain intermittent pumping of 15 minutes to 12 hours, however, during summer, the yield of these wells is considerably diminished. The vesicular & amygdaloidal horizons within basalt at places may have yields of up to 1000 m^3/day. The dykes occurring in the district themselves form aquifers at places where they are highly fractured. The wells in such dykes range in depth from 5 to 25 m and the yield of wells range between 15 and 600m3/day.

Supratrappean

The Supratrappean formations generally form limited aquifers with wells ranging in depth from 5 to 20m. The yield of wells range between 20 and 300 m^3/day.

Gaj Beds

Gaj Beds form potential but limited aquifers at places, particularly in the coastal areas. The wells tapping this aquifer generally range in the depth from 5 to 15 m and the yield of wells range between 15 and 150$m^{3/}$day.

Miliolite Limestone

Gaj Beds

Gaj Beds form potential but limited aquifers at places, particularly in the coastal areas. The wells tapping this aquifer generally range in the depth from 5 to 15 m and the yield of wells range between 15 and 150$m^{3/}$day.

Miliolite Limestone

Miliolites form potential aquifers in the coastal areas. The depth of the dugwell in this formation range between 4 and 65m bgl, however, most of the wells are less than 25 m deep. Horizontal bore wells increase the yield of the dugwells,. The yields range between 15 and 800m^3/day. At places, very high yields are observed due to karstic nature of this formation.

Alluvium

The Alluvium forms very potential aquifer, particularly in the central part.The wells in alluvium range in depth from 4 to 50 m bgl. Drilling of horizontal bores in the wells to increase the yields is quite common. Such horizontal bores generally have 2.5 to 5 cm of diameter and extend laterally to 10 to 15 m. The yields of wells range between 10 and 820m^3/day. The specific capacity of the wells range from 3.4lpm/m (Rangpur) to 187 lpm/m (Sajanpur). The specific capacity of wells within the Bhadar River basin range from 0.05mlpm/m to 488 lpm/m. the transmissivity values range between 0.05m^2/day and 527m^2/day. The average transmissivity was found to be 81m^2/day.

6.0 Ground Water Regime monitoring :-

Ground Water Regime monitoring are being carried out four times in a year during May, August, November and January. In all 75 Hydrograph stations (59 open wells & 16 purpose build fiezometers) spread over the entire district were monitored during the year 2012.

Depth to Water level :-

The Ground water level during the pre monsoon period (May 2012) ranged from 1.68m.bgl was recorded in Victor village and the deepest water level of 34.85 m.bgl was recorded in Vavdi p2m in Vavdi village of the district. Depth to water level map for the pre monsoon period is shown in figure-3. The Range of groundwater level in the district is given in table-7.

Table :-7 Range of Ground Water Level in Amreli district During pre monsoon May 2012

`No. of Well Analysed	D T W L mbgl	No. of Well in different Range & %					
	Min.	Max	O TO 2 (m)	2 to 5 (m)	5 to 10 (m)	10 to 20(m)	>20 (m)
49	1.68	34.85	2	3	12	16	16
			4	6	24	33	33

The Ground water level during post monsoon period (Nov. 2012) ranged from 1.55 m.bgl. to 37.50 m.bgl. Depth to water level map for the period post monsoon 2012 is shown in figure-4. Shallowest water level of 1.55m.bgl was recorded in Victor village and the deepest water level of 37.50 m.bgl. was recorded in vavdi p2m in Vavdi village of the district. The range of Ground water level for post monsoon (Nov. 2012) period in given below in table -8.

Table :-8 Range of Ground water level in Amreli district during post Monsoon November 2012.

No. of Well	D T W L mbgl	No. of Well in different Range & %

Analysed							
	Min.	Max	O TO 2 (m)	2 to 5 (m)	5 to 10 (m)	10 to 20(m)	>20 (m)
48	1.55	37.50	2	8	16	14	8
			4	17	33	29	17

Rise and Fall in Water Levels :-

Rise and fall in water levels (Fluctuation) between May 2012 and November 2012 has been shown in figure 5. About 69 % of the wells in the district showed rise in the ground water level between May to November 2012. Rise in water level ranges from 0.13 to 14.62m. Minimum rise of 0.13 m was recorded in Victor Village and Maximum rise 14.62 m was recorede in Goradka Village. 31% of the wells in the district showed fall in water level between May to November 2012. Fall in water level ranges from 0.05 to 4.05m. Minimum fall of 0.05 m was recorded in Bagasara Village and maximum fall 4.05 was recorded in Piyava village of the district.

In village Dhari, Kotedapitha and Gokharwala no change in ground water level has observed.

