Ground Water Department,
Rajasthan

European Union
State Partnership Programme

Hydrogeological Atlas of Rajasthan

Mahi River Basin

2013

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Rolta India Limited

Hydrogeological Atlas of Rajasthan

Mahi River Basin

Contents:

2013

ADMINISTRATIVE SETUP

MAHI RIVER BASIN

Location:

Mahi River Basin is located in south-eastern part of Rajasthan extending between 23° 03' 03.45" and 24° 35' 46.46" North latitudes and longitudes 73° 18' 29.57'' to 74° 51' 11.73'' East. It lies south of Banas Basin, its eastern edge borders Chambal Basin, and its western edge borders Sabarmati Basin whereas its south edge creates the state border with Gujarat. Mahi River Basin extends over parts of Banswara, Chittorgarh, Dungarpur, Pratapgarh and Udaipur Districts. The total catchment area of the Basin is 16,630 sq km approximately.

Mahi River originates in the Mahi Kanta hills in the Vindhyachal range, in the western part of Madhya Pradesh, and enters Rajasthan in Banswara District, near Chandangarh. It leaves the State at Salakari village. On an average the river is about 100 - 130 m wide and it flows mostly through rocky terrain. Its banks may be steep, though not very high. The main tributaries of the Mahi River are the Anas, Hiran, Eru and Chap Rivers, in Banswara District. Of these, only the Anas River is perennial. The Jakam and Gomti Rivers are the next most important downstream tributaries of the Mahi River, originating from Chittorgarh and Udaipur Districts, respectively. In Dungarpur District, the last lap of the Mahi River in Rajasthan, the main tributary is the Som River. Another tributary, the Moran, a seasonal river, also flows through this District.

Administrative Set-up:

Administrative, Mahi River Basin extends over parts of Banswara. Pratapgarh, Dungarpur and Chittaurgarh and Udaipur Districts and encompasses 3,979 towns and villages.

S. No.	District Name	Area (sq. km)	% of Basin Area	Total Number of Blocks	Total Number of Towns and Villages
1	Banswara	4,493.1	27.0	8	1,413
2	Chittaurgarh	188.4	1.1	2	85
3	Dungarpur	3,164.8	19.0	5	724
4	Pratapgarh	3,328.2	20.0	5	699
5	Udaipur	5,455.1	32.9	8	1,058
Total		**16,629.6**	**100.0**	**28**	**3,979**

Climate:

Mahi River basin largely falls within humid and sub-humid to even semi-arid. It is extremely cold from October to February while turning hot from March to September. Eastern part in nature and receives good rainfall. The mean annual rainfall over Mahi River Basin was 690 mm, of which about 94% is received during the four Monsoon months (June-September).

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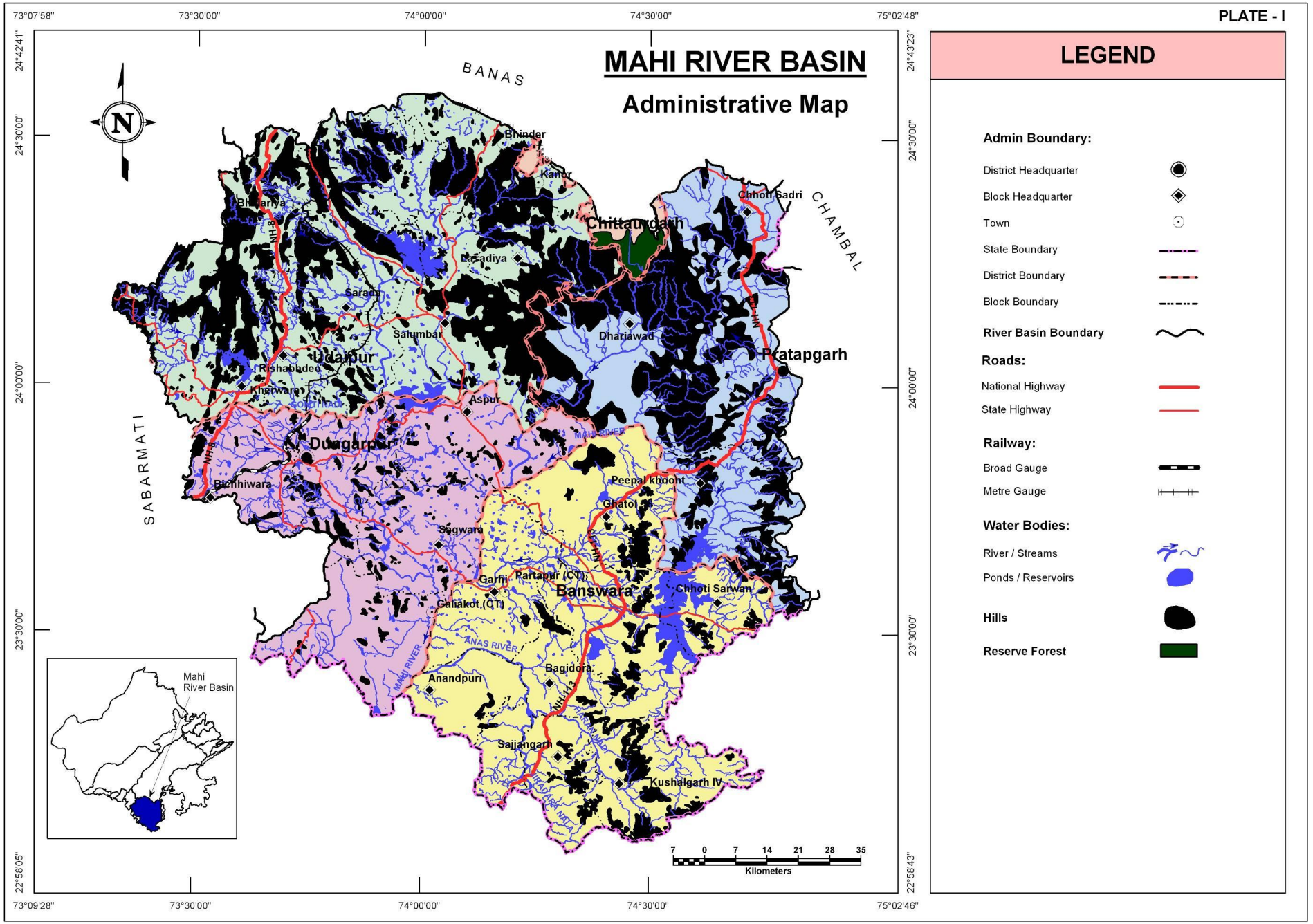
PLATE - I



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary

Roads:

- National Highway
- State Highway

Railway:

- Broad Gauge
- Metre Gauge

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Reserve Forest

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TOPOGRAPHY

Geographically, the Mahi basin is marked by hilly terrain belonging to the Aravali chain in the north western part of the basin. Southern hilly part of the basin less elevated as compare to north western part of the basin. The alluvial plain elevations above mean sea level (amsl) range from 112 meter to 262 meter approximately. The upstream part of the Basin lies outside Rajasthan, extending over 8,864 km^2, in Madhya Pradesh and Gujarat States. The topography levels in the basin are ranging from 112 meter to 1009 meter, highest being in the northwestern part and lowest in the southern region.

Table: District wise minimum and maximum elevation

District Name	Min. Elevation (m amsl)	Max. Elevation (m amsl)
Banswara	112.6	582.3
Chittaurgarh	310.7	587.1
Dungarpur	112.0	540.8
Pratapgarh	162.7	576.8
Udaipur	159.3	1,009.0

RAINFALL

The general distribution of rainfall across can be visualized from isohyets presented in the Plate – III where most of the central part of the basin received total annual rainfall in the range of 500-700mm in year 2010, and the hilly areas received highest rainfall reaching a maximum of 1,000mm. The rainfall data for available rain gauge stations is presented below.

Table: District wise total annual rainfall (based on year 2010 meteorological station recordings) (http://waterresources.rajasthan.gov.in)

Rain Gauge Station Location	Total Monsoon Rainfall (mm)	Total Non-Monsoon Rainfall (mm)	Total Annual Rainfall (mm)
Aspur	522.0	46.0	568.0
Bagidora	656.0	6.0	662.0
Banswara	594.0	42.0	636.0
Dhariawad	633.0	41.0	674.0
Dungarpur	678.0	82.0	760.0
Garhi	508.0	15.0	523.0
Ghatol	620.0	9.0	629.0
Kherwara	646.0	47.0	693.0
Kushalgarh	894.0	121.0	1,015.0
Pipalkhunt	549.0	13.0	562.0
Pratapgarh	938.0	67.0	1,005.0
Sagwara	614.0	54.0	668.0
Sajjangarh	694.0	29.0	723.0
Sallopat	671.0	12.0	683.0
Salumber	602.0	69.0	671.0
Sarara	560.0	40.0	600.0
Shergarh	574.8	48.0	622.8

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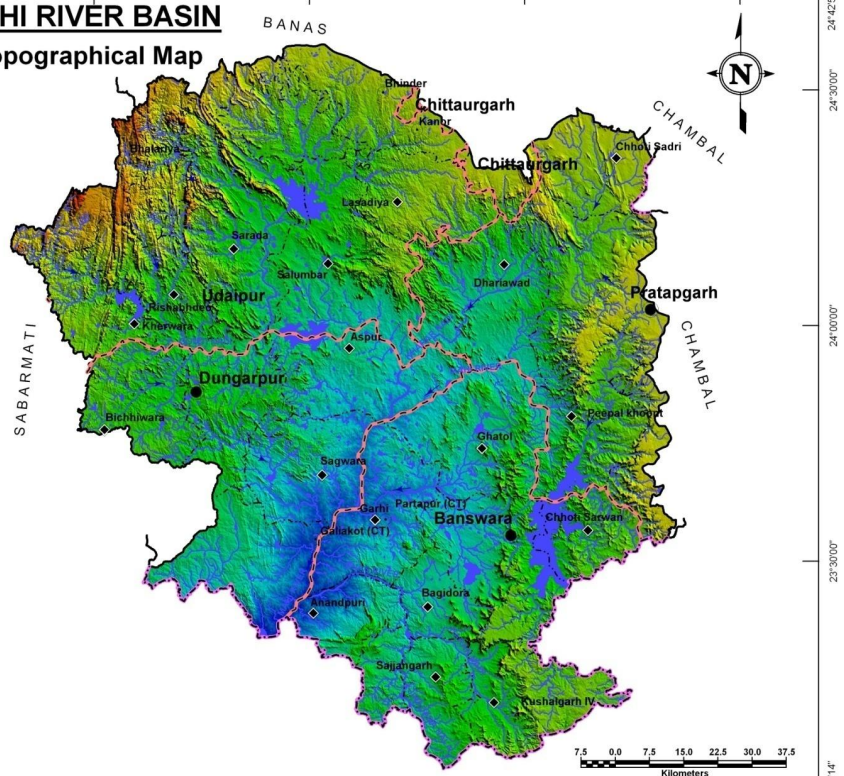
PLATE - II

MAHI RIVER BASIN

Topographical Map



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Water Bodies:
- River / Streams
- Ponds / Reservoirs

Elevation(m amsl):

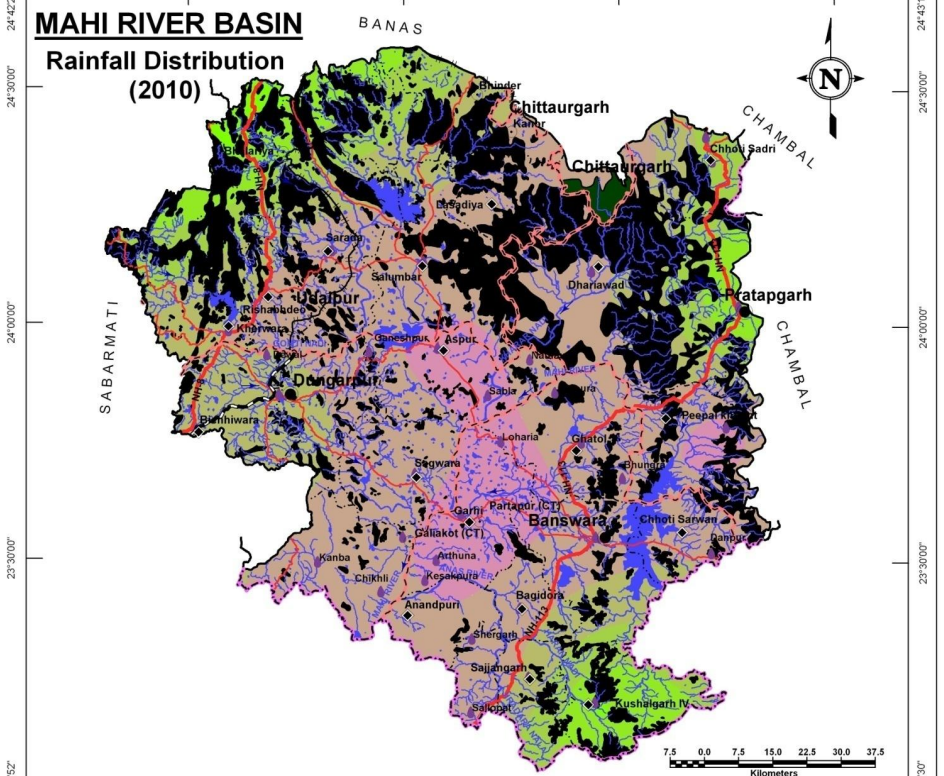
1009 m
875 m
750 m
625 m
500 m
375 m
250 m
112 m

Source : SRTM DEM

PLATE - III

MAHI RIVER BASIN

Rainfall Distribution (2010)



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- Raingauge Station
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Roads:
- National Highway
- State Highway

Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs

Hills

Reserve Forest

Isohyets(mm):
- 500-600
- 600-700
- 700-800
- 800-900
- 900-1000
- >1000

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GEOLOGY

MAHI RIVER BASIN

The Basin is covered mainly by rocks belonging to the Archaean metamorphic complex and The Aravali Super-Group of rocks. Alluvium either does not exist or is present to an insignificant extent. This is true also of the colluvial deposits and even the windblown sands, which are very thinly spread in The Mahi River basin.

