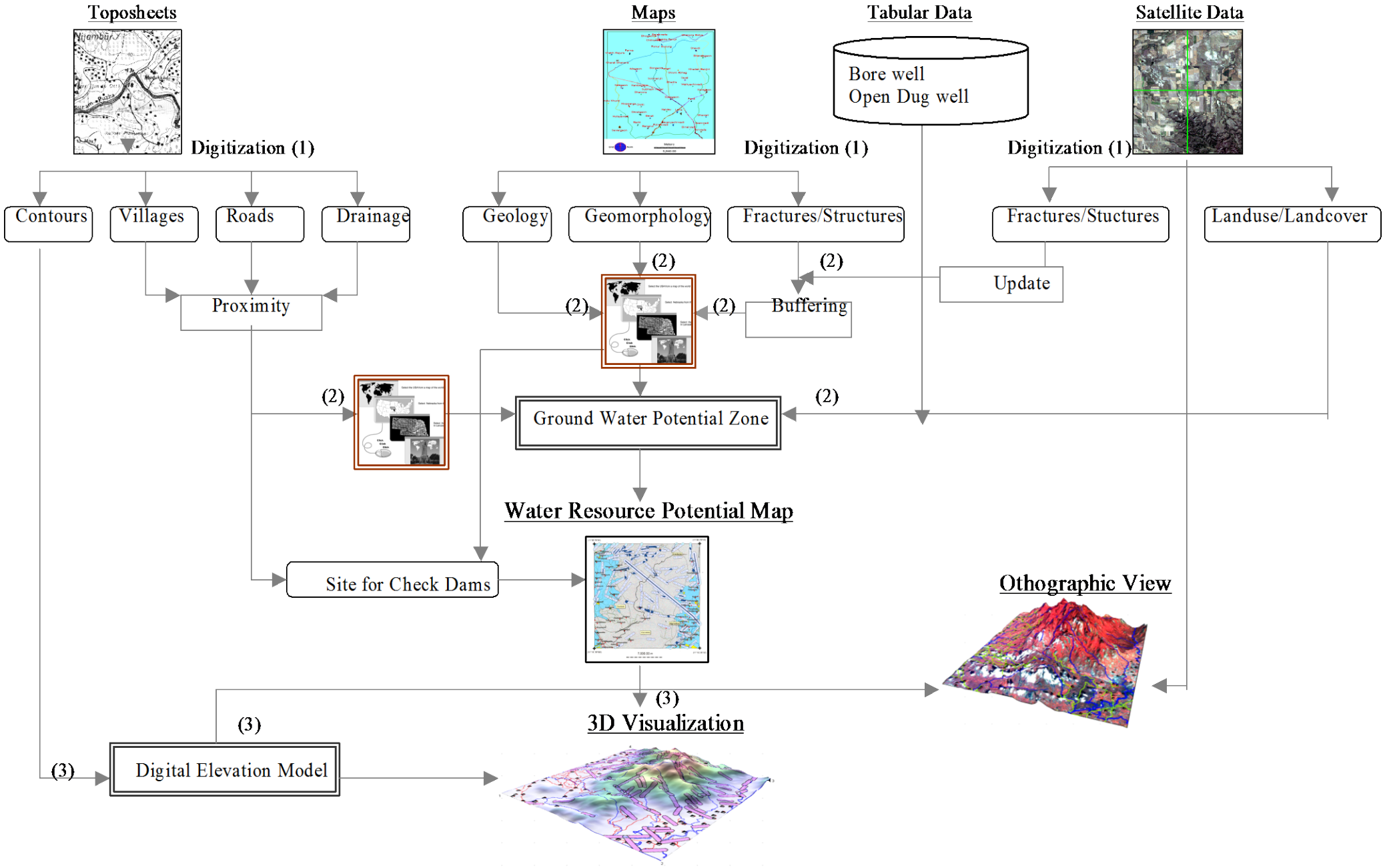
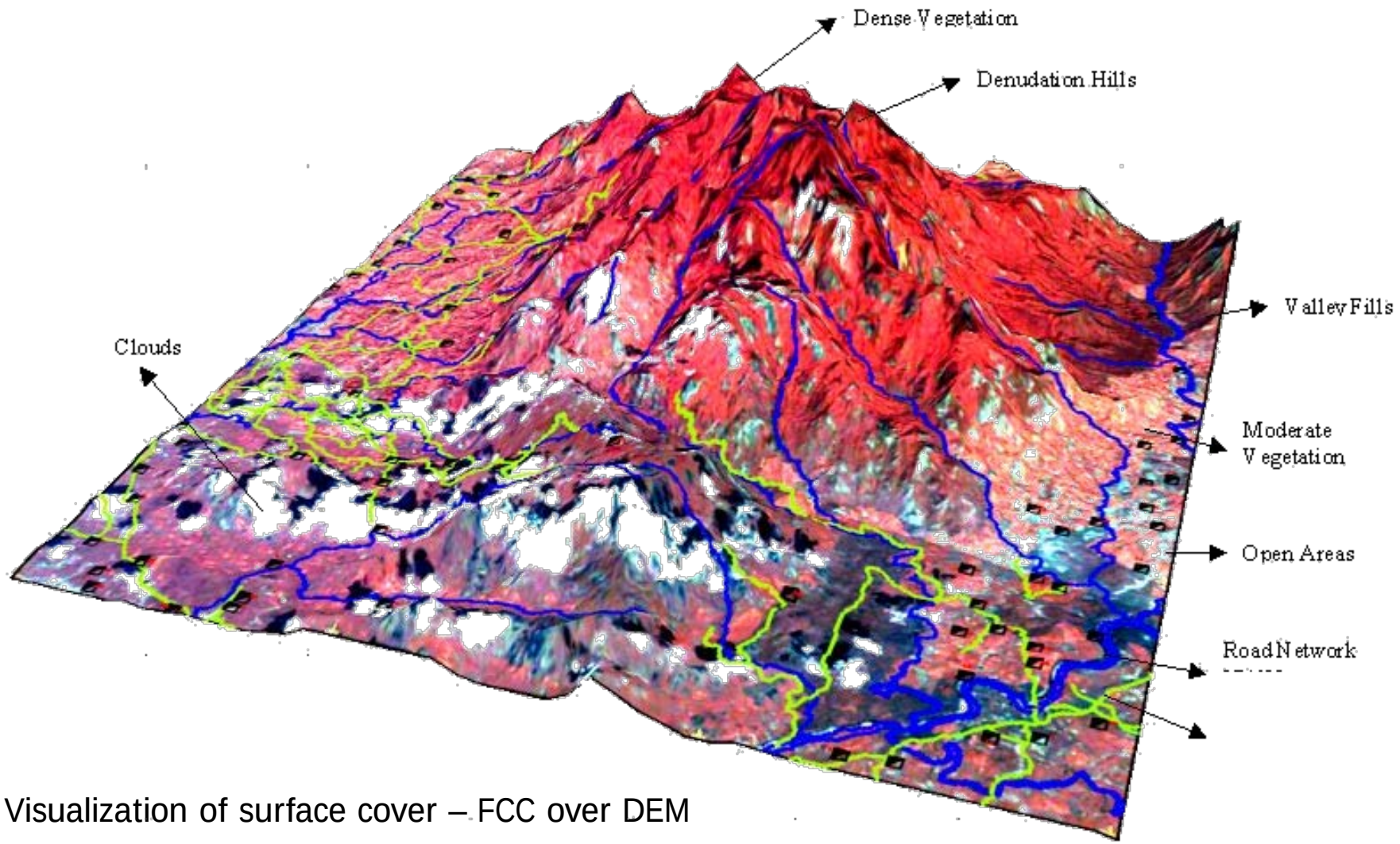
Groundwater Potential Mapping