Long Term Groundwater Level Trend :-

Analysis of the long term groundwater level trend for 10 years from 2003 to 2012 in the district reveals that during premonsoon period 55% of the wells shows rise in water level between 0.010 to 2.01 m/yr and about 45% of the wells shows fall in the water level between 0.011 to 2.74 m/yr. During post monsoon period 50% of wells show rise in water level between 0.011 to 2.56 m/year and 50% of the wells shows fall in the water level between 0.01 to 2.21 m/yr.

7.0 Ground Water Quality :-

The Quality of ground water in the shallow aquifer has been studied based on the chemical analysis of water samples collected from NHS. During May 2012. A result of chemical analysis of ground water quality data for May 2012 is presented below in the table-9.

Table :- Range of different Chemical Constituents in Ground Water.

Chemical Constituents	Minimum	Maximum
PH	7.60	8.83
EC. (US/m)	295	13410
Co3 (ppm)	0.0	84
Hco3 (ppm)	92	1122
Cl	21	3728
No3	5	540
Soy	5	880
F	0.10	4.70
Ca	12	280
Mg.	7	304
TH	70	1600
Na	18	2450
SAR	0.7	28.5
TDS	198	8985

The Shallow groundwater in the district is generally alkaline with P^H more than 7.50. The value of P^H ranges between 7.60 to 8.83. The Electrical conductivity (EC) of ground water varies from 295 us/cm (Kunkavav) to

about 13410 us/cm (Ishwaria). In major parts of the district it is between 500 and 4000 us/cm. It is noticed that the ground water is relative more saline in Southern (coastal part comprising alluvium & soft rock .

8.0 Irrigation Scenario :-

Prime source of ground water irrigation In the district is mainly from the dug wells. Number of dugwells (Masonry & Non Masonry) for irrigation purpose are 54146. And total no. of wells including tubewells are 61192 as per statistical abstract of Gujarat State-2011.

Main surface water resources in the district are in the form of masonry and non masonry dams on rivers and numerous village tanks. There are no major irrigation schemes in the district but there are 6 medium dams in the district, mostly for providing irrigation. These are Dhatarwadi, Munjiasar, Raidy, Vadia , Khodinar and Surawadi. There are no dams exclusively constructed for domestic water supply in the district. How ever there is some component of water supply in all the irrigation schemes during the periods of acute drought , the water available in all the dams is reserved for water supply only.

9.0 Status of Ground Water Development (Taluka Wise)

In major parts of the district, particularly the areas underlain by Deccan Trap basalt, the groundwater is usually exploried through medium to large diameter dug wells. These dug wells are generally shallow, about 30 m deep. However, at several places the boreholes are drilled below the bottom of the dug wells to make the Dug Cum Bored wells (DCB). These boreholes are generally drilled vertically bellow the bottom of the wells to a depth of about 20 to 30 m. At places, however, the horizontal boreholes are also drilled, generally along the fractures. Both these method considerably increase the yields of the wells. The drilling bit is driven by a compressor. Borewells in the depth range of 200 to 500m are also being constructed in the hard rock (Basaltic) areas of the district using DTH drilling rigs. These borewells generally have diameter of 6" to 8" and are fitted with submersible pumps.

The groundwater development in the district is mainly through dugwells, DCB, borewells and tubewells. Their yield potential and suitability of drilling rigs techniques is presented in table 1-.

Table -10:- Feasibility, yield potential and Depth of ground water abstraction structures is listed below in the table.

Taluka	Wells Feasible	Suitable Drilling Technique	Depth of Well (m)	Discharge (1pm)
Jaffarabad Rajula Savarkundla	Dugwells	Manual	10-25	100-300
Amreli	Dugwell	Manual	10-25	80-150
Babra Bagasara Dhari Khamba Lathi Liliya Rajula	Borewells	Down the Hole Hammer	100-500	60-300

10.0 Ground Water Resources & Development :-

The ground water resources potential as on 2011 of Amreli district and stage of development are presented in table 11. Only one taluka (Khambha) is semi critical and the remaining talukas are in safe category. The level of groundwater development varies from 54.99% (Rajula) to 74.63% (Khambha) Overall level of ground water development in the district is 64.34%. There is further scope for development of groundwater resources in major part of the district in the coastal talukas, i.e. Jaffarabad and Rajula care may be taken to properly identify the saline zones through h electrical logging and sealng these zone at the time of construction of tubewells. These measures are essential to prevent the existing fresh water zones from getting contaminated.

In the entire hard rock terrain, scope exists for augmenting the groundwater resources through the artificial recharge. Large scale artificial recharge schemes may not be feasible due to non availability of prolific aquifers and paucity of source water. However, small and cost effective measures like contour bunding, nalla plugging, small check dams may be quite effective in increasing the groundwater recharge.