Age	Super-Group	Group/Formation	Rock Types
Recent to Sub-Recent	-	Alluvium, Colluvium and Aeolian deposits (sand dunes)	Clay, silt, gravel, Kankar, talus and dune sand
----------x----------x----------Unconformity----------x----------x----------			
Upper Cretaceous to Palaeocene	-	Deccan Trap	Basaltic lavas
Upper Precambrian	Vindhyan	Bhander	Sandstones, Shales
		Rewa	Limestones, Conglomerates, Grits and basic lava flows
		----------x----------x----------Unconformity----------x------- -------x----------	
		Semri	Limestones, shales,
			Sandstones, grits and basic lava flows
----------x----------x----------Unconformity----------x----------x----------			
Precambrian	Delhi	Ajabgarh	Calc-schists, gneisses, Marbles, mica schists, Garnetiferous mica schists, Quartzites and migmatites
	Aravali	Gogunda	Quartzites, mica schist, calc schists, hornblende-schists
		Lunavada	Phyllites, meta-siltstones, mica schists quartzites, Conglomerates, dolomites
		Jharol	Chloritic-micaceous-schists and calc-schists
		Udaipur	Phyllites, siltstones, Conglomerates, dolomites, Quartzites, gneisses and Migmatites
		Dabari	Volcanics, Conglomerates, meta-arkoses, Cherts, quartzites, phyllites, Dolomites, dolomitic marbles
----------x----------x----------Unconformity----------x----------x----------			
Archaean	Bhilwara	Ranthambor	Quartzites, shales and slates
		Hindoli	Shales, slates, phyllites, Limestones, dolomitic Marbles, Volcanics, quartzites and Mica schists
		Mangalwar complex	Migmatites, gneisses, Schists-felspathised - Garnetiferous- micaceous and with sillimanite, Silicified quartzites, impure marbles and para – amphibolites

GEOMORPHOLOGY

Origin	Landform Unit	Description
Denudational	Pediment	Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, criss-crossed by fractures & faults.
	Buried pediment	Pediment covers essentially with relatively thicker alluvial, colluvial or weathered materials.
	Pediplain	Coalescence and extensive occurrence of pediment.
	Piedmont zone	Formed by coalescence of several alluvial fans by stream covering large area at foot hills, with gentle slope in humid to sub humid region.
	Intermontane Valley	Depression between mountains, generally broad & linear, filled with colluvial deposits.
Fluvial	Alluvial Plain (Sandy)	Flat to gentle undulating plain formed due to fluvial activity, mainly consists of gravels, sand, silt and clay with unconsolidated material of varying lithology, predominantly sand along river.
	Valley Fill	Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles, gravels, sand, silt and clay. The unit has consolidated sediment deposits.
Hills	Structural Hill	Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.
Structural	Plateau	
	Dissected Plateau	Plateau, criss-crossed by fractures forming deep valleys.

PLATE - IV

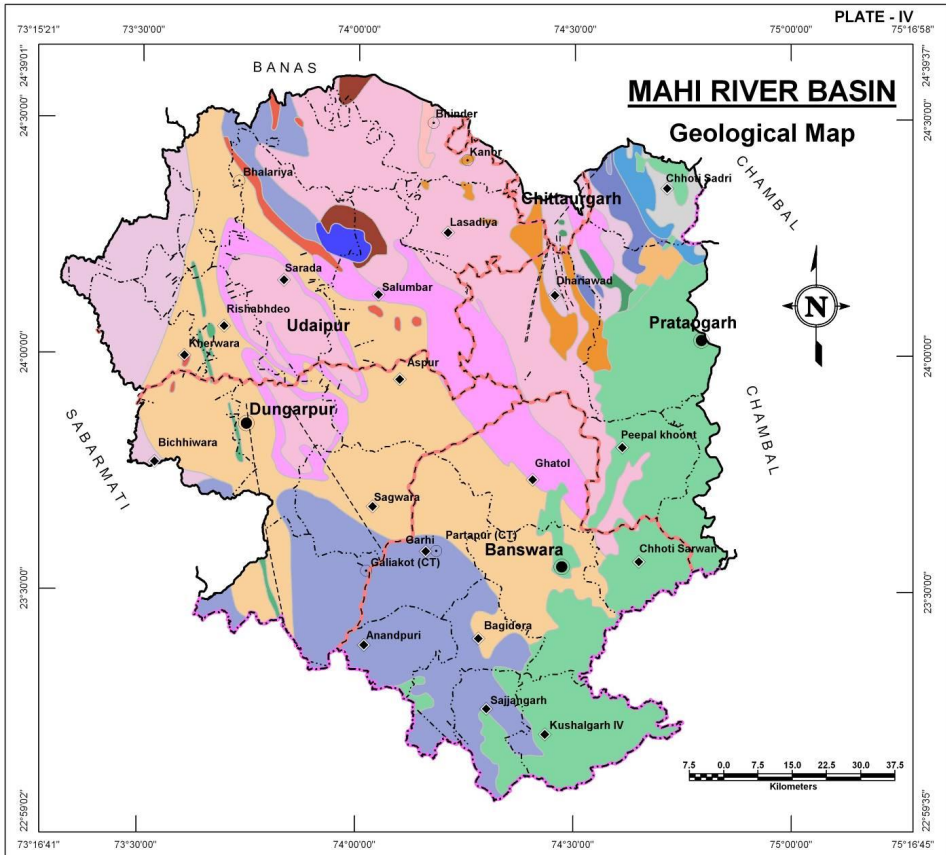
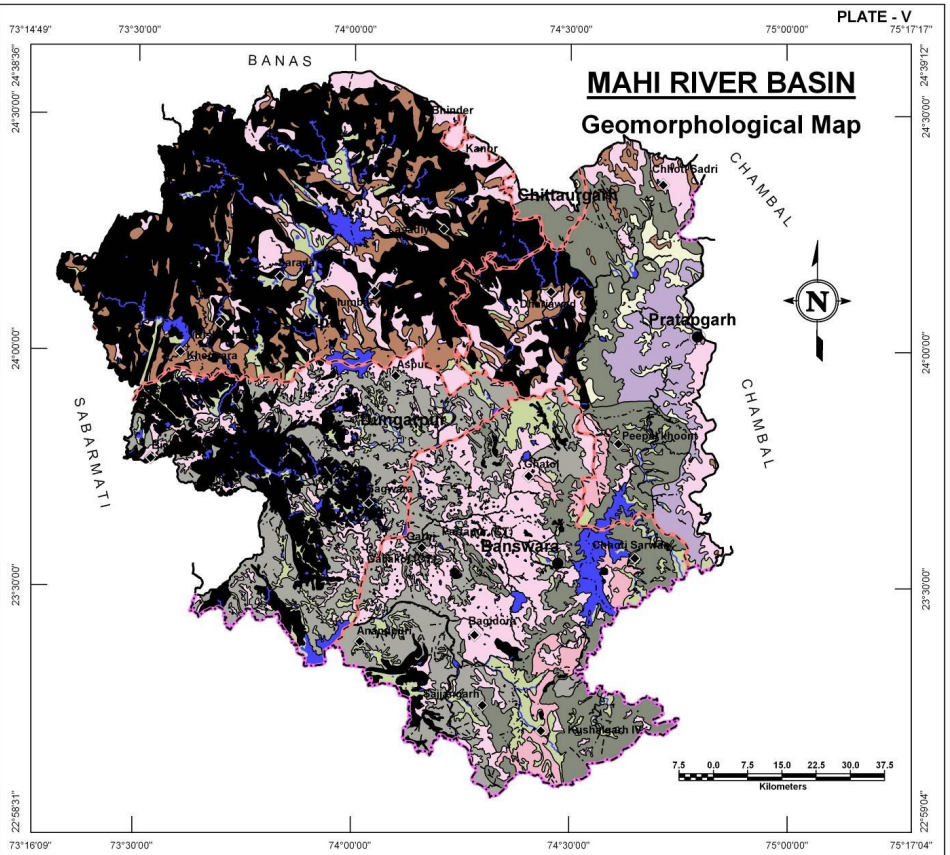


PLATE - V



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Water Bodies

Structural Features:
- Fault
- Lineament
- Shear

Geology:
- Gogunda Group
- Lunavada Group
- Jharol Group
- Udaipur Group
- Debari Group
- Ranthambhor Group
- Rajpura-Dariba Group
- Hindoli Group
- Mangalwar Complex
- Khorip Group
- Lasrawan Group
- Sand Group
- Satola Group
- Deccan Traps
- Udaipur/Salumbar/Udaisagar/Darwal Granite
- Rakhabdev Ultramafic Suite
- Dolerite sills & dykes
- Undifferentiated granites
- Berach Granite & Gneiss (2505 m.y.)
- Untala & Gingla Granites (2960 m.y.)

Source : District Resource Map of Rajasthan - GSI

LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Water Bodies:
- River/Ponds / Reservoirs

Structural Features:
- Fault/Fractures/Lineament

Hills:
- Structural/Denudational/Linear Ridge

Landforms Units:

Fluvial Origin:
- Alluvial Plain (Sandy)
- Valley Fill

Denudational Origin:
- Burried Pediment
- Pediment
- Intermontane Valley
- Pediplain
- Piedmont Zone

Structural Origin:
- Plateau
- Dissected Plateau

Source : Ground Water Atlas of Rajasthan - SRSAC & GWD, Rajasthan

AQUIFERS

MAHI RIVER BASIN

The Old Archaean rocks known as the Bhilwara Super Group rocks in the river basin especially Quartzite, Shale, Limestone, shale and Schist are highly jointed and fractured. Joints in the shales are mostly north – south or northwest – southwest striking, with moderate to high dips westwards, in granitic rocks northwest – southeast and northeast – southwest joints are more common. The structural lineaments and general strike of ridges is parallel to the great strike-slip boundary fault, of NE-SW to NNE-SSW alignment of the Aravali. Ground water occurs in the weathered zones of hard rocks and in secondary openings, and these comprise the only, rather poor, exploitable aquifers in the basin. Significant part of the basin is hilly.

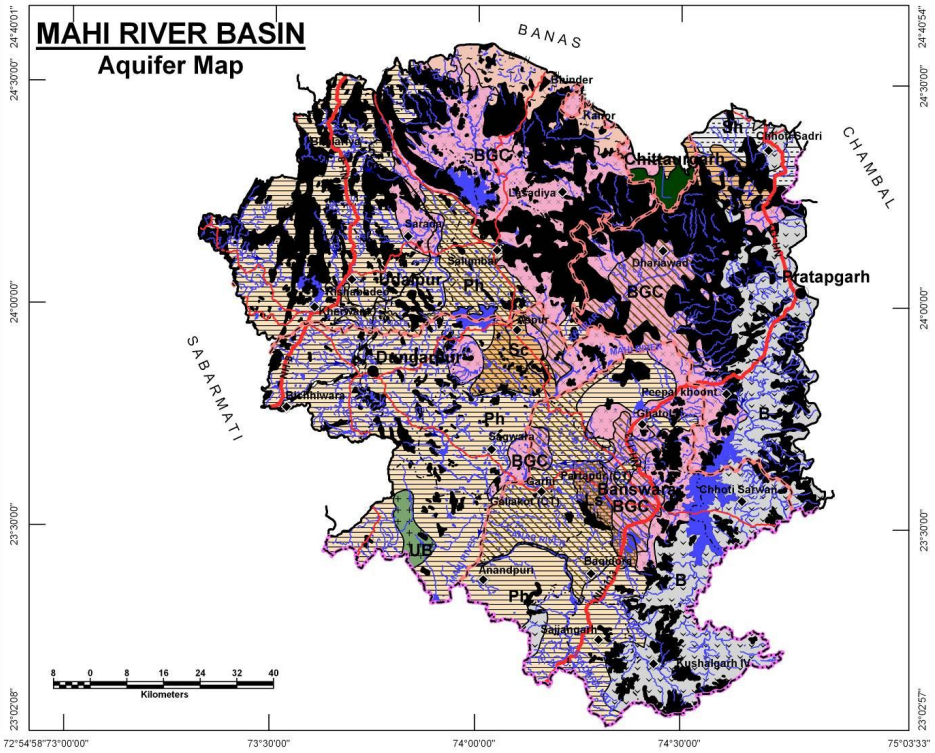
Aquifer in Potential Zone	Area (sq km)	Description of the unit/Occurrence
Limestone	144.5	In general, it is fine to medium grained, grey, red yellowish, pink or buff in colour.
Phyllite	6,342.5	These include meta sediments and represented by carbonaceous phyllite.
Schist	396.5	Medium to fine grained compact rock. The litho units are soft, friable and have closely spaced cleavage.
Shale	190.5	Grey, light green and purple in colour and mostly splintery in nature.
Ultra Basic	101.2	This comprises serpentinite, hyperstinite and amphibolite.
Basalt	1,944.7	Dark grey, olive green and green colour, compact, vesicular, amygdaloidal and weathered.
Quartzite	0.7	Medium to coarse grained and varies from feldspathic grit to sericitic quartzite.
Gneiss	344.6	Comprises of porphyritic and non porphyritic gneissic complex.
BGC	2,950.4	Grey to dark coloured, medium to coarse grained rocks.
Non Potential Zone	4,213.9	Hills
Total	**16,629.5**	

LOCATION OF GROUND WATER MONITORING WELLS

The basin has large number of ground water monitoring stations (742) in the basin owned by RGWD (658) and CGWB (84). Benchmarking and optimization studies in the basin has led to recommendation of 39 additional wells for water level monitoring and 13 additional wells to be added to network.