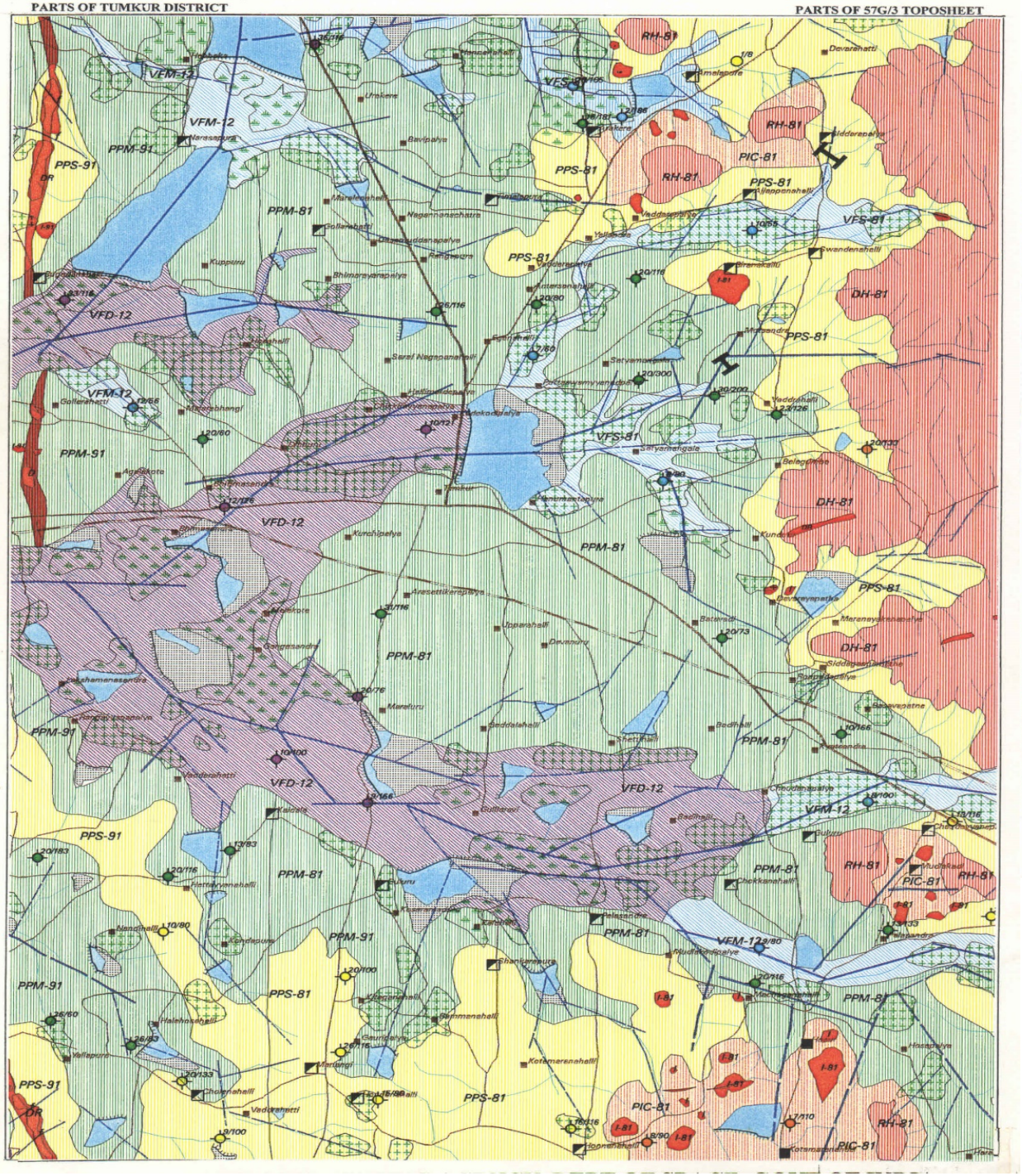
Flow chart showing the methodology

Data Formats : (1) AutoCAD Drawing Files (2) ARC Info Coverages (3) Surfer GRID Files



3D Visualization of surface cover – FCC over DEM

This visual, shows the aerial view of the area. Perspective view of the terrain was generated using Digital elevation model was superimposed with the IRS false color image and the road network and drainage layers, generated using GIS.



COLOUR	YIELD RANGE OF WELLS	DEPTH RANGE OF WELLS		
		SHALLOW < 30 M	MODERATE 30-80 M	DEEP >80 M
	> 800 LPM			
	400-800 LPM			
	200-400 LPM			
	100-200 LPM			
	50-100 LPM			
	10-50 LPM			
	Prospects limited to valley portions only (HILLS & PLATEAUX)			
	Run off zones/Barriers (Linear Ridge/Dyke Ridge/Inselberg)			

SYMBOL	DESCRIPTION
	RIVER / STREAM
	WATER BODY / SPRING
	CANAL
NH-7	NATIONAL HIGHWAY
SH-9	STATE HIGHWAY
	METALLED ROAD
	UNMETALLED ROAD
	RAILWAY
	SETTELMENTS : CITY / VILLAGE
	HABITATIONS : NOT COVERED / PARTLY COVERED
	BOUNDERY : INTERNATIONAL
	STATE
	DISTRICT
	TALUK / TAHSIL

Groundwater prospect map

(Source: NRSC Hyderabad)

DESCRIPTION	SYMBOL
CANAL/TANK IRRIGATED AREA	
GROUND WATER IRRIGATED AREA	
RAIN GUAGE STATION (with average annual rainfall in mm)	

RECHARGE STRUCTURES

PERCOLATION TANK — CHECK DAM

SUB-SURFACE DYKE — INVERT WELL

DESILTING OF TANK — RECHARGE PIT

WELLS OBSERVED

YIELD RANGE IN LPM	BORE/ TUBE WELL	YIELD RANGE IN M3/DAY	DUG WELL/ RING WELL
> 800 LPM	15/70	>400 cu.m/day	8/15
400-800 LPM	15/70	200-400 cu.m/day	8/15
200-400 LPM	15/70	100-200 cu.m/day	8/15
100-200 LPM	15/70	50-100 cu.m/day	8/15
50-100 LPM	15/70	25-50 cu.m/day	8/15
10-50 LPM	15/70	5-25 cu.m/day	8/15
<10 LPM	15/70	< 5 cu.m/day	8/15

DEPTH TO WATER TABLE AND TOTAL DEPTH OF WELL ARE INDICATED ABOVE THE SYMBOL IN METERS.