Water Conservation and Artificial Recharge.

The Suitable recharge structures feasible in the district are Percolation tanks/ponds, Recharge wells, recharge shaft, check dams, nalla bunds and gully plugs etc depending on the terrain conditions.

In the phreatic aquifers with deep water levels and desaturation, spreading channels, recharge pits, recharge ponds etc are suitable to utilize surplus runoff and tail end releases from the canals.

In the confined aquifers, artificial echarge by indirect injection technique is suitable that is dual purpose connector wells. These recharge wells should have screens against upper saturated aquifer and also against the targeted confined aquifer. It would function under gravity since the piezometric levgel of confined aquifer is much below phreatic water level.

Various rainwater harvesting schemes depending on the suitable hydrogeological conditions have been constructed in the district viz. Check dams, Recharge tube wells , deepening the of the village ponds etc and have shown good impact on the ground water in the district.

Ground Water Related Issues and Problems

- Over exploration of ground water is the single major issue in the district resulting in the fast depletion of this resource. Piezometric heads of deep confined aquifer has also declined sharply owing to the huge withdrawal in many parts of the district phreatic aquifers are desaturated needing urgent attention.
- Replacement wells, increase in well depth, prime mover, declining well yields are also the major issues.
- Since groundwater is the main source for irrigation and the farmers don't have control over power supply, therefore they irrigate the crops when power supply is available rather than waiting for the wilting to start.
- Flood Irrigation technique, which is practiced in the area, is also the major cause of wastage of ground water as there is no control on the watering depth.
- Control on the area under fodder crops like alfalfa is also to be done as this is water intensive crop and consumes much more water compared to other crops like wheat, bajra, castor, mustard etc.
- Although ground water quality for irrigation practice is within the limit in most parts of the district the groundwater are with high fluoride (>1.5 ppm) content. As a result, many people in fluoride affected villages are affected by fluorosis.
- Awareness of seawater intrusion and insist salinity amongst people and farmers are much important in coastal talukas of Jaffarabad and Rajuala.

- Awareness among the people regarding rainwater harvesting and artificial recharge.

11.0 Awareness and Training Activity

No Water management training programme and Mass Awareness Programme has been conducted in the district by CGWB.

12.0 Areas Notified by CGWA/SGWA

None

13.0 Recommendations

- There is need for management of Groundwater resources for sustainable development.
- Creating awareness among the farmers regarding water cosneration and judicious use of water and adoption of efficient irrigation techniques like drip/sprinkler irrigation.
- Awareness of seawater intrusion and insitu salinity amongst people and farmers are much important in coastal talukas of Jaffarabad and rajuala.
- Planned pumping pattern can be deployed in hard rock regions so that further discharge/withdrawal can be carried out during lean period this drawdown/withdrawal created will be recharged in the subsequent rainfall.
- Awareness among people on aquifer system and yield.
- Taking up artificial recharge on large scale through appropriate technique on a regional scale with active community participation.

Table-ii TALUKA WISE GROUND WATER RESOURCES , AVAILA BILITY, UTILIZATION AND STAGE OF GROUND WATER DEVELOPMENT (2011) DISTRICT AMRELI

Sr. No.	Taluka	ANNUAL REPLENISHABLE GROUND WATER RESOURCE (mcm)					Natural Discharge during non Monsoon Season (mcm) (5 % of 7)	Net Annual Ground Water Availability (mcm) (7-8)	Annual Ground water Draft (mcm)			Projected Demand For Domestic And Industrial Uses Up to 2025 (mcm)	Ground Water Availability for future irrigation (mcm) {(9)-(10+13)}	Stage of G/W Devel. (%) (12/9) X100	Category
		Monsoon		Non Mon soon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation	Domestic And Indu. Uses	Total (10+11)				
		Recharge from rainfall	Recharge from Other sources	Recharge from rainfall	Recharge from Other Resources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Amreli	7661.54	1111.74	0.00	1112.74	9886.02	494.30	9391.72	5529.8	412.00	5941.8	552.00	3309.92	63.27	Safe
2	Babra	6884.35	1048.65	0.00	777.95	8710.95	435.55	8275.41	5314.00	233.00	5547.00	312.00	2649.41	67.03	Safe
3	Bagasara	4371.62	447.00	0.00	682.20	5500.82	275.04	5225.78	3427.3	148.00	3575.30	199.00	1599.48	68.42	Safe
4	Dhari	8658.62	1685.32	0.00	1459.78	11803.72	590.19	11213.54	7356.00	171.00	7527.00	345.00	3512.54	67.12	Safe
5	Jafrabad	2852.10	359.39	0.00	259.74	3471.24	173.56	3297.68	1704.00	258.00	1962.00	230.00	1363.68	59.50	Safe
6	Khambha	4035.49	649.61	0.00	502.52	5187.62	259.38	4928.24	3518.10	160.00	3678.10	214.00	1196.14	74.63	Semi critical
7	Kukavav	5384.14	972.07	0.00	656.25	6992.46	349.62	6642.83	4040.00	182.00	4222.00	243.00	2359.83	63.56	Safe
8	Lathi	4642.74	1067.06	0.00	651.68	6361.47	318.07	6043.40	3818.80	250.00	4068.80	335.00	1889.6	67.33	Safe
9	Liliya	3200.37	466.53	0.00	347.58	4014.47	200.72	3813.75	2268.00	115.00	2383.00	154.00	1391.75	62.48	Safe
10	Rajula	4649.91	1147.86	0.00	2180.14	7977.92	398.9	7579.02	3891.60	276.00	4167.6	369.00	3318.42	54.99	Safe
11	Savarkundla	9395.35	629.97	0.00	903.82	10929.14	546.46	10382.68	5906.40	432.00	6338.4	579.00	3897.28	61.05	Safe
Total		61736.22	958520	0.00	9514.41	80835.82	4041.79	76794.03	46774.00	2637.00	49411.00	3532.00	26488.03	64.34	Safe