District Name	Existing Ground Water Monitoring Stations			Recommended Additional Ground Water Monitoring Stations	
	CGWB	RGWD	Total	Water Level	Water quality
Banswara	30	256	286	21	2
Chittaurgarh	1	5	6	-	-
Dungarpur	18	198	216	-	-
Pratapgarh	11	69	80	18	4
Udaipur	24	130	154	-	7
Total	**84**	**658**	**742**	**39**	**13**

PLATE - VI



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary

Roads:
- National Highway
- State Highway

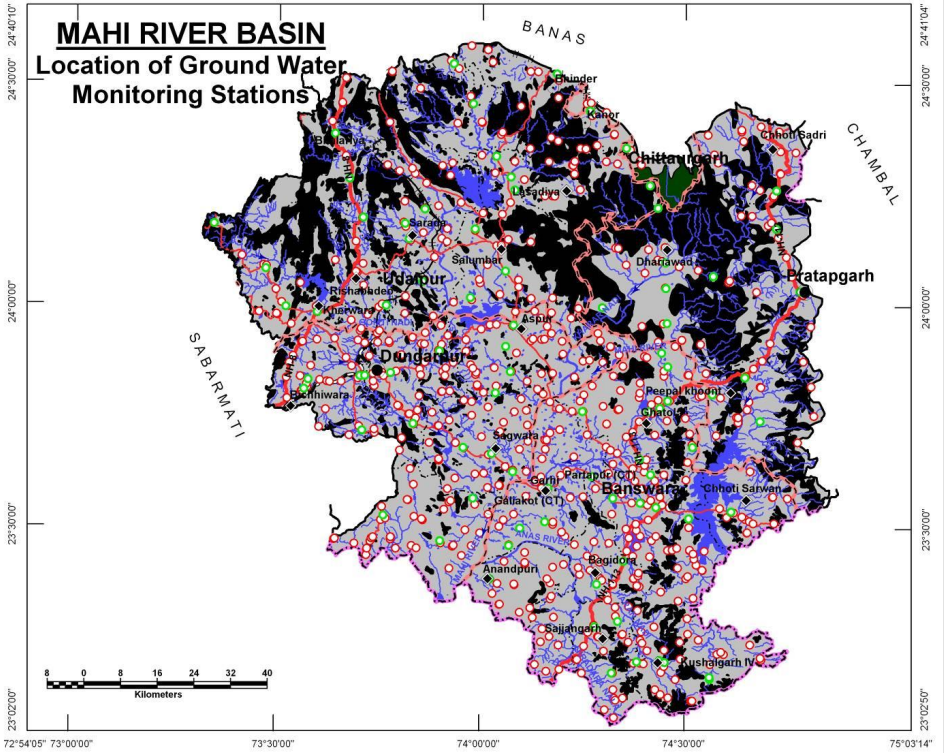
Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- Hills
- Reserve Forest
- Command Area

Aquifer:
- Limestone
- Phyllite
- Schist
- Shale
- Ultra Basic
- Basalt
- Quartzite
- Gneiss
- BGC

Source: Ground Water Potential Zone Map - GWD,Rajasthan

PLATE - VII



LEGEND

Admin Boundary:
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- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary

Roads:
- National Highway
- State Highway

Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- Hills
- Reserve Forest

Ground Water Monitoring Stations:
- CGWB
- RGWD

LOCATION OF EXPLORATORY WELLS

MAHI RIVER BASIN

In all there are 266 exploratory wells present in the basin drilled in the past by RGWD (176) and CGWB (90). Interpretation of these maps has led to detailed sub-surface studies related to aquifer disposition.

District Name	Exploratory Wells		
	CGWB	RGWD	Total
Banswara	32	59	91
Chittaurgarh	-	2	2
Dungarpur	18	70	88
Pratapgarh	2	18	20
Udaipur	38	27	65
Total	**90**	**176**	**266**

DEPTH TO WATER LEVEL (PRE MONSOON – 2010)

The general depth to water level in the basin ranges from 10 to 40 meters, however the general depth over most part of the basin is between 20 to 30m. Very small pockets have <10 or >30m depth to water level.

Table: District wise area covered in each water level depth range

Depth to water level (m bgl) Pre Monsoon - 2010	District wise area (sq km)*					Total Area (sq km)
	Banswara	Chittaurgarh	Dungarpur	Pratapgarh	Udaipur	
< 10	60.9	-	26.7	6.7	30.3	**124.6**
10-20	668.2	85.2	1,260.8	572.1	1,617.3	**4,203.6**
20-30	3,333.1	12.5	1,645.0	1,296.4	1,774.0	**8,061.0**
30-40	6.5	-	5.3	-	10.2	**22.0**
> 40	-	-	-	-	0.0	**0.0**
Total	**4,068.7**	**97.7**	**2,937.8**	**1,875.2**	**3,431.8**	**12,411.2**

* The area covered in the derived maps is less than the total basin area since the hills have been excluded from interpolation/contouring.

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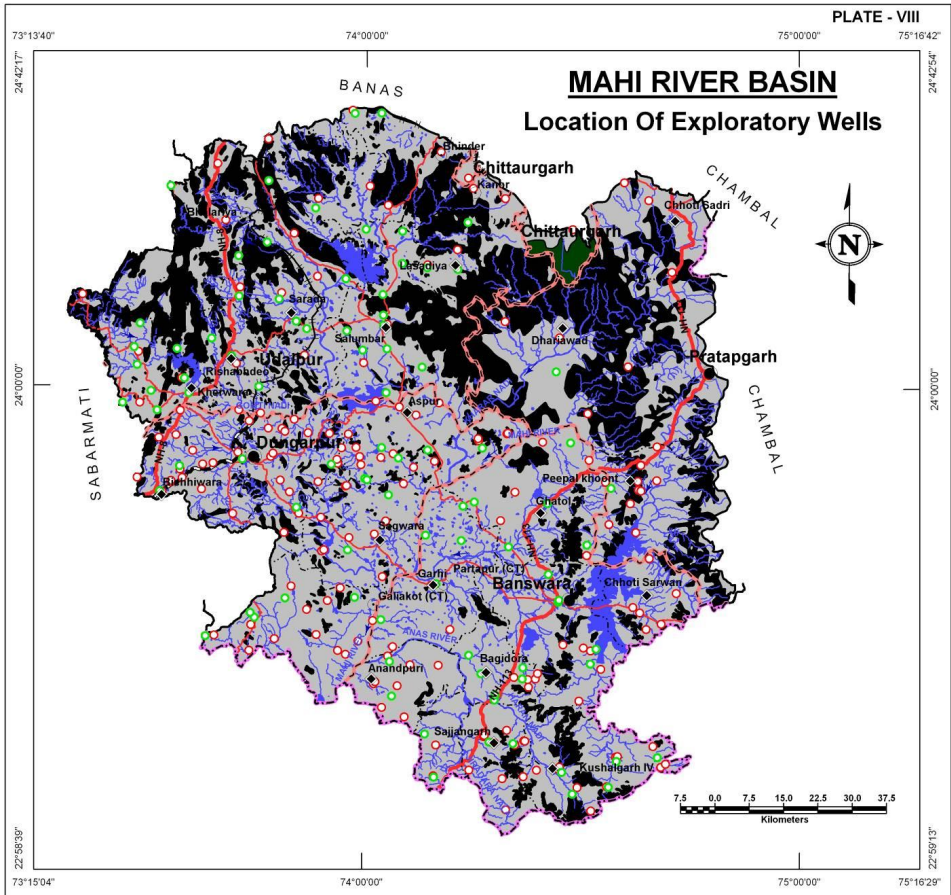
PLATE - VIII



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Roads:
- National Highway
- State Highway

Railway:
- Broad Gauge
- Metre Gauge

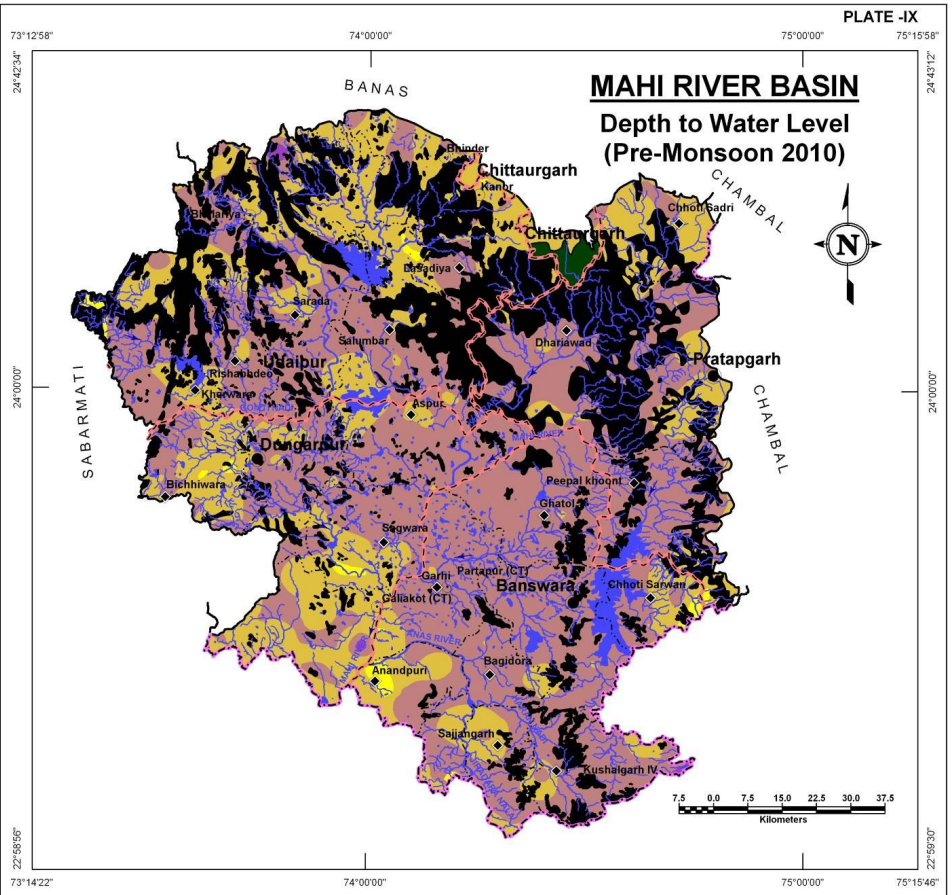
Water Bodies:
- River / Streams
- Ponds / Reservoirs

Hills

Reserve Forest

Exploratory Wells:
- CGWB
- RGWD

PLATE -IX



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary

River Basin Boundary

Water Bodies:
- River / Streams
- Ponds / Reservoirs

Hills

Reserve Forest

Depth to Water Level(m bgl):
- < 10
- 10 - 20
- 20 - 30
- 30 - 40
- > 40

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WATER TABLE ELEVATION (PRE MONSOON – 2010)

MAHI RIVER BASIN

Significant part of the basin is covered by hilly areas and hence the water table has shown large variation ranging from less than 120m to about 720m above mean sea level. As can be seen from Plate – X, the high water table areas are present along the fringes of the basin which happen to be the catchment areas and most of the remaining basin has water table elevation at less than 200m in general. Flow gradients are high in hills whereas moderate in plain areas towards central and south western parts of the basin.

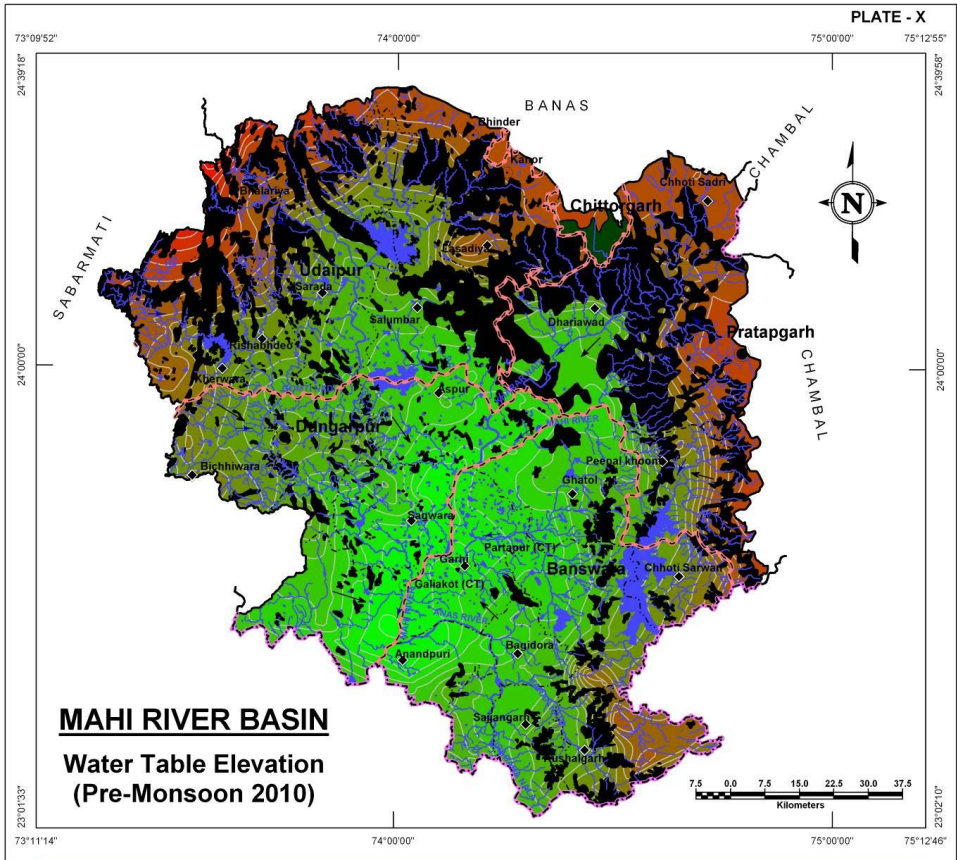
District Name	District wise Area (sq km) within water table elevation (m amsl) range																		Total Area (sq km)
	< 120	120-140	140-160	160-180	180-200	200-220	220-240	240-260	260-280	280-300	300-320	320-340	340-360	360-380	380-400	400-440	440-480	480-720	
Banswara	1.8	224.6	321.6	532.9	492.6	634.8	461.9	332.0	150.0	199.4	161.7	130.4	116.0	101.3	171.7	36.0	-	-	**4068.7**
Chittaurgarh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.1	26.6	**97.7**
Dungarpur	20.8	335.8	239.2	434.3	490.7	337.5	187.2	218.1	215.7	185.3	177.1	81.8	14.3	-	-	-	-	-	**2937.8**
Pratapgarh	-	-	-	-	47.3	175.8	174.4	134.1	71.0	57.5	57.7	49.9	70.7	69.7	90.4	227.7	439.0	210.0	**1875.2**
Udaipur	-	-	-	20.5	114.5	159.0	227.1	223.5	246.8	325.7	320.0	187.1	153.0	150.8	214.2	363.8	372.3	353.5	**3431.8**
Total	**22.6**	**560.4**	**560.8**	**987.7**	**1,145.1**	**1,307.1**	**1,050.6**	**907.7**	**683.5**	**767.9**	**716.5**	**449.2**	**354.0**	**321.8**	**476.3**	**627.5**	**882.4**	**590.1**	**12,411.2**

WATER LEVEL FLUCTUATION (PRE TO POST MONSOON 2010)

While the fluctuation has been in the range from about -6m to +16m, the general rise in water level in the basin has remained in the 0m to 4m with respect to pre monsoon water levels. The high variation is rather limited in spatial distribution and is very localized in north and western parts of the basin only.