DUG-CUM-BORE WELL — HAND PUMP WELL

GROUND WATER PROSPECTS

MAP UNIT (HYDROGEO-MORPHIC UNIT)	GEOLOGICAL SEQUENCE/ ROCK TYPE	GEOMORPHIC UNIT/LANDFORM	DEPTH TO WATER TABLE (IN METERS)	RECHARGE CONDITIONS	AQUIFER MATERIAL	TYPE OF WELLS SUITABLE	DEPTH RANGE OF WELLS (SUGGESTED)	YIELD RANGE OF WELLS	HOMOGENITY IN THE AQUIFER &SUCCESS RATE OF WELLS	QUALITY OF WATER	GROUND WATER IRRIGATED AREA	RECHAGE STRUCTURES SUITABLE & PRIORITY	REMARKS
			No OF WELLS OBSERVED	BASED ON AVAILABILITY OF WATER (RAINFALL &OTHER SOURCES)	LS = LOOSE SEDIMENT PR =PERMEABLE ROCK FIR = FISSURED ROCK FR =FRACTURED ROCK WR = WEATHRED ROCK IR = IMPERVIOUS ROCK	DW = DUGWELL BW =BORE WELL DBW=DUG-CUM BORE WELL DTW=DUG-CUM TUBE WELL RW =RING WELL	MIN-MAX (IN METERS)	(EXPECTED) (IN LPM OR CU.M/DAY)	VERY HIGH HIGH MODERATE LOW	POTABLE (P) NOT POTABLE (NP)	(RANGE IN %)	PT =PERCOLATION TANK CD =CHECK DAM SD =SUB-SURFACE DYKE IW =INVERT WELL D=DESILTING OF TANK R =RECHARGE PIT	(PROBLEMS / LIMITATIONS)
VFD-12	QUARTERNARY SEDIMENTS — ALLUVIUM (12) (SAND & SILT DOMINANT)	VALLEY FILL DEEP (VFD) (20-30 M)	7-10 M / 6 wells	GOOD	L S	T W	20-40	400-600	HIGH	p	25-30%	PT & FP VERY HIGH	VALLEY FILL IS SHALLOW ALONG PERIPHERAL ZONES. EXPLOITATION OF GROUND-WATER IS VERY HIGH.
VFM-12		VALLEY FILL MODERATE (VFM) (10-20 M)	8-12 M / 2wells	GOOD	L S + WR	TW /BW	50-60	200-400	MODERATE	P	10-20%	PT & FP HIGH	VALLEY FILL AND THE UNDERLYING WEATHERED ZONE TOGETHER FORM THE AQUIFER. EXPLOITATION OF GROUND WATER IS MORE.
VFS -81	CLOSPET GRANITE — PINK & GREY GRANITE (81)	VALLEY FILL SHALLOW (VFS) (5-10 Mtrs)	10-15 M / 3wells	GOOD	LS + WR	B W	40-60	200-300	LOW	P	10-15%	PT HIGH	VALLEY FILL AND THE UNDERLYING WEATHERED ZONE TOGETHER FORM THE AQUIFER.CASING IS REQUIRED UPTO 10-15 MTRS.
PPM-81		PEDIPLAIN MODERATELY WEATHERED (PPM) (10-20 Mtrs)	20-30 M / 11 wells	MODERATE	WR+FIR	B W	90-100	100-200	Moderate	p	2-5%	C D/PT	WEATHERING IS NOT UNIFORM.IN GENERAL CASING IS REQUIRED UPTO 10-16 MTRS.
PPS -81		PEDIPLAIN SHALLOW WEATHERED (PPS) (8-10 MTRS)	10-20 M / 4 WELLS	MODERATE	FIR	B W	100-120	50-100	LOW	P	2-5%	C D/PT	LOW SUCCESS RATE OF WELLS DUE TO SHALLOW WEATHERING. FRACTURE ZONES ARE MORE SUITABLE FOR GROUND WATER DEVELOPMENT
PIC-81		PEDIMENT INSELBERG COMPLEX (PIC) (5-8 MTRS)	8-12 M / 2 wells	LIMITED	FIR	B W	100-110	10-50	LOW	P	— —	C D/PT	INSELBERGS ACT AS RUN OFF ZONES. PROSPECTS LIMITED TO PEDIMENT PART ONLY.FRACTURE ZONES MORE SUITABLE FOR GROUND WATER DEVELOPMENT.
I-81		INSELBERG (I)	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	RUN OFF ZONE.
RH-81		RESIDUAL HILL (81)	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	MAINLY RUN OFF ZONE. PROSPECTS LIMITED TO VALLEY PORTIONS ONLY.
DH-81		DENUDATIONAL HILL (81)	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	MAINLY RUN OFF ZONE. PROSPECTS LIMITED TO VALLEY PORTIONS ONLY.
DR	DOLERITE DYKE	DYKE RIDGE (DR)	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	ACT AS BARRIER FOR GROUND WATER DEVELOPMENT.
PPM-91	PENINSULAR GNEISSIC COMPLEX — BIOTITE & HORNBLENDE GNEISS (91)	PEDIPLAIN MODERATELY WEATHERED (PPM) 10-20 Mtrs	20-30 M / 6 WELLS	MODERATE	FIR	B W	90-100	100-200	Moderate	P	1-2%	C D/PT	WEATHERING IS NOT UNIFORM.IN GENERAL CASING IS REQUIRD UPTO 10-15 MTRS.
PPS-91		PEDIPLAIN SHALLOW WEATHERED (PPS) (7-10 MTRS)	10-20 M / 2 WELLS	MODERATE	FIR	B W	100-120	50-100	LOW	P	1-2%	C D/PT	LOW SUCCESS RATE OF WELLS DUE TO SHALLOW WEATHERING. FRACTURE ZONES ARE MORE SUITABLE FOR GROUND WATER DEVELOPMENT
I-91		INSELBERG (I)	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	RUN OFF ZONE.

N.B. The yield ranges are tentative and ground water prospects are generalised for entire unit excluding the fracture/ lineament zones, where yields would be higher with better success rate of wells especially in hard rocks. The fractures / lineaments which are clearly observed / inferred are indicated on the map. There could be some obscured fractures which also influence the ground water prospects. This map may be used for narrowing down the target zones and selection of sites on the ground should be done based on followup ground hydrgeological / geophysical surveys.