Fig1

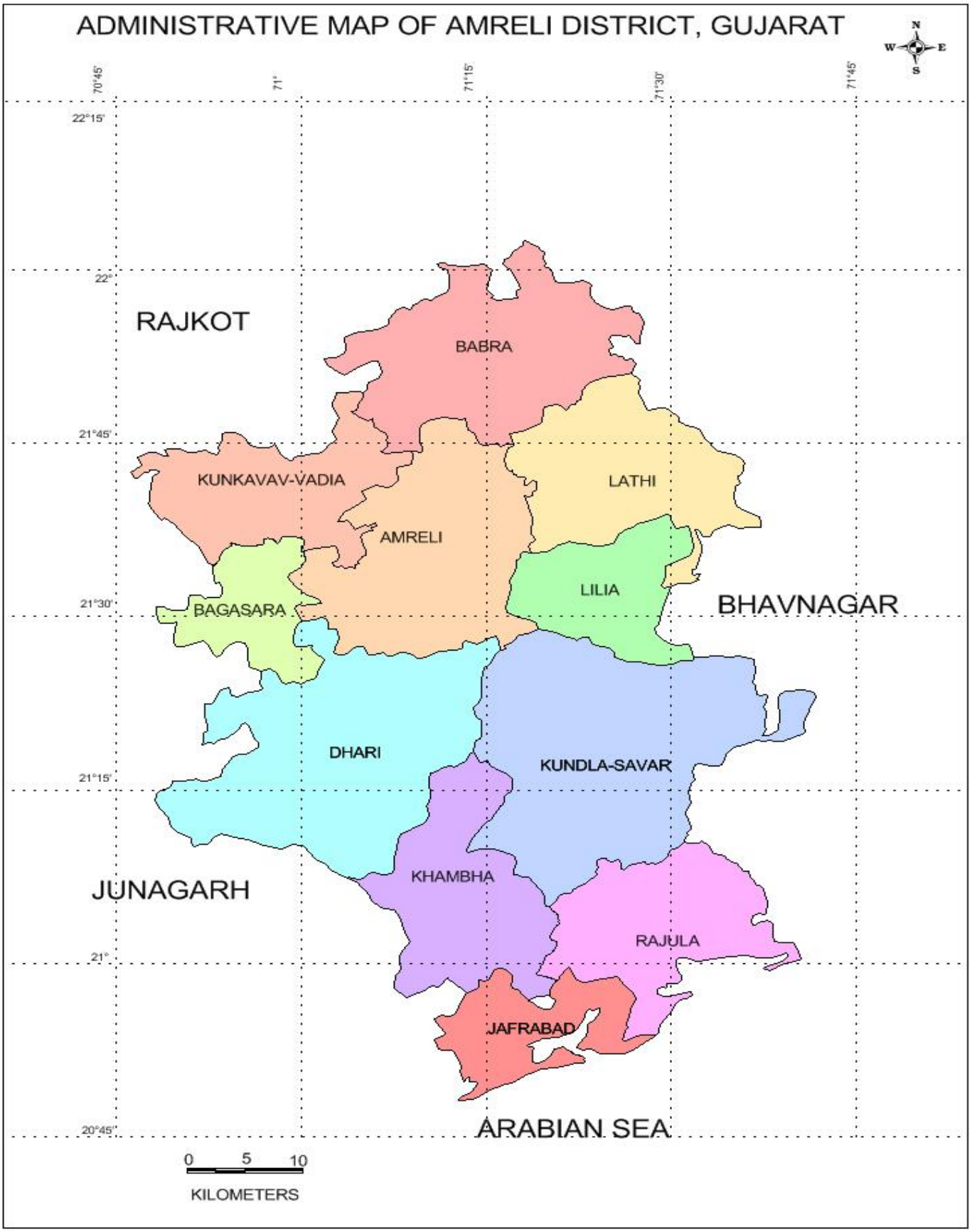

ADMINISTRATIVE MAP OF AMRELI DISTRICT, GUJARAT
N
W
E
S
70°45'
71°
71°15'
71°30'
71°45'
22°15'
22°
21°45'
21°30'
21°15'
21°
20°45'
RAJKOT
BABRA
KUNKAVAV-VADIA
LATHI
AMRELI
LILIA
BAGASARA
BHAVNAGAR
DHARI
KUNDLA-SAVAR
KHAMBHA
JUNAGARH
RAJULA
JAFRABAD
ARABIAN SEA