District Name	District wise area coverage (sq km) within fluctuation range (m)													Total Area (sq km)
	< -6	-6 to -4	-4 to -2	-2 to 0	0 to 2	2 to 4	4 to 6	6 to 8	8 to 10	10 to 12	12 to 14	14 to 16	> 16	
Banswara	-	-	-	6.4	1,719.6	1,189.4	721.5	275.0	85.2	38.0	17.8	11.0	4.8	**4,068.7**
Chittaurgarh	-	-	-	4.3	15.5	47.4	22.4	8.1	-	-	-	-	-	**97.7**
Dungarpur	-	-	-	3.9	518.0	1,108.2	913.6	359.1	30.1	4.4	0.5	-	-	**2,937.8**
Pratapgarh	-	-	3.4	67.4	547.1	823.7	336.2	97.0	0.4	-	-	-	-	**1,875.2**
Udaipur	0.4	2.9	7.6	77.9	112.3	1,219.0	1,039.2	548.3	232.9	120.3	57.4	13.6	-	**3,431.8**
Total	**0.4**	**2.9**	**11.0**	**159.9**	**2,912.5**	**4,387.7**	**3,032.9**	**1,287.5**	**348.6**	**162.7**	**75.7**	**24.6**	**4.8**	**12,411.2**

PLATE - X



MAHI RIVER BASIN

Water Table Elevation (Pre-Monsoon 2010)

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary

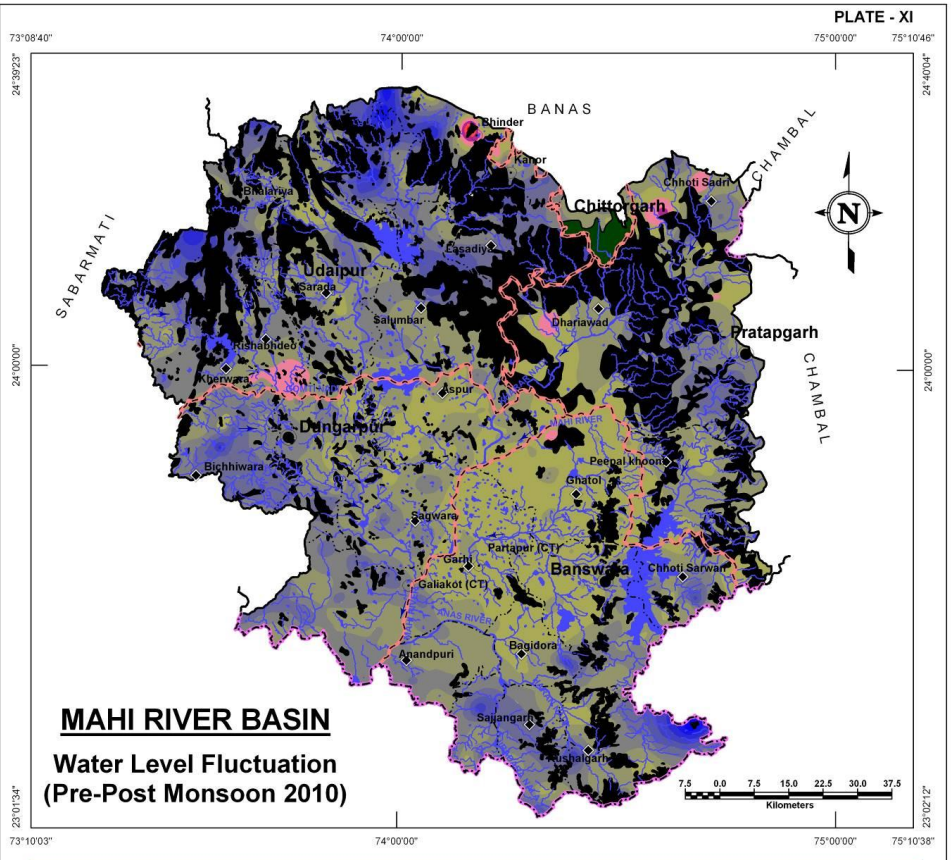
Water Bodies:

- River / Streams
- Ponds / Reservoirs
- Hills
- Reserve Forest
- Water Table Elevation

Water Table Elevation(m amsl):

< 120	340 - 360
120 - 140	360 - 380
140 - 160	380 - 400
160 - 180	400 - 440
180 - 200	440 - 480
200 - 220	480 - 520
220 - 240	520 - 560
240 - 260	560 - 600
260 - 280	600 - 640
280 - 300	640 - 680
300 - 320	680 - 720
320 - 340	>720

PLATE - XI



MAHI RIVER BASIN

Water Level Fluctuation (Pre-Post Monsoon 2010)

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- Hills
- Reserve Forest

Water Level Fluctuation(m):

- < -6
- -6 to -4
- -4 to -2
- -2 to 0
- 0 to 2
- 2 to 4
- 4 to 6
- 6 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- 14 to 16
- >16

ELECTRICAL CONDUCTIVITY DISTRIBUTION

MAHI RIVER BASIN

A perusal of Plate – XII reveals that most of the basin area is having fresh water as indicated by yellow coloured (EC<2000 (µS/cm)) region all over. Being hard rock areas predominantly occupying the basin, the ground water thus is relatively fresh and suitable for domestic consumption and other uses. There are some isolated pockets of high EC areas (>2000 µS/cm) around north of Udaipur and Sagwara; around Salumbar and around the northern fringe of the basin, where ground water is unsuitable for domestic purposes, however can be used for other purposes in absence of better alternative.

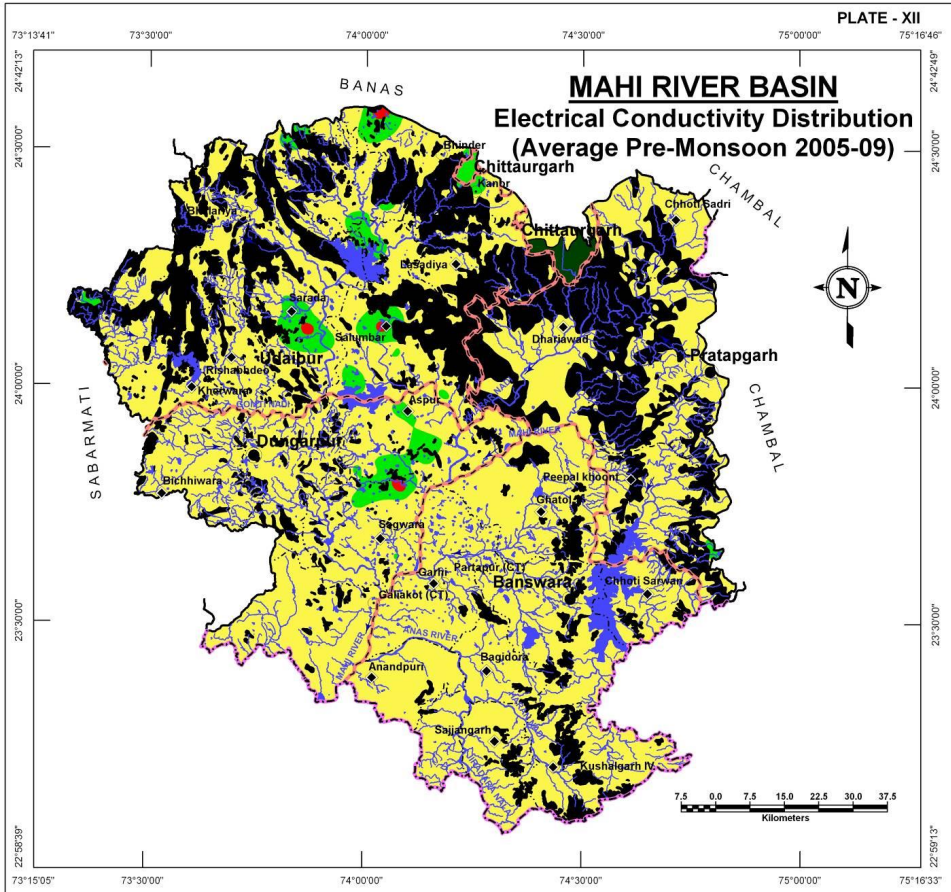
Electrical Conductivity Ranges (µS/cm at 25°C) (Ave. of years 2005-09)	District wise area coverage (sq km)										Total Area (sq km)
	Banswara		Chittorgarh		Dungarpur		Pratapgarh		Udaipur		
	Area	% age	Area	% age	Area	% age	Area	% age	Area	% age	
< 2000	4,068.7	100.0	70.8	72.5	2,758.1	93.9	1,863.0	99.5	3,044.2	88.8	**11,804.8**
2000-4000	-	-	26.9	27.5	172.2	5.8	12.2	0.5	366.9	10.7	**578.2**
> 4000	-	-	-	-	7.5	0.3	-	-	20.7	0.5	**28.2**
Total	**4,068.7**	**100.0**	**97.7**	**100.0**	**2,937.8**	**100.0**	**1,875.2**	**100.0**	**3,431.8**	**100.0**	**12,411.2**

CHLORIDE DISTRIBUTION

The chloride distribution also follows the same pattern of distribution as that of Electrical conductivity. The analysis is based on average of Chloride values observed during Pre-Monsoon between years 2005-09. High chloride concentration in ground water is found in the areas around Sagwara, Salumbar, Sarada, Bhinder, and to the south of Pratapgarh. Remaining part of the basin is bye and large low in Chloride concentration is more than 200 mg/l.

Chloride Ranges (mg/l) (Ave. of years 2005-09)	District wise area coverage (sq km)										Total Area (sq km)
	Banswara		Chittorgarh		Dungarpur		Pratapgarh		Udaipur		
	Area	% age	Area	% age	Area	% age	Area	% age	Area	% age	
< 250	4,068.7	100.0	68.9	70.5	2,520.7	85.8	1,723.5	91.9	2,612.1	76.1	**10,993.9**
250 - 1000	-	-	-	-	1.5	0.1	-	-	6.6	0.2	**8.1**
> 1000	-	-	28.8	29.5	415.6	14.1	151.7	8.1	813.1	23.7	**1,409.2**
Total	**4,068.7**	**100.0**	**97.7**	**100.0**	**2,937.8**	**100.0**	**1,875.2**	**100.0**	**3,431.8**	**100.0**	**12,411.2**

PLATE - XII



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- **River Basin Boundary**

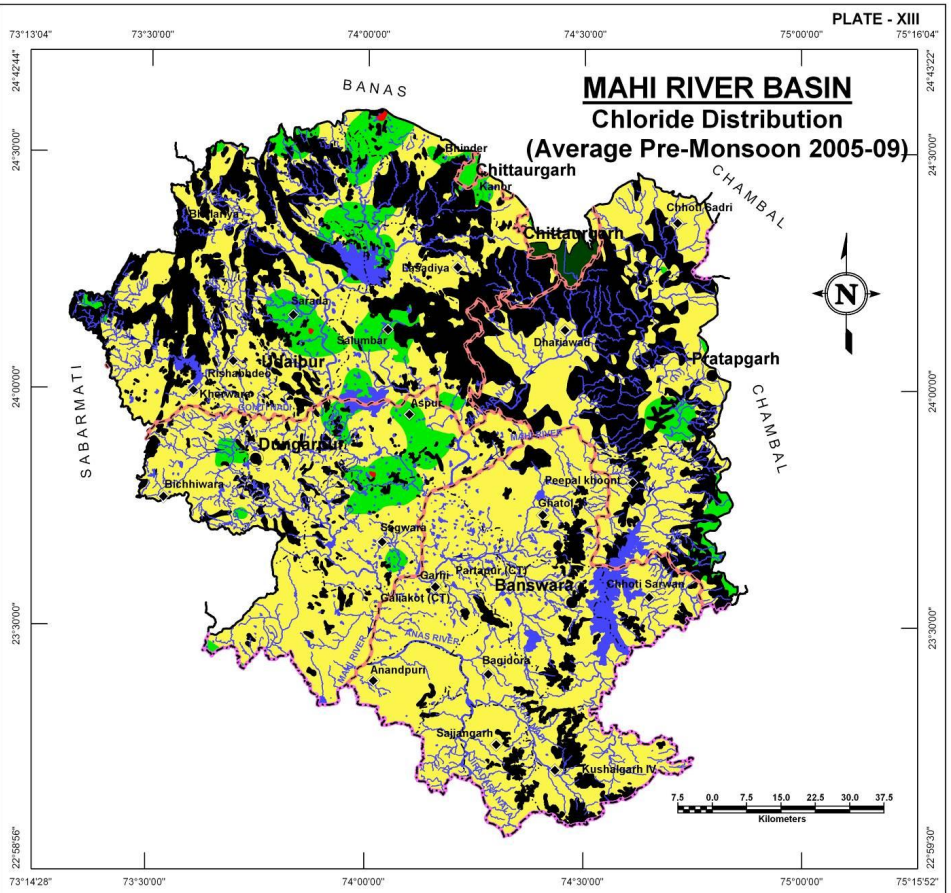
Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Reserve Forest**

Electrical Conductivity (µS/cm at 25°C):

- < 2000
- 2000-4000
- > 4000

PLATE - XIII



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- **River Basin Boundary**

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Reserve Forest**

Chloride Concentration (mg/l):

- < 250
- 250 - 1000
- > 1000

FLUORIDE DISTRIBUTION

Perusal of Plate – XIV reveals high fluoride concentration (>1.5 mg/l) pocket in the central part of the basin in Sagwara-Aspur-Salumbar-Sarada-Udaipur-Dungarpur region. The general concentration of Fluoride in most of the area is below 1.5 mg/l. Areas around Aspur, Ghatol and northwest of Bhinder have shown very high concentration exceeding 3 mg/l.