GROUND WATER PROSPECTS INFORMATION

COLOUR	YIELD RANGE OF WELLS	DEPTH RANGE OF WELLS: SHALLOW <30 M	MODERATE 30-80 M	DEEP >80 M
	> 800 LPM			
	400-800 LPM			
	200-400 LPM			
	100-200 LPM			
	50-100 LPM			
	10-50 LPM			
	PROSPECTS LIMITED TO VALLEY PORTIONS ONLY (HILLS & PLATEAUS)			
	RUN-OFF ZONES / BARRIERS (Linear Ridge/Dyke Ridge/Inselberg)			

DATA USED
1. IRS-1D LISS-3 FCC dated 14 Mar 1998
2. SOI TOPOSHEET SURVEYED IN 1971-72
3. Geological Map of Karnataka &7G on 1:2500000SCALE (PUBLISHED IN 1981-82)
4.GROUND TRUTH / WELL OBSERVATION DURING DEC 1999

HYDROLOGICAL INFORMATION

DESCRIPTION	SYMBOL
CANAL/TANK IRRIGATED AREA	
GROUND WATER IRRIGATED AREA	
RAIN GUAGE STATION (with average annual rainfall in mm)	
RECHARGE STRUCTURES: PERCOLATION TANK	CHECK DAM
SUB-SURFACE DYKE	INVERT WELL
DESILTING OF TANK	RECHARGE PIT

WELLS OBSERVED

YIELD RANGE IN LPM	BORE/ TUBE WELL	YIELD RANGE IN M3/DAY	DUG WELL/ RING WELL
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50-100 LPM	15/70	25-50 cu.m/day	8/15
10-50 LPM	15/70	5-25 cu.m/day	8/15
<10 LPM	15/70	< 5 cu.m/day	8/15

DEPTH TO WATER TABLE AND TOTAL DEPTH OF WELL ARE INDICATED ABOVE THE SYMBOL IN METERS. DUG-CUM-BORE WELL — HAND PUMP WELL

STRUCTURAL INFORMATION

DIPS IN DEGREES	BEDDING	SCHISTOSITY/ FOLIATION
GENTLE (<15)		
MODERATE (15-45)		
STEEP (45-80)		
SUB-VERTICAL (>80)		

ANTICLINE/ ANTIFORM
SYNCLINE/ SYNFORM
TREND LINE
ESCARPMENT
LITHOLOGIC/GEOMORPHIC BOUNDARY
SYMBOLS FOR GROUND WATER MOVEMENT: Major
FAULT
FRACTURE/ LINEAMENT
FRACTURE/ LINEAMENT (INFERRED)
BARRIERS FOR GROUND WATER MOVEMENT
DYKE
QUARTZ REEF / QUARTZITE BAND
PEGMATITE
(Lithologic contacts are inferred at places & geomorphic boundaries are gradational)

BASE MAP INFORMATION

SYMBOL	DESCRIPTION
	RIVER / STREAM
	WATER BODY / SPRING
	CANAL
NH-7	NATIONAL HIGHWAY
SH-9	STATE HIGHWAY
	METALLED ROAD
	UNMETALLED ROAD
	RAILWAY
	SETTLEMENTS : CITY / VILLAGE
	HABITATIONS : NOT COVERED / PARTLY COVERED
	BOUNDARY : INTERNATIONAL
	STATE
	DISTRICT
	TALUK / TAHSIL