0 5 10
KILOMETERS

Fig-2

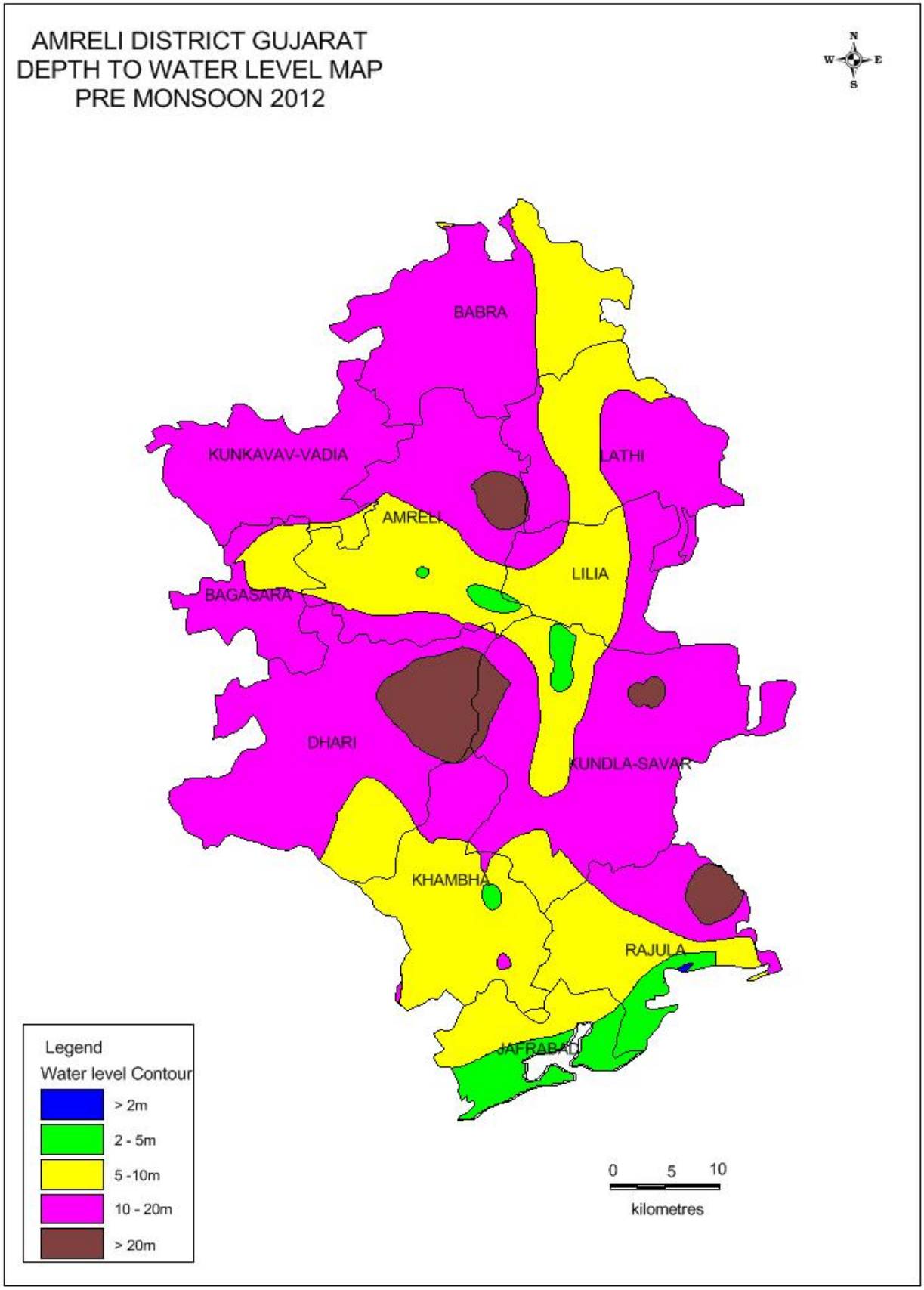

AMRELI DISTRICT GUJARAT
DEPTH TO WATER LEVEL MAP
PRE MONSOON 2012
N
W
E
S
BABRA
KUNKAVAV-VADIA
LATHI
AMRELI
LILIA
BAGASARA
DHARI
KUNDLA-SAVAR
KHAMBHA
RAJULA
JAFRABAD
Legend
Water level Contour
> 2m
2 - 5m
5 -10m
10 - 20m
> 20m
0 5 10
kilometres