Fluoride Ranges (mg/l) (Ave. of years 2005-09)	District wise area coverage (sq km)										Total Area (sq km)
	Banswara		Chittorgarh		Dungarpur		Pratapgarh		Udaipur		
	Area	% age	Area	% age	Area	% age	Area	% age	Area	% age	
< 1.5	3,846.1	0.9	95.2	1.0	2,065.4	0.7	1,853.3	1.0	2,754.1	0.8	**10,614.1**
1.5-3.0	207.3	0.1	2.5	0.0	707.8	0.2	21.5	0.0	663.1	0.2	**1,602.2**
> 3.0	15.3	0.0	-	-	164.6	0.1	0.3	0.0	14.6	0.0	**194.8**
Total	**4,068.7**	**1.0**	**97.7**	**1.0**	**2,937.9**	**1.0**	**1,875.1**	**1.0**	**3,431.8**	**1.0**	**12,411.2**

NITRATE DISTRIBUTION

Plate – XV shows distribution of Nitrate in ground water. High nitrate concentration in ground water renders it unsuitable for agriculture purposes. There are some high Nitrate concentration pockets in the central part of the basin i.e., in the northern part of Dungarpur district and southern part of Udaipur district surrounded by moderate (50-100 mg/l) concentration areas. Rest of the area has low Nitrate concentration in ground water i.e., lesser than 50 mg/l.

Nitrate Ranges (mg/l) (Ave. of years 2005-09)	District wise area coverage (sq km)										Total Area (sq km)
	Banswara		Chittorgarh		Dungarpur		Pratapgarh		Udaipur		
	Area	% age	Area	% age	Area	% age	Area	% age	Area	% age	
<50	3,049.1	74.9	4.6	4.8	1,765.5	60.1	1,069.7	57.1	1,647.1	48.0	**7,536.2**
50-100	873.2	21.4	27.6	28.3	776.7	26.4	651.9	34.8	740.7	21.6	**3,070.1**
>100	151.3	3.7	65.4	67.0	395.6	13.5	151.5	8.1	1,041.1	30.4	**1,804.9**
Total	**4,073.6**	**100.0**	**97.7**	**100.0**	**2,937.9**	**100.0**	**1,873.1**	**100.0**	**3,429.0**	**100.0**	**12,411.2**

Ground Water Department, Rajasthan

European Union
State Partnership Programme

PLATE - XIV

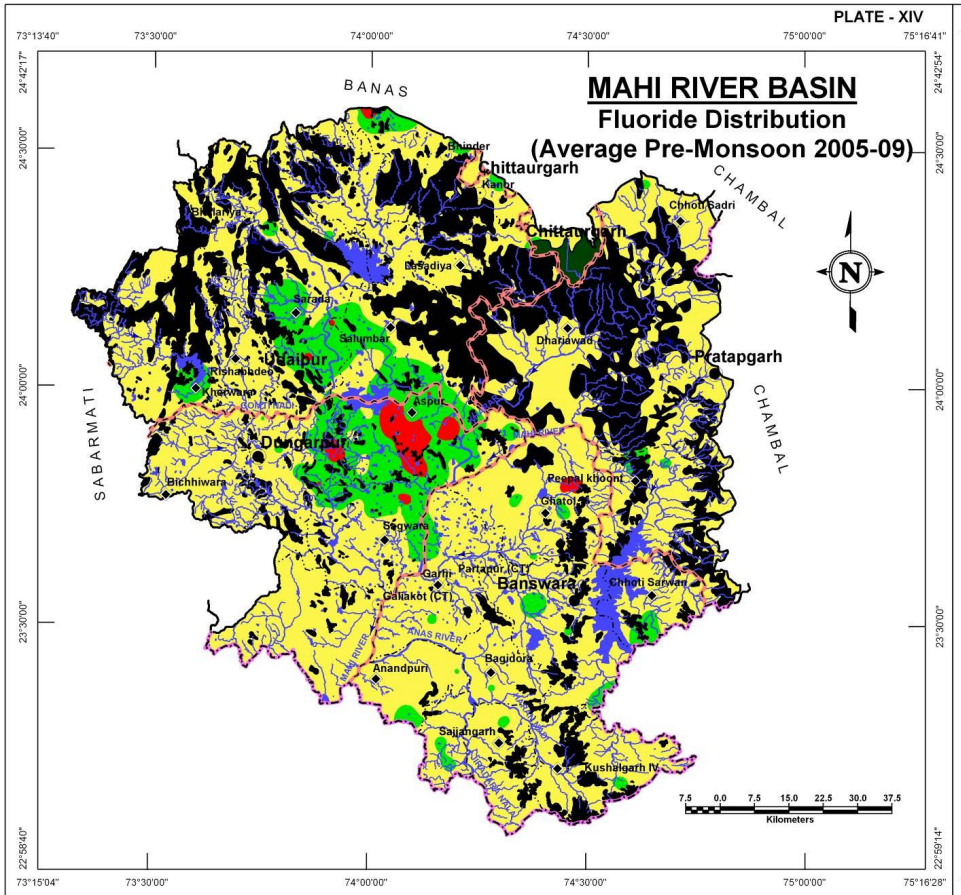
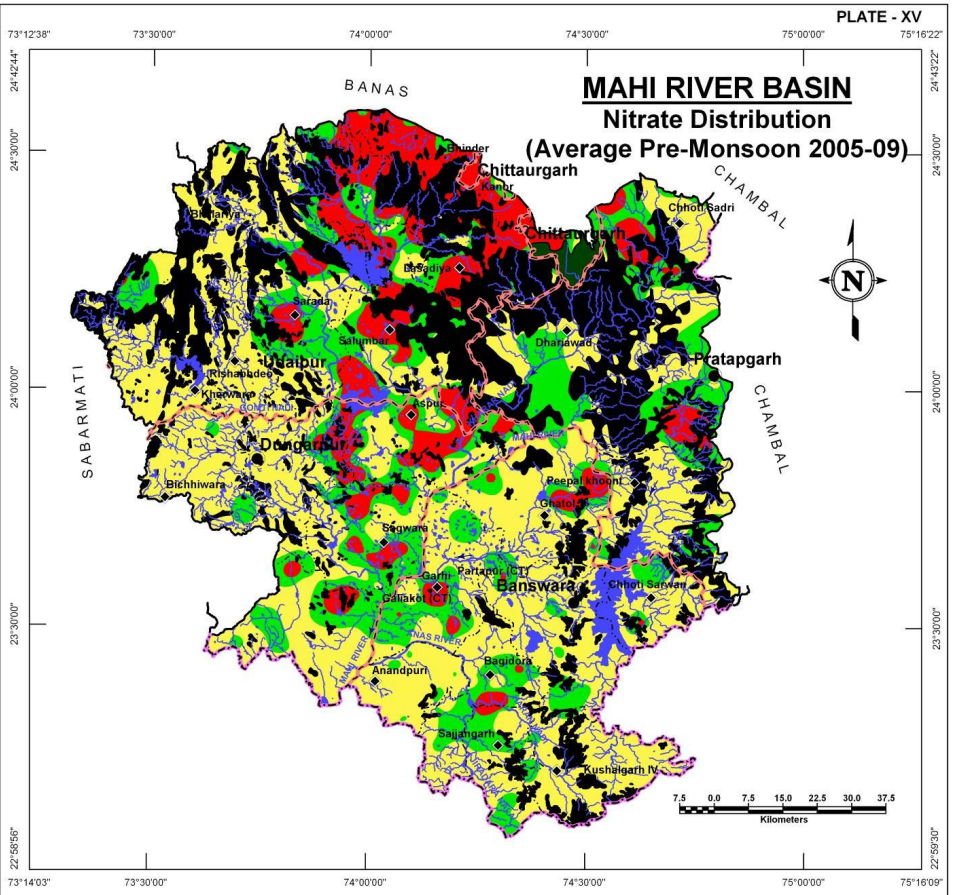


PLATE - XV



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- **River Basin Boundary**

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Reserve Forest**

Fluoride Concentration(mg/l):

- < 1.5
- 1.5-3.0
- > 3.0

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- **River Basin Boundary**

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Reserve Forest**

Nitrate Concentration (mg/l):

- < 50
- 50-100
- > 100

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DEPTH TO BEDROCK

MAHI RIVER BASIN

Mahi River Basin is underlined by the hard rocks at different depths. The major rocks types constituting the bedrock are: Limestone, Sandstone, Shale, Schist, Phyllite, Gneiss and Quartzite, overlain by sand, clay, silt, kankar and gravels. The depth to bed rock defines the sub surface topography of the occurrence of hard rock beneath alluvial deposits. From map (Plate – XVI) it is apparent that in general, the depth to bed rock is at deeper levels in northwestern and central part of the river basin. The depth to bedrock in the river basin varies from more than >140 meter bgl in the north western to exposures in the form of hills. Depth of >140 is reported in Garhi and Ghatol region in the central part of the basin. Major part of Dungarpur district and significant part of Banswara district have shallower depth to bedrock extending tp 60m bgl.

Depth to Bedrock (m bgl)	District wise area coverage (sq km)					Total Area (sq km)
	Banswara	Chittorgarh	Dungarpur	Pratapgarh	Udaipur	
<20	90.4	-	10.0	173.3	-	**273.7**
20-40	736.7	-	1,007.6	721.6	509.2	**2,975.2**
40-60	1,962.5	60.7	1,484.0	787.8	1,251.8	**5,546.8**
60-80	964.5	32.4	310.3	182.9	982.0	**2,472.0**
80-100	277.3	2.6	61.7	7.6	496.2	**845.4**
100-120	40.4	-	41.5	-	191.7	**273.6**
>120	1.8	-	22.7	-	-	**24.5**
Total	**4,073.6**	**95.7**	**2,937.9**	**1,873.1**	**3,430.8**	**12,411.2**

UNCONFINED AQUIFER

Hardrock areas

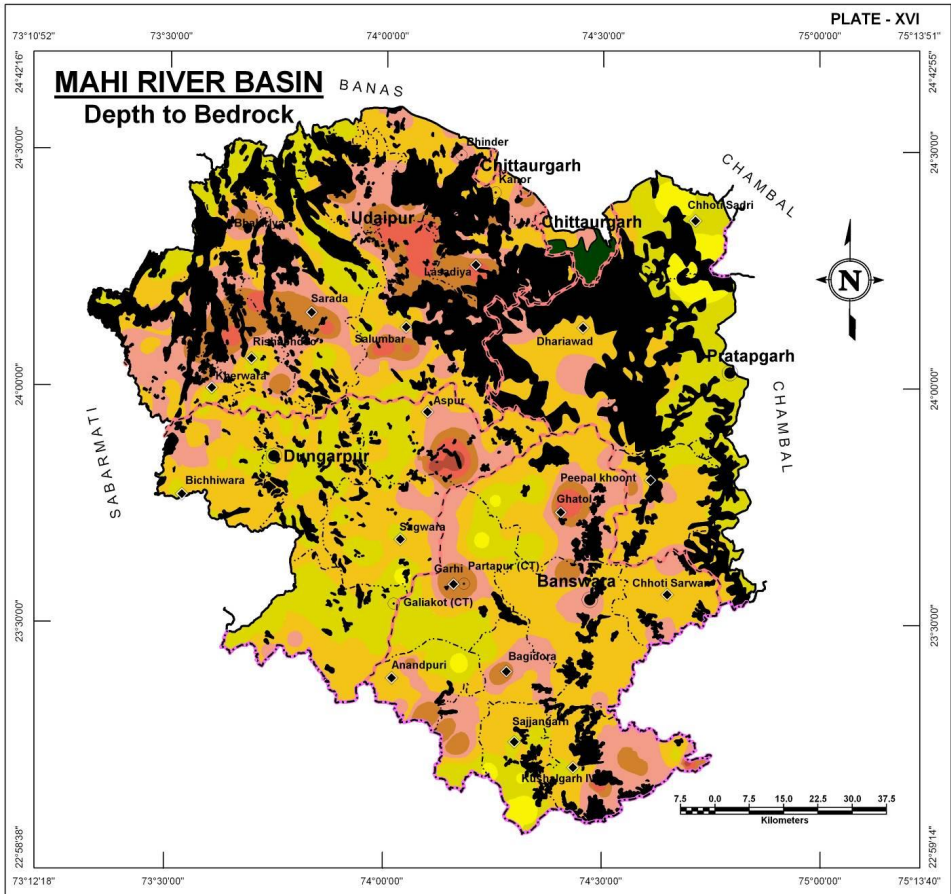
There are not any aquifers formed in alluvium in this basin as most of the basin predominantly hilly. The aquifers are principally formed in weathered and fractured zones of the hardrocks and vary in thickness from negligible to upto 80m. The aquifer is thin in areas around Ghatol, Banswara, Galiakot etc., whereas rest of the basin area has variable aquifer thickness.