OTHER INFORMATION

LOCATION INFORMATION

57 G/ 3

TOPOSHEET INDEX

57G/14	57G/15	57G/16
57G/10	57G/11	57G/12
57G/6	57G/7	57G/8

ADMINISTRATIVE INDEX

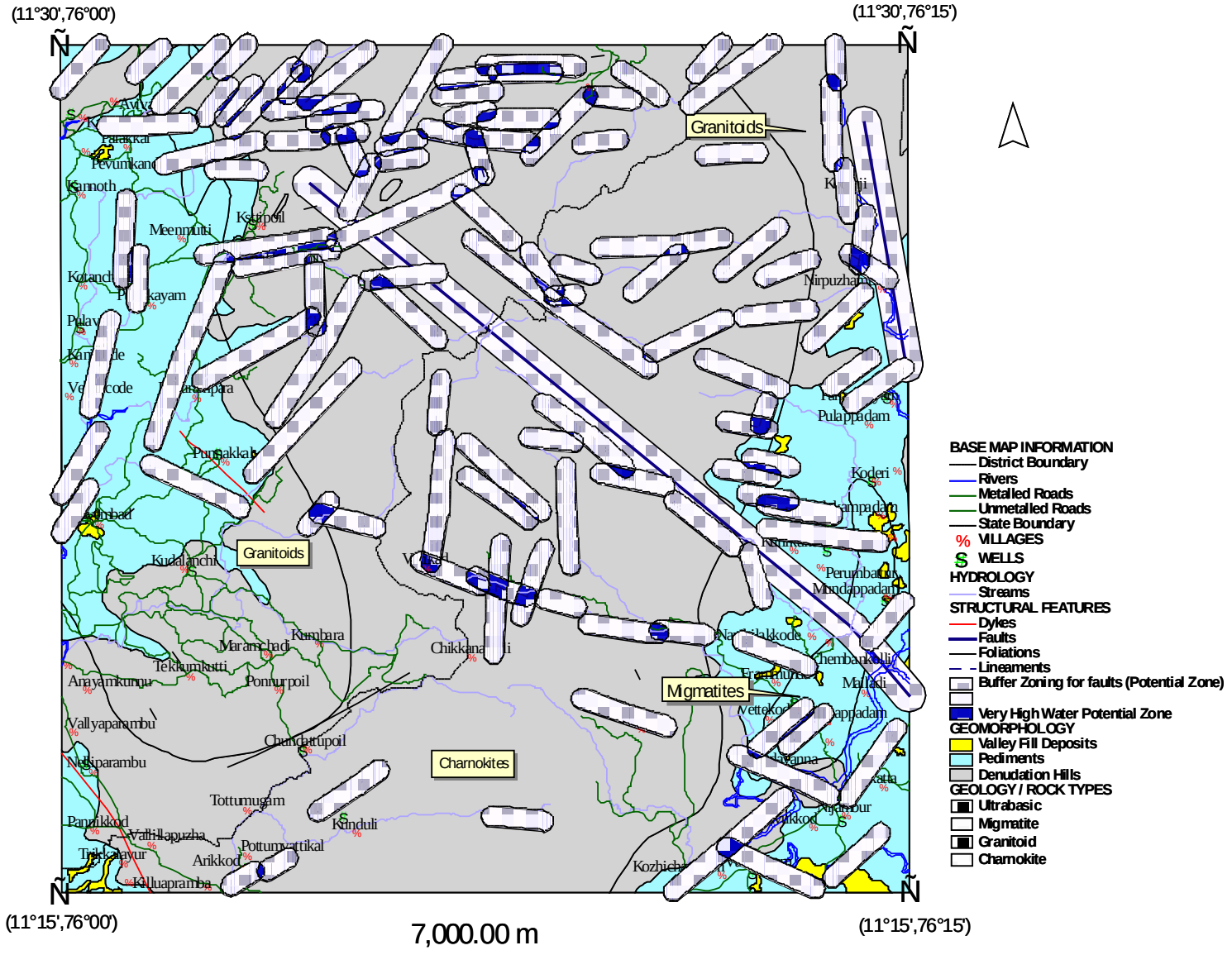
TUMKUR

PREPARED BY
NATIONAL REMOTE SENSING AGENCY
DEPT. OF SPACE, GOVT. OF INDIA
BALANAGAR ,HYDERABAD