Fig-3

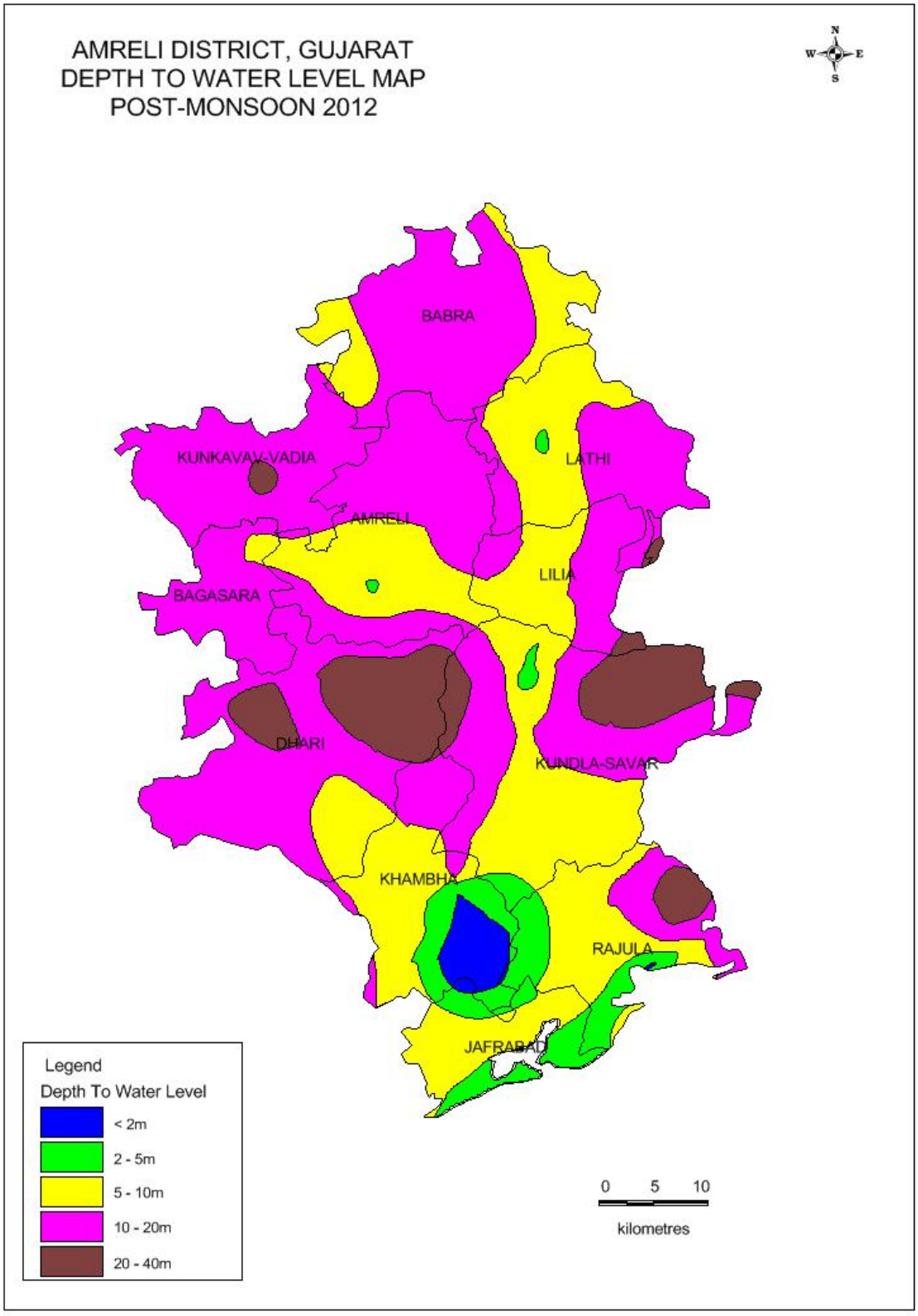

AMRELI DISTRICT, GUJARAT
DEPTH TO WATER LEVEL MAP
POST-MONSOON 2012
N
W
E
S
BABRA
KUNKAVAV-VADIA
LATHI
AMRELI
LILIA
BAGASARA
DHARI
KUNDLA-SAVAR
KHAMBHA
RAJULA
JAFRABAD
Legend
Depth To Water Level
< 2m
2 - 5m
5 - 10m
10 - 20m
20 - 40m
0 5 10
kilometres