Unconfined aquifer Thickness (m)	District wise area coverage (sq km)					Total Area (sq km)
	Banswara	Chittorgarh	Dungarpur	Pratapgarh	Udaipur	
<10	1,642.60	9	591.2	733.9	880.7	**3,857.4**
10-20	1,585.90	33.4	953.3	549.8	1,512.50	**4,634.9**
20-30	550.5	49	809	485.6	613	**2,507.1**
30-40	252.5	4.1	343.7	101.9	229.2	**931.4**
40-50	28.1	0.2	134.4	2	115.1	**279.8**
50-60	14	-	62.4	-	64.5	**140.9**
60-70	-	-	28.5	-	13.3	**41.8**
70-80	-	-	11.3	-	2.1	**13.4**
>80	-	-	4.1	-	0.4	**4.5**
Total	**4,073.6**	**95.7**	**2,937.9**	**1,873.2**	**3,430.8**	**12,411.2**

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

PLATE - XVI



LEGEND

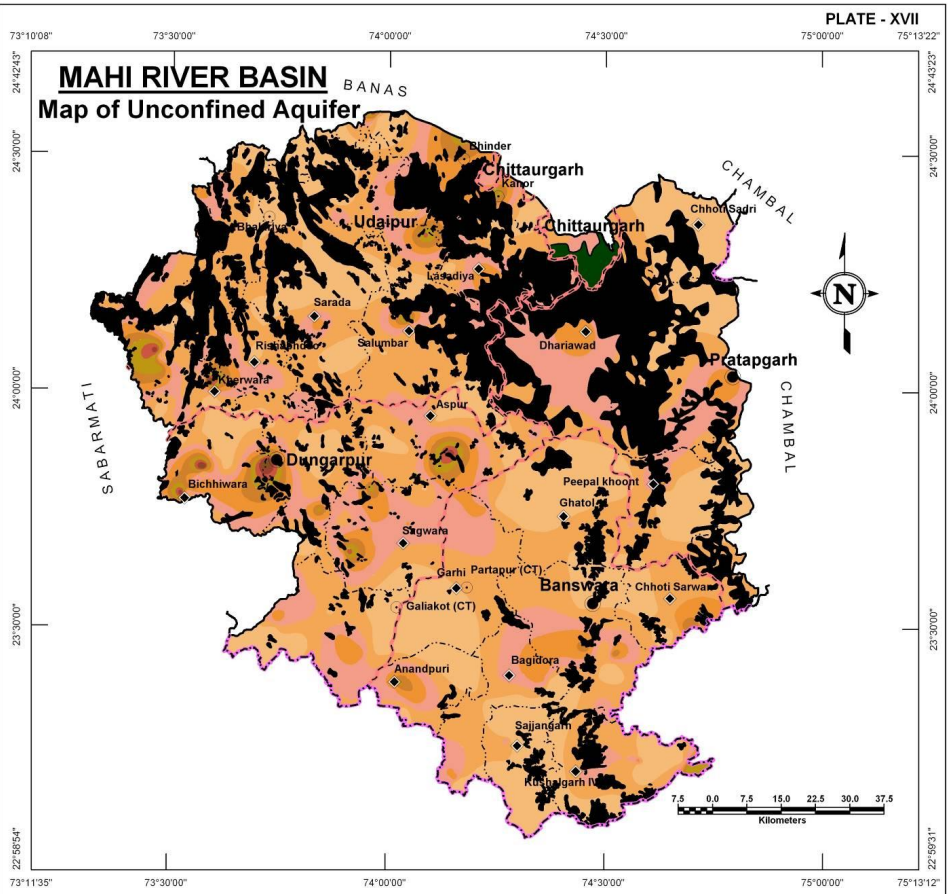
Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary
- Hills
- Reserve Forest

Depth to Bedrock (m bgl):

- < 20
- 20-40
- 40-60
- 60-80
- 80-100
- 100-120
- >120

PLATE - XVII



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary
- Hills
- Reserve Forest

Aquifer Thickness (m):

Weathered & Fractured Zone in Hardrock Area :

- <10
- 10-20
- 20-30
- 30-40
- 40-50
- 50-60
- 60-70
- 70-80
- >80

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CROSS SECTIONS

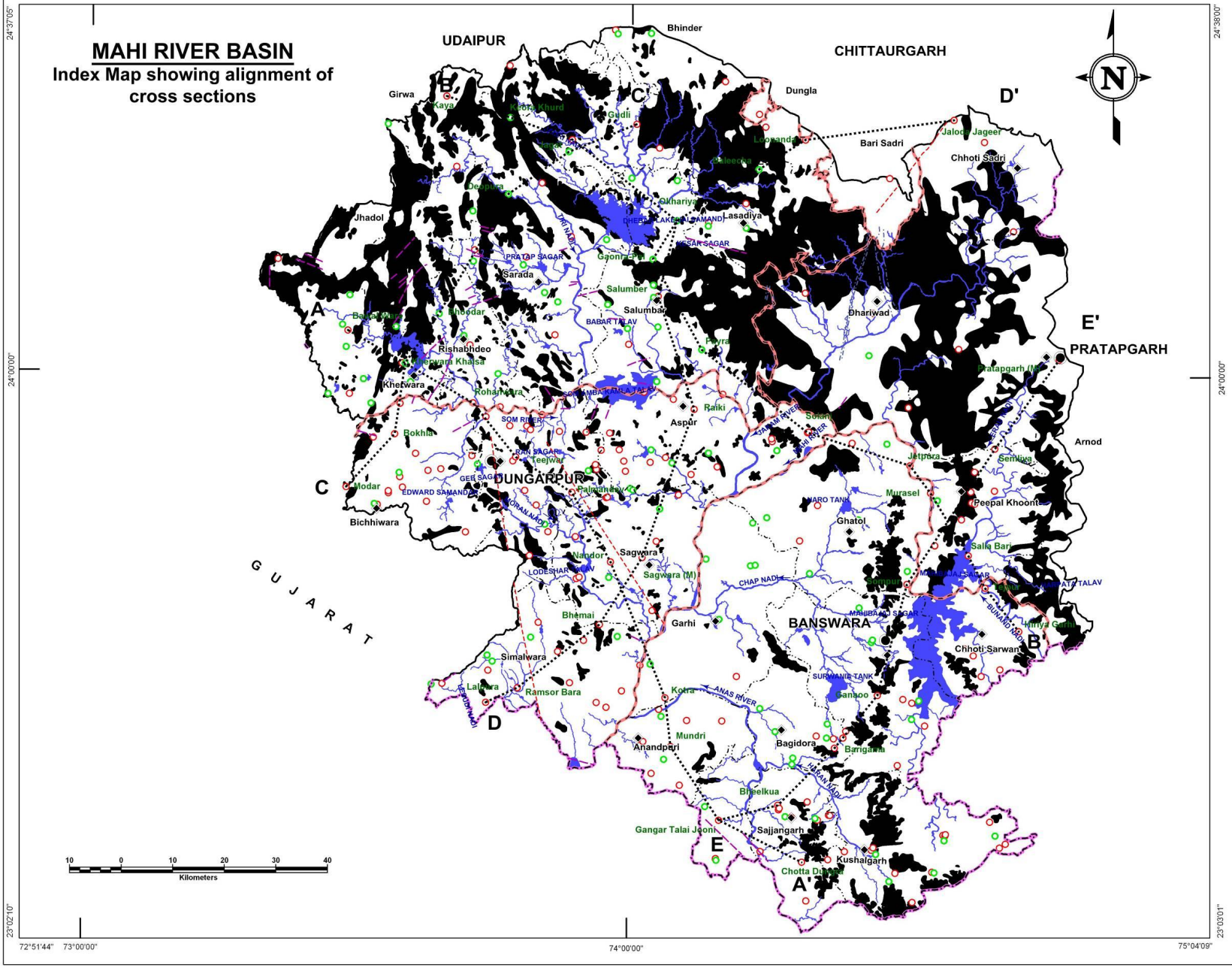
Four different hydrogeologic cross sections have been prepared to better understand sub-surface lighologic distribution. This has been overlaid with water table elevation of pre-monsoon 2010 and structural faults. The alignment of the cross sections is shown in Plate XVIII and corresponding sections are presented in Plates XIX through XXII. The broad orientation of the sections is as given below:

Name of Section Line	Orientation
Section AA’	NW – SE
Section BB’	NW – SE
Section CC’	NE – SW
Section DD’	SW – NE
Section EE’	SW – NE

PLATE - XVIII

MAHI RIVER BASIN

Index Map showing alignment of cross sections



Legend

- District Headquarter
- Block Headquarter
- State Boundary
- District Boundary
- Block Boundary
- River Basin Boundary
- Fault
- Lineament
- Shear
- Section_Line
- Major Streams / River
- Pond / Reservoir
- Hills / Hilly Forest

Exploratory Wells

- Kaya — Well location for Sections
- CGWB
- RGWD

Section A-A':

The A-A' section is 120 km long sections plotted in the area and trends in NW-SE direction cutting across the basin (Plate – XIX). Lithologs of 10 bore holes have been taken to prepare this cross section. The predominant lithology indicated in this cross section is phyllite, schist and gneiss which was found to be in weathered and fractured in one well. There is also a thin soil cover which is not of much significance from hydrogeological point of view. In addition, two tentative faults are indicated in the central part of the section.

The water level varies from 115 m amsl to 420 m amsl following the surface topography as observed from the 2010 pre monsoon season measurements.

Section B-B':

The B-B' section is one of the longest section, (160 km in length) trending NW-SE and as shown in (Plate – XVIII and XX). Lithologs of 12 bore holes have been taken to prepare this cross section. This section reveals layers of weathered and fractured gneiss, schist, basalt and granite. Gneiss is dominating in the profile in the central, west and in extreme northwest. In the central part schist is encountered at a depth of 105 m, while in south east basalt is present. A tentative fault separates Basalts from Gneisses.

It is observed from pre monsoon 2010 data the ground water table varies from 180 m amsl to 550 m amsl following surface topography.

PLATE - XIX

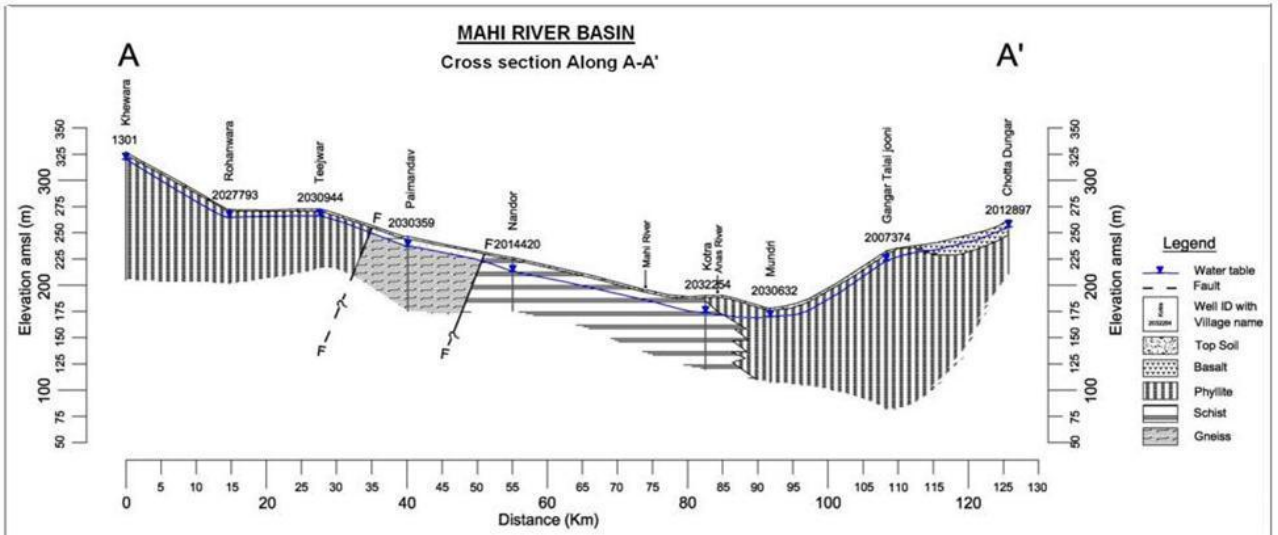
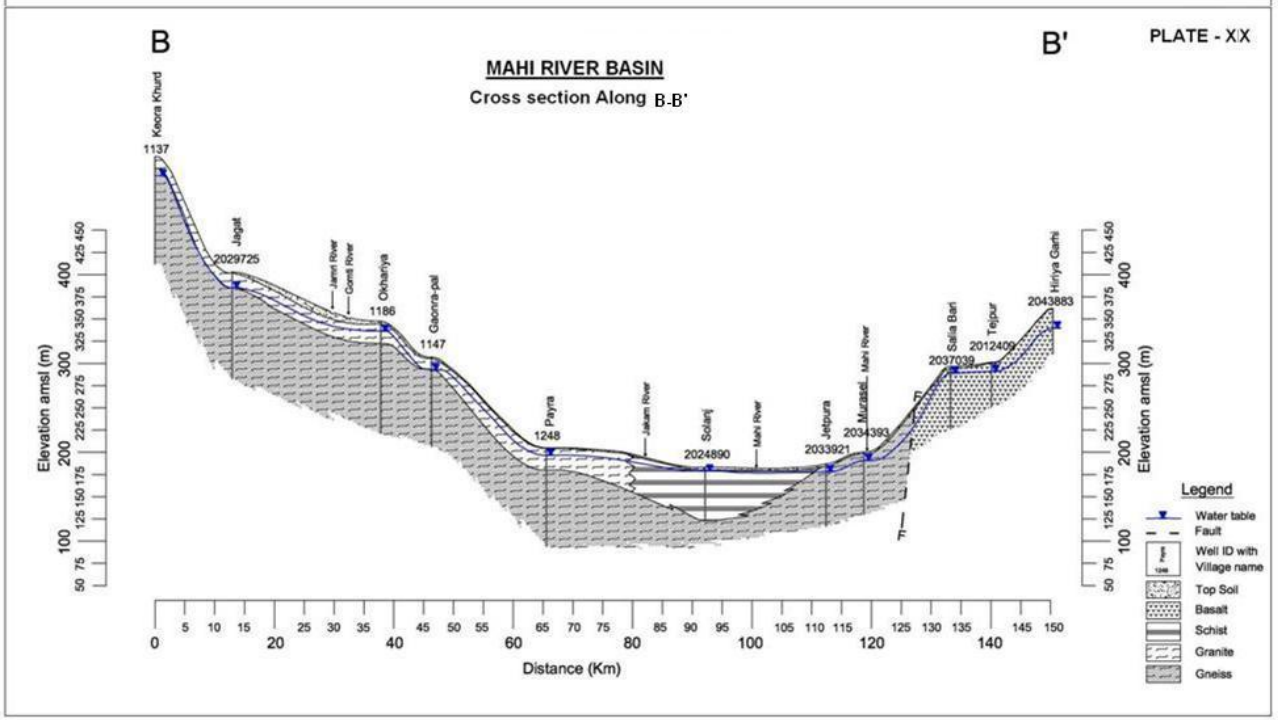


PLATE - XX



Section C-C':