TECHNICAL GUIDANCE / SUPERVISION
NATIONAL REMOTE SENSING AGENCY
DEPT.OF SPACE, GOVT.OF INDIA
BALANAGAR ,HYDERABAD

SPONSORED BY
RAJIV GANDHI NATIONAL DRINKING WATER MISSION
MINISTRY OF RURAL AREAS & EMPLOYMENT
GOVT.OF INDIA, NEW DELHI

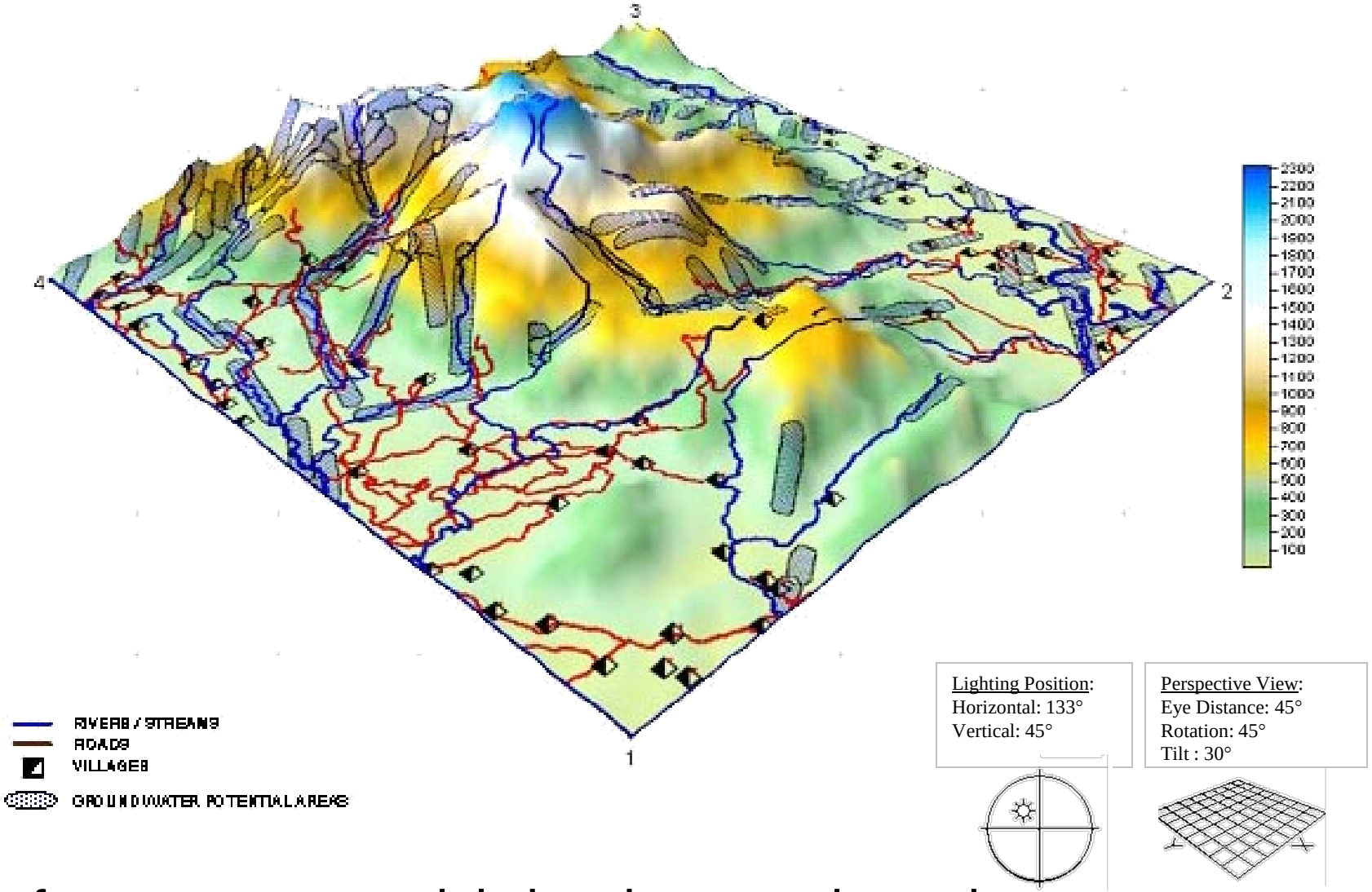
(Source: NRSC Hyderabad)