Fig-4

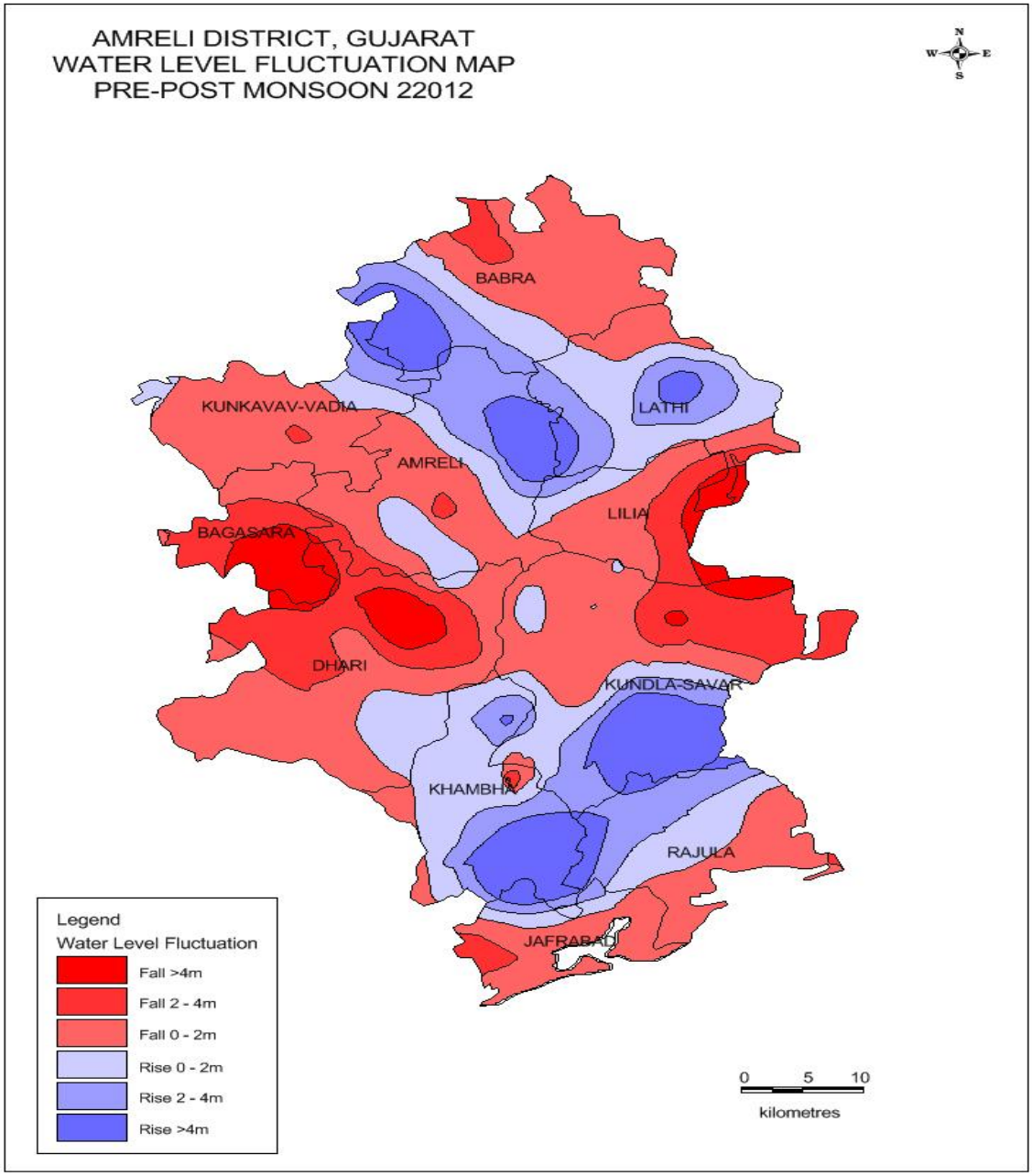
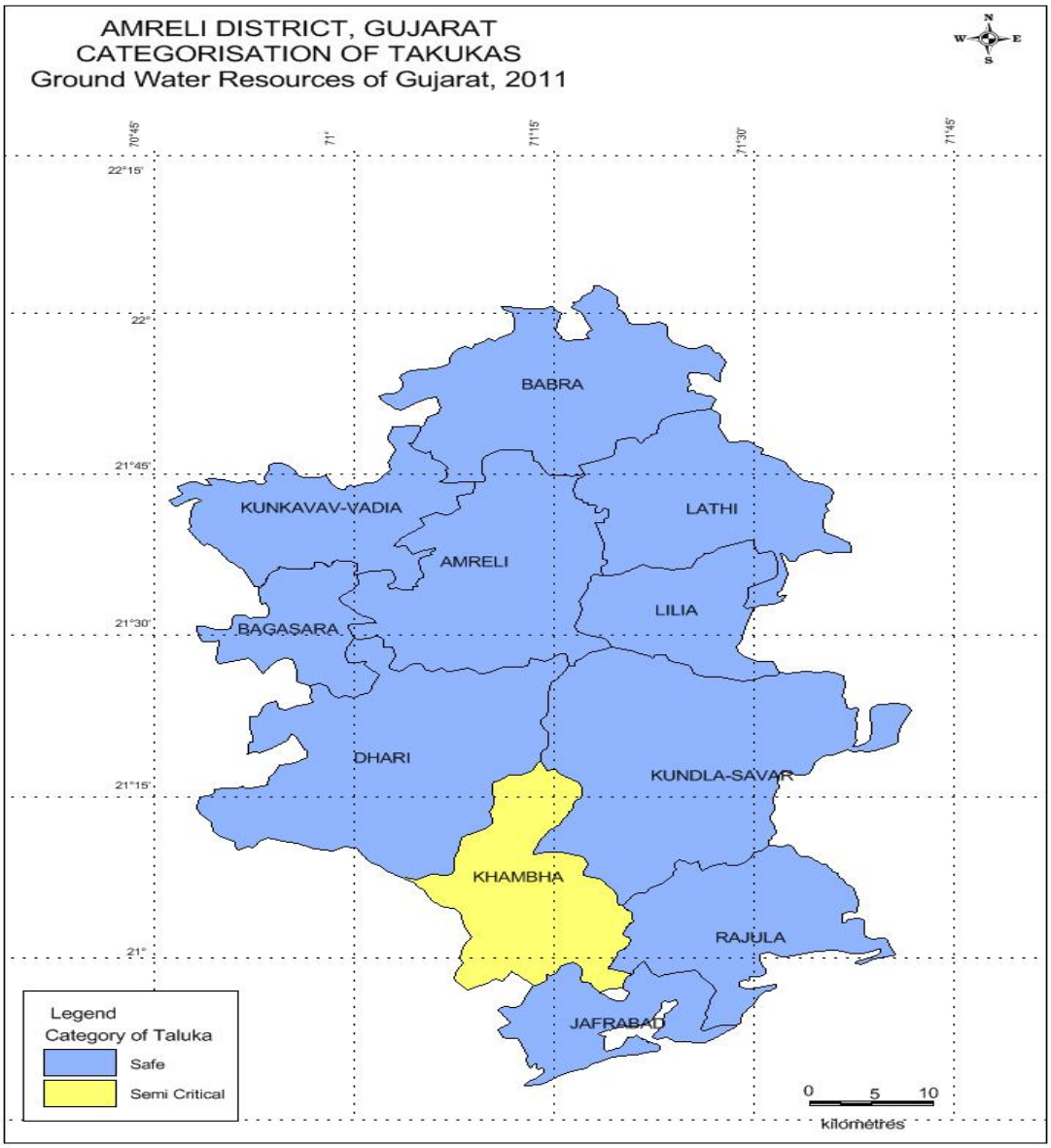

AMRELI DISTRICT, GUJARAT
WATER LEVEL FLUCTUATION MAP
PRE-POST MONSOON 22012
N
W
E
S
BABRA
KUNKAVAV-VADIA
LATHI
AMRELI
LILIA
BAGASARA
DHARI
KUNDLA-SAVAR
KHAMBHA
RAJULA
JAFRABAD
Legend
Water Level Fluctuation
Fall >4m
Fall 2 - 4m
Fall 0 - 2m
Rise 0 - 2m
Rise 2 - 4m
Rise >4m
0 5 10
kilometres

Fig-5


AMRELI DISTRICT, GUJARAT
CATEGORISATION OF TAKUKAS
Ground Water Resources of Gujarat, 2011
N
W
E
S
70°45'
71°
71°15'
71°30'
71°45'
22°15'
22°
21°45'
21°30'
21°15'
21°
BABRA
KUNKAVAV-VADIA
LATHI
AMRELI
LILIA
BAGASARA
DHARI
KUNDLA-SAVAR
KHAMBHA
RAJULA
JAFRABAD
Legend
Category of Taluka
Safe
Semi Critical
0
5
10
kilometres