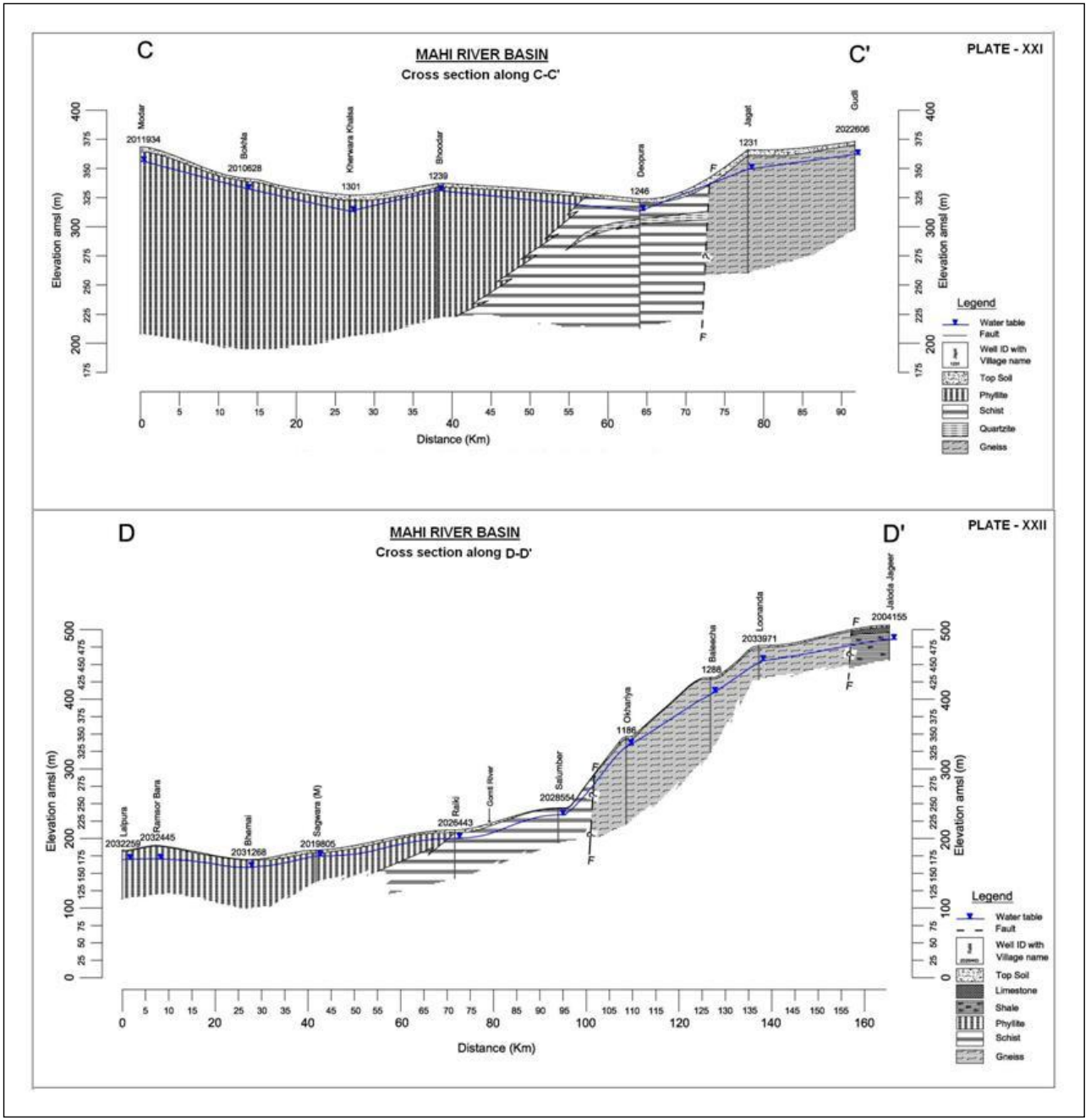
The C-C' section is 90 km long trending NE-SW in the western part of the basin. Lithologs of 7 bore holes have been taken to prepare this cross section. The SW part of the section is characterized by presence of phyllite while gneiss is present in the NW. The weathered and fractured portions of phyllite and gneiss are most suitable aquifer zones (Plate – XXI).

The water level varies from 318 m amsl to 355 m amsl as per the data of pre monsoon 2010.

Section D-D':

The D-D' section is 160 km long trending in SW – NE direction across the basin. Lithologs of 10 bore holes have been analyzed to prepare this cross section. The SW part of the section is characterized by presence of phyllite; schist and gneiss in the NE. The weathered and fractured portions of phyllite, schist and gneiss are suitable aquifer zones (Plate – XXII). Two tentative faults are also indicated in the section.

It is observed from pre monsoon 2010 data the ground water level varies from 170 m amsl to 490 m amsl.

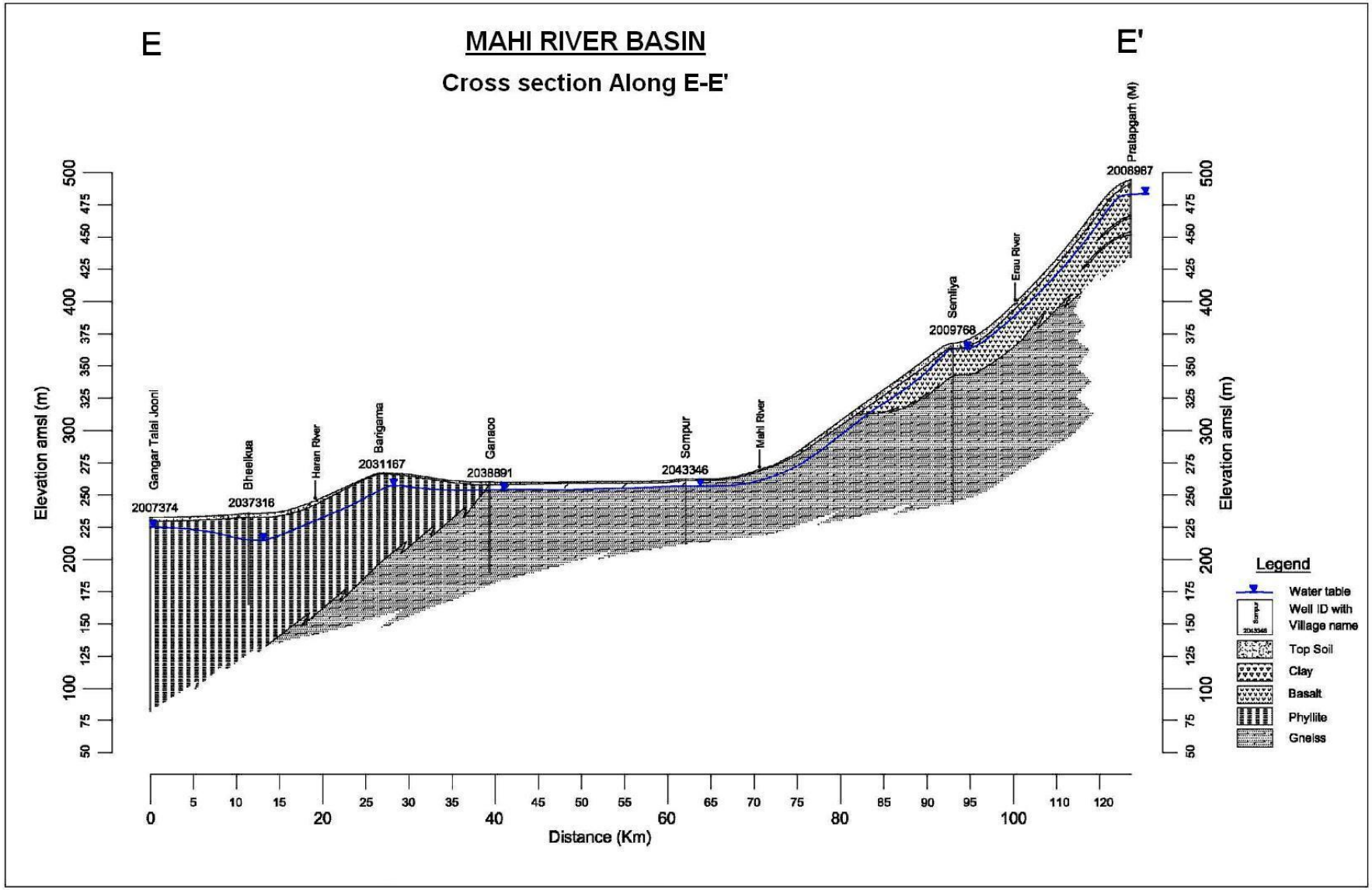

C
MAHI RIVER BASIN
Cross section along C-C'
C'
PLATE - XXI
Modar
Bokha
Kherwara Khalsa
Bhoodar
Deopura
Jogat
Gudli
2011934
2010628
1301
1239
1246
1231
2022606
Elevation amsl (m)
Distance (Km)
Legend
Water table
Fault
Well ID with Village name
Top Soil
Phyllite
Schist
Quartzite
Gneiss
D
MAHI RIVER BASIN
Cross section along D-D'
D'
PLATE - XXII
Lalpura
Ramsar Bara
Bhemal
Sagwara (M)
Ruki
Gomti River
Salumber
Okhariya
Baleecha
Loonanda
Jalodia Jageer
2032259
2032445
2031268
2019805
2026443
2028554
1186
1288
2033971
2004155
Elevation amsl (m)
Distance (Km)
Legend
Water table
Fault
Well ID with Village name
Top Soil
Limestone
Shale
Phyllite
Schist
Gneiss

Section E-E':

The E-E' section is plotted connecting wells in SW – NE direction in the south eastern part of the basin (Plate – XVIII and Plate – XXIII). Lithologs of 10 boreholes were used to prepare this cross section. The section reveals a predominantly phyllitic and gneissic sub-surface. The northeastern part has thin layer of alluvial material (upto a maximum of 40m thickness) but having been made of clay, does not have any promising aquifers. The SW part of the section is characterized by presence of phyllite. The weathered and fractured portions of phyllite and gneiss are expected to constitute aquifer zones.

It is observed from pre monsoon 2010 data the ground water table varies from 170 m amsl to 490 m amsl. The depth to water level is indicates occurrence of ground water at shallow depths.

PLATE - XXIII


E
MAHI RIVER BASIN
E'
Cross section Along E-E'
Elevation amsl (m)
Distance (Km)
Gangar Talai Jooni
Bheelkua
Heran River
Barigama
Ganaoo
Sompur
Mahi River
Semliya
Erau River
Pratapgarh (M)
2007374
2037316
2031167
2038891
2043346
2009768
2008987
Legend
Water table
Well ID with Village name
Top Soil
Clay
Basalt
Phyllite
Gneiss

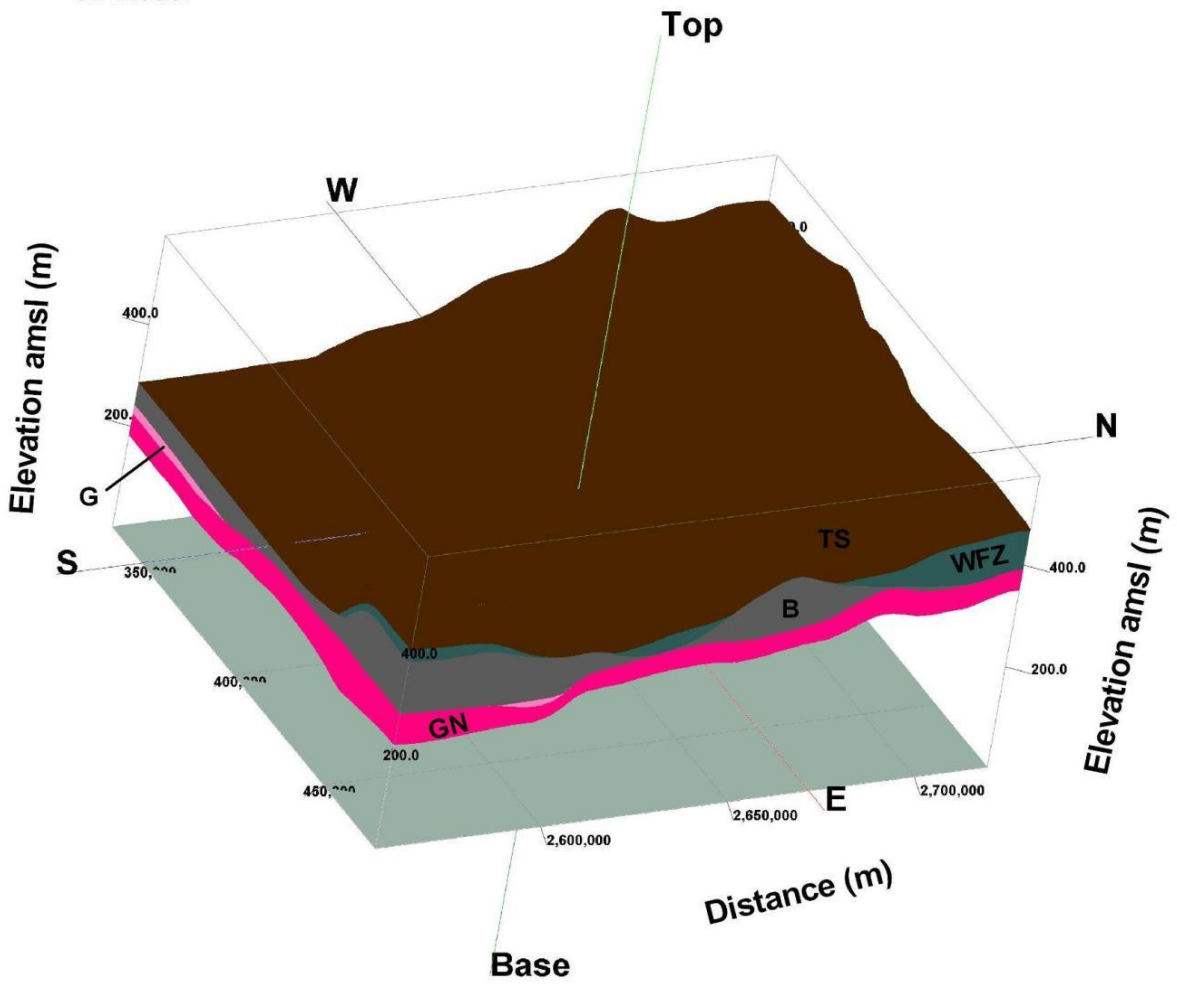
3D MODEL OF AQUIFERS

MAHI RIVER BASIN

The continuous litho-stratigraphic model has been prepared for the Mahi River Basin and presented in Plate XXIV. 3D model is one of the presentation methods depicting the sub-surface aquifer disposition of litho-stratigraphic units forming aquifers, aquicludes and aquitards in the area. The 3D model presents various litho-stratigraphic units in the entire river basin. With this model it is apparent that in north eastern part a thick weathered and fractured zone is present which forms very porous aquifers. No alluvial formation is encountered in the area i.e., the basin is predominantly a hard rock terrain. A significant phyllite formation is present in the southern and eastern part of the area. Gneiss is encountered in eastern and south western part of the area. Granite is the basement rock occurring in the basin which is not been encountered in the wells of southern part.