Map showing the ground water sites for exploitation

Various terrain layers (geology, geomorphology, structure, drainage, road network and settlements) were integrated using GIS. The probability ground water potential is very high at the intersection of fracture patterns in this hard rock area.

(Source: Nagarajan 2012)



Surface and Subsurface water potential sites in rugged terrain

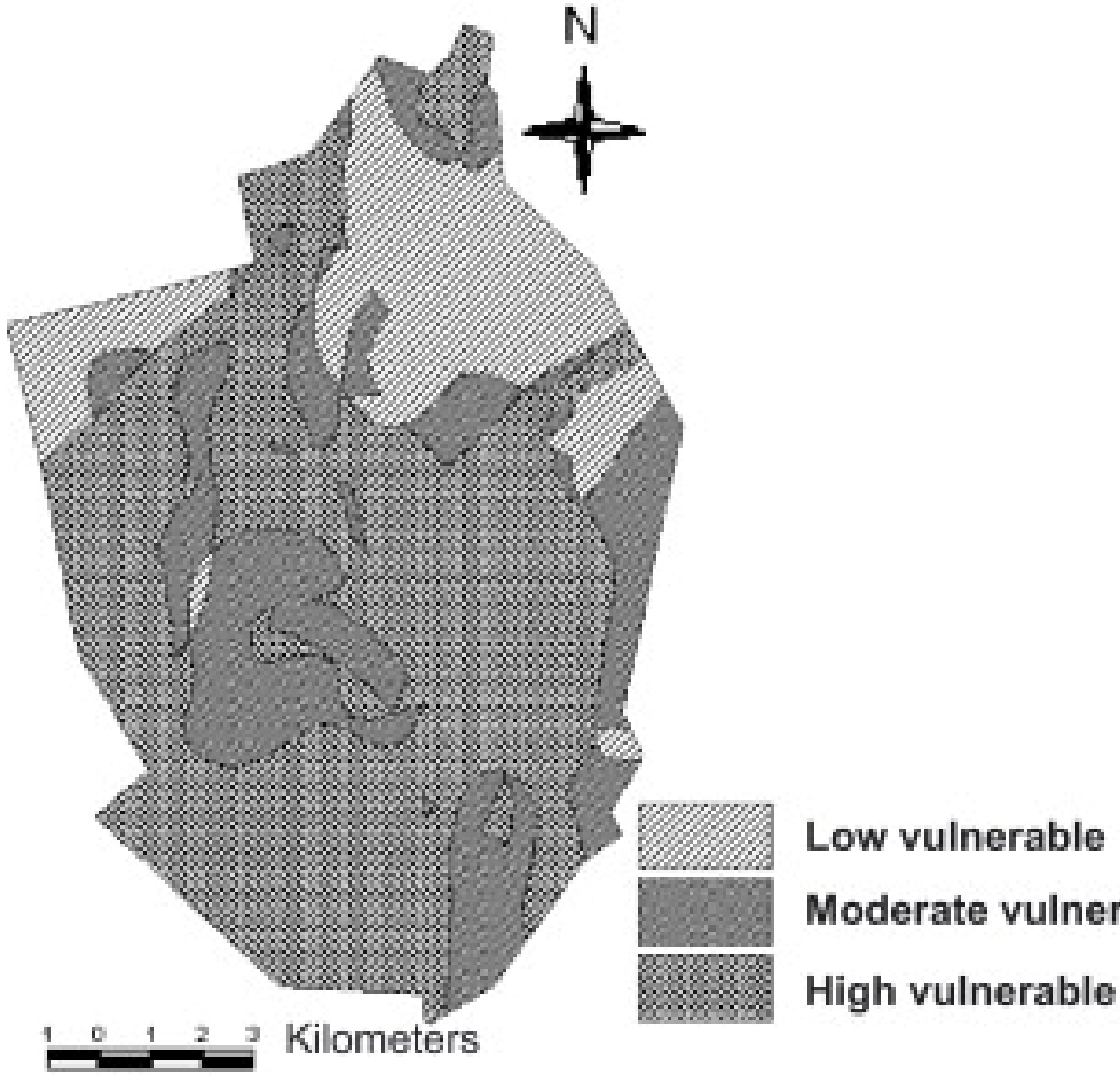
Ground water potential regions shown on a perspective mode