PLATE - XXIV

MAHI RIVER BASIN
3D Model



Legend

TS	Top Soil
C	Clay
WFZ	Weathered & Fractured Zone
B	Basalt
Q	Quartzite
Ph	Phyllite
Sc	Schist
G	Granite
GN	Granite Gneiss

Glossary of terms

S. No.	Technical Terms	Definition
1	AQUIFER	A saturated geological formation which has good permeability to supply sufficient quantity of water to a Tube well, well or spring.
2	ARID CLIMATE	Climate characterized by high evaporation and low precipitation.
3	ARTIFICIAL RECHARGE	Addition of water to a ground water reservoir by man-made activity
4	CLIMATE	The sum total of all atmospheric or meteorological influences principally temperature, moisture, wind, pressure and evaporation of a region.
5	CONFINED AQUIFER	A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.
6	CONTAMINATION	Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.
7	DRAWDOWN	The drawdown is the depth by which water level is lowered.
8	FRESH WATER	Water suitable for drinking purpose.
9	GROUND WATER	Water found below the land surface.
10	GROUND WATER BASIN	A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.
11	GROUND WATER RECHARGE	The natural infiltration of surface water into the ground.
12	HARD WATER	The water which does not produce sufficient foam with soap.
13	HYDRAULIC CONDUCTIVITY	A constant that serves as a measure of permeability of porous medium.
14	HYDROGEOLOGY	The science related with the ground water.
15	HUMID CLIMATE	The area having high moisture content.
16	ISOHYET	A line of equal amount of rainfall.
17	METEOROLOGY	Science of the atmosphere.
18	PERCOLATION	It is flow through a porous substance.
19	PERMEABILITY	The property or capacity of a soil or rock for transmitting water.
20	pH	Value of hydrogen-ion concentration in water. Used as an indicator of acidity (pH < 7) or alkalinity (pH > 7).
21	PIEZOMETRIC HEAD	Elevation to which water will rise in a piezometers.
22	RECHARGE	It is a natural or artificial process by which water is added from outside to the aquifer.
23	SAFE YIELD	Amount of water which can be extracted from ground water without producing undesirable effect.
24	SALINITY	Concentration of dissolved salts.
25	SEMI-ARID	An area is considered semiarid having annual rainfall between 10-20 inches.
26	SEMI-CONFINED AQUIFER	Aquifer overlain and/or underlain by a relatively thin semi-pervious layer.
27	SPECIFIC YIELD	Quantity of water which is released by a formation after its complete saturation.
28	TOTAL DISSOLVED SOLIDS	Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.

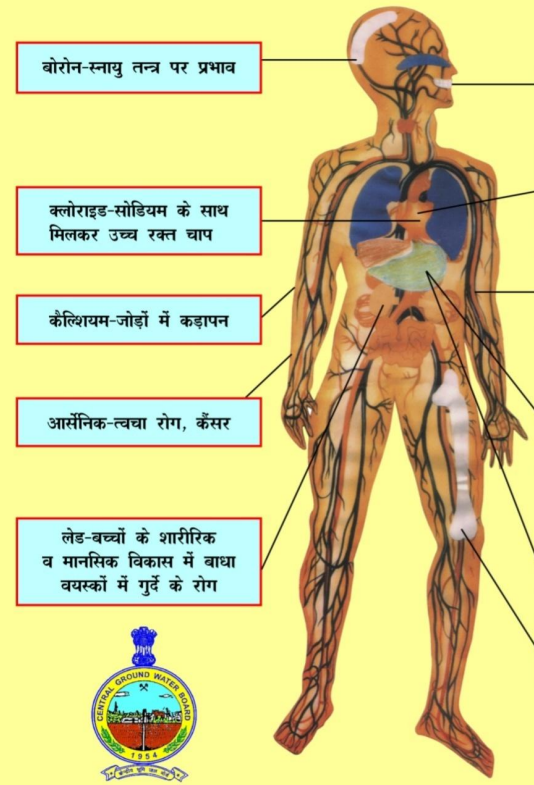
(Contd…)

S. No.	Technical Terms	Definition
29	TRANSMISSIBILITY	It is defined as the rate of flow through an aquifer of unit width and total saturation depth under unit hydraulic gradient. It is equal to product of full saturation depth of aquifer and its coefficient of permeability.
30	UNCONFINED AQUIFER	A water bearing formation having permeable overburden. The water table forms the upper boundary of the aquifer.
31	UNSATURATED ZONE	The zone below the land surface in which pore space contains both water and air.
32	WATER CONSERVATION	Optimal use and proper storage of water.
33	WATER RESOURCES	Availability of surface and ground water.
34	WATER RESOURCES MANAGEMENT	Planned development, distribution and use of water resources.
35	WATER TABLE	Water table is the upper surface of the zone of saturation at atmospheric pressure.
36	ZONE OF SATURATION	The ground in which all pores are completely filled with water.
37	ELECTRICAL CONDUCTIVITY	Flow of free ions in the water at 25C mu/cm.
38	CROSS SECTION	A Vertical Projection showing sub-surface formations encountered in a specific plane.
39	3-D PICTURE	A structure showing all three dimensions i.e. length, width and depth.
40	GWD	Ground Water Department
41	CGWB	Central Ground Water Board
42	CGWA	Central Ground Water Authority
43	SWRPD	State Water Resources Planning Department
44	EU-SPP	European Union State Partnership Programme
45	TOPOGRAPHY	Details of drainage lines and physical features of land surface on a map.
46	GEOLOGY	The science related with the Earth.
47	GEOMORPHOLOGY	The description and interpretation of land forms.
48	PRE MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer before Monsoon (carried out between 15th May to 15th June)
49	POST-MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer after Monsoon (carried out between 15th October to 15th November)
50	PIEZOMETER	A non-pumping small diameter bore hole used for monitoring of static water level.
51	GROUND WATER FLUCTUATION	Change in static water level below ground level.
52	WATER TABLE	The static water level found in unconfined aquifer.
53	DEPTH OF BED ROCK	Hard & compact rock encountered below land Surface.
54	G.W. MONITORING STATION	Dug wells selected on grid basis for monitoring of state water level.
55	EOLIAN DEPOSITS	Wind-blown sand deposits

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

भूजल में घुले मुख्य तत्वों की अधिकता का मानव शरीर पर दुष्प्रभाव



- बोरोन-स्नायु तन्त्र पर प्रभाव
- क्लोराइड-सोडियम के साथ मिलकर उच्च रक्त चाप
- कैल्शियम-जोड़ों में कड़ापन
- आर्सेनिक-त्वचा रोग, कैंसर
- लेड-बच्चों के शारीरिक व मानसिक विकास में बाधा वयस्कों में गुर्दे के रोग
- फ्लोराइड - दंत क्षरण
- सोडियम-हृदय, गुर्दा व रक्त परिसंचरण रोगों से ग्रसित लोगों को हानिकारक
- नाइट्रेट-नवजात शिशुओं में ब्लू बेबी बीमारी (मेथमोग्लोबिनिमिया)
- सल्फेट-अधिकता में मैग्नेशियम के साथ मिलकर दस्तावर
- आयरन-आयरन जीवाणु से आमाशय संबंधी रोग
- फ्लोराइड-जोड़ों में अकड़न, हड्डियों में मुड़ाव

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पश्चिमी क्षेत्र, जयपुर
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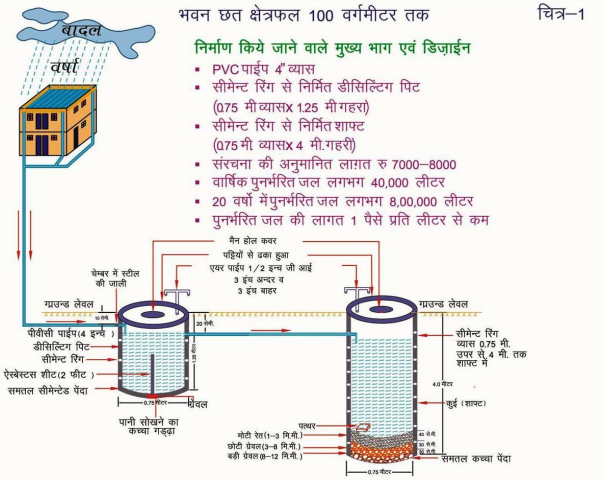
भूजल अमूल्य है इसे प्रदूषित न करें।

चित्र–1

भवन छत क्षेत्रफल 100 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 7000–8000
- वार्षिक पुनर्भरित जल लगभग 40,000 लीटर
- 20 वर्षों में पुनर्भरित जल लगभग 8,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

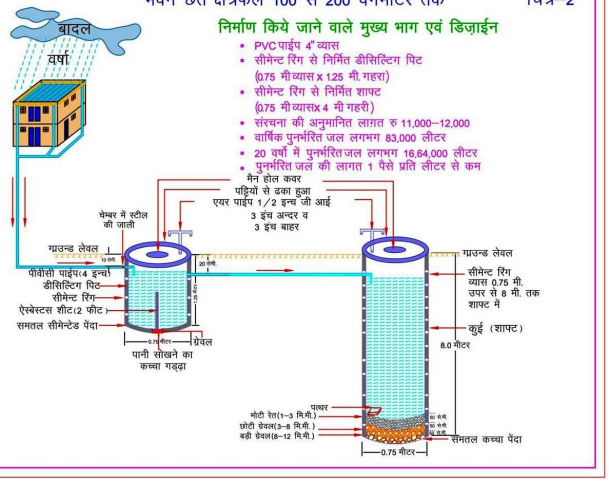


चित्र–2

भवन छत क्षेत्रफल 100 से 200 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी. गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी गहरी)
- संरचना की अनुमानित लाग़त रु 11,000–12,000
- वार्षिक पुनर्भरित जल लगभग 83,000 लीटर
- 20 वर्षों में पुनर्भरित जल लगभग 16,64,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

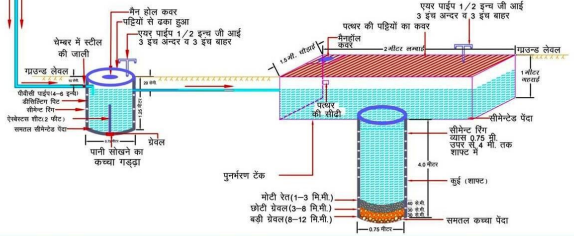


चित्र–3

भवन छत क्षेत्रफल 200 से 300 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4"– 6" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 2 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 15,000–16,000
- वार्षिक पुनर्भरित जल लगभग 1,25,000 लीटर
- 20 वर्षों में पुनर्भरित जल लगभग 25,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

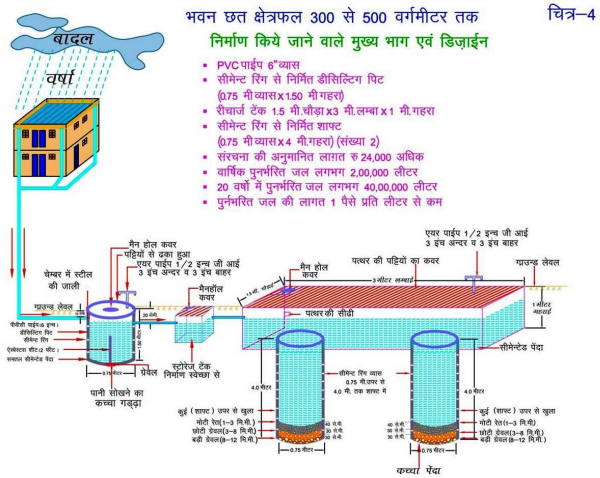


चित्र–4

भवन छत क्षेत्रफल 300 से 500 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 6" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.50 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 3 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरा) (संख्या 2)
- संरचना की अनुमानित लाग़त रु 24,000 अधिक
- वार्षिक पुनर्भरित जल लगभग 2,00,000 लीटर
- 20 वर्षों में पुनर्भरित जल लगभग 40,00,000 लीटर
- पुर्नभरित जल की लागत 1 पैसे प्रति लीटर से कम



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Myths and Facts about Ground Water

S No	Myths	Facts
1	What is Ground Water • an underground lake • a net work of underground rivers • a bowl filled with water	Water which occurs below the land in geological formations/rocks is Ground water
2	Ground Water occurs everywhere beneath the Land Surface	Not really, it depends on the nature of rock formation
3	There is a relationship between ground water and surface water	Not all the places. Near streams/rivers there is relation
4	Groundwater is not renewable resource	It is renewable source and every year it is being recharged through rain/applied irrigation etc
5	Ground water is unlimited and deeper you drill more discharge	It is limited to annual recharge from rain/applied irrigation. The discharge may not increase if you go deeper
6	Ground Water moves rapidly	The movement of ground water is very slow
7	Ground water pumped from wells is thousands of years old	Generally the ground water being tapped through wells is a few years old
8	If water taste good—it is safe to drink	It may have other chemicals e.g. fluoride, nitrates etc which are harmful
9	Water from free flowing tube wells is very pure	This water can also be contaminated so test before use
10	If I recharge my TW/DW/HP it will not benefit me	It will also benefit you and also adjoing wells
11	There is no static ground water resources in Rajasthan	Rajasthan is also having Static GW resources, and being tapped in most of areas as GW annual withdrawal is more than annual recharge
12	I cannot meet annual cooking and drinking water requirement by rain water harvesting	The water requirement for drinking and cooking is only 8 lit/day. You can harvest this water for family of 5 persons from roof top or paved area of 75 Sq m to meet annual requirement
13	You can increase ground water recharge	This can be done by harvesting the rain water and storing in sub surface reservoir (GW) by constructing the recharge structures
14	You cannot use abandoned TW/HP/DW for ground water recharge	These should be used as recharge structures as harvested rain water is directly put into GW reservoir
15	Putting waste near HP/TW will not cause any problem	Such actions will pollute wells and water

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