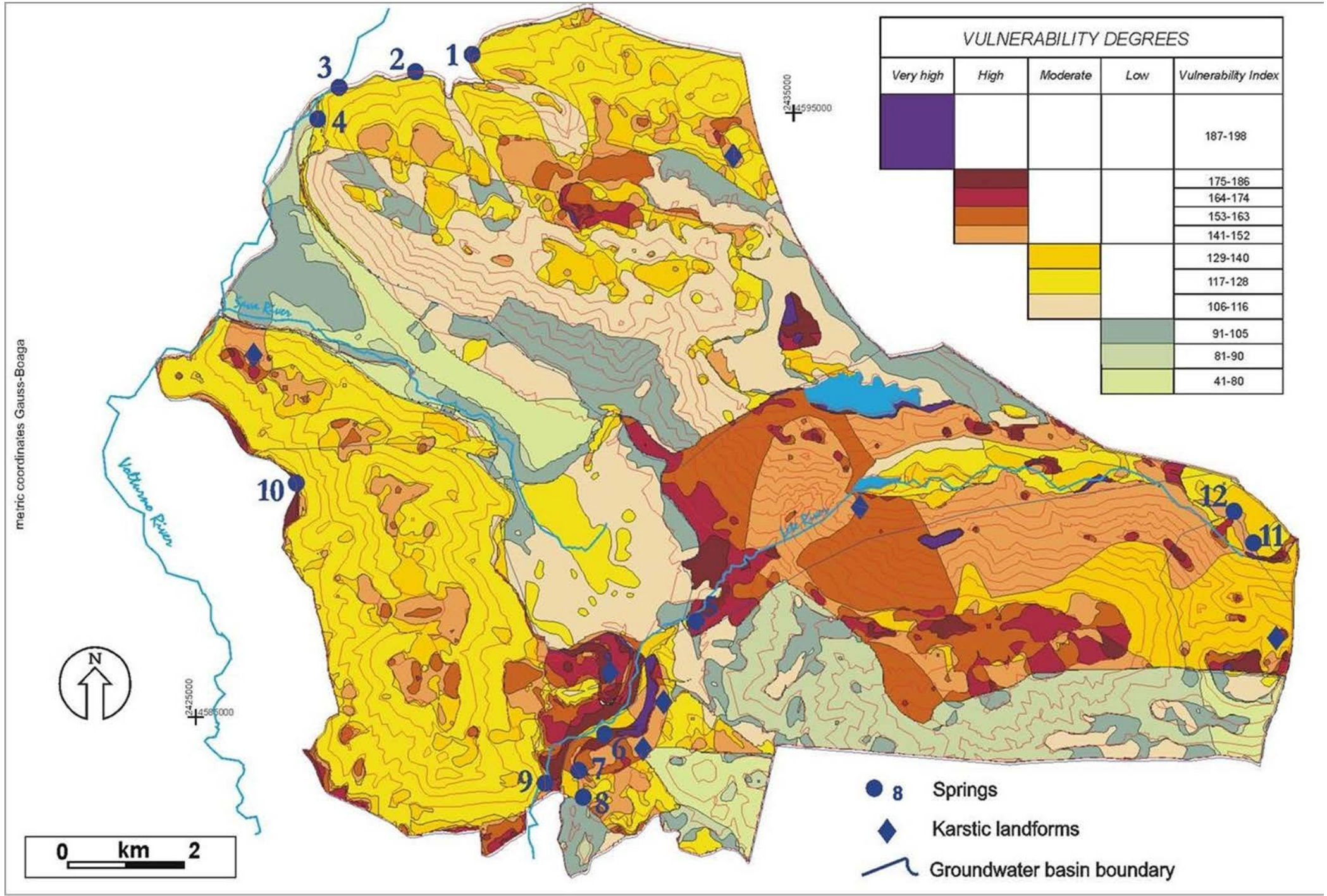
(Source: Nagarajan 2012)

DRASTIC software

Parameter	Weight
Depth to water	5
Net **R**echarge	4
Aquifer Media	3
Soil Media	2
Topography	1
Impact of Vadose Zone	5
Hydraulic **C**onductivity	3

Aquifer Vulnerability Index (AVI) Method (Van Stempvoorl et a|.,1992) is a measure of groundwater vulnerability based on i) thickness (d) of each sedimentary layer above the uppermost, saturated aquifer surface, and, ii) estimated hydraulic conductivity (K) of each of these sedimentary layers




VULNERABILITY DEGREES
Very high
High
Moderate
Low
Vulnerability Index
187-198
175-186
164-174
153-163
141-152
129-140
117-128
106-116
91-105
81-90
41-80
metric coordinates Gauss-Boaga
2435000
4595000
2425000
4585000
Sele River
Vallo River
Lete River
1
2
3
4
5
6
7
8
9
10
11
12
N
0 km 2
Springs
Karstic landforms
Groundwater basin boundary

Thank you