“Development of Open source Web GIS based geospatial application for Rural Water Supply & Sanitation (RWS&S) Department, Government of Telangana”

India Geospatial Forum 2015

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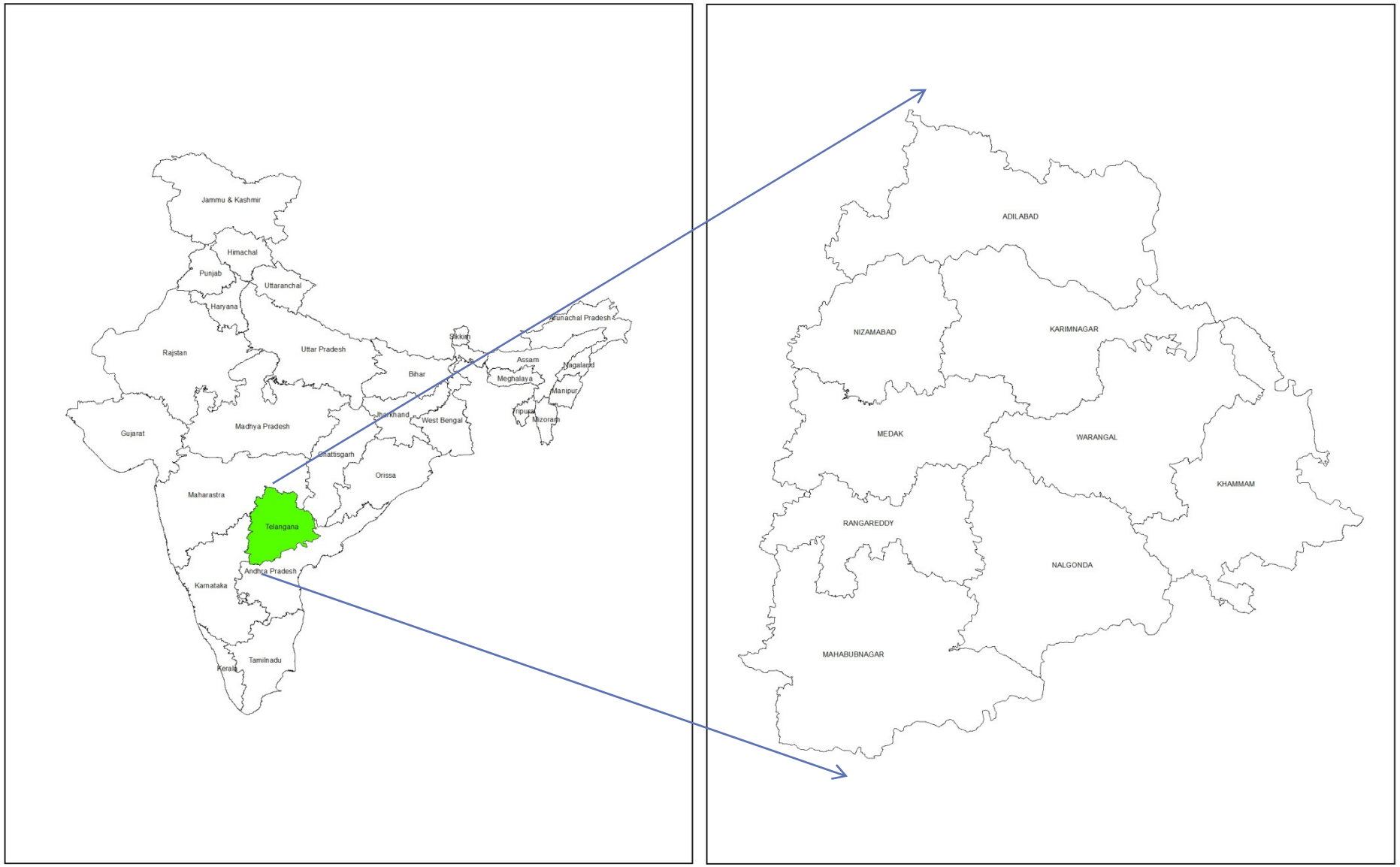
Planning Department, Govt. of Telangana

LOCATION MAP



OBJECTIVE

1. Drinking water is one of the primary requisite for planners as it is the basic necessity for one's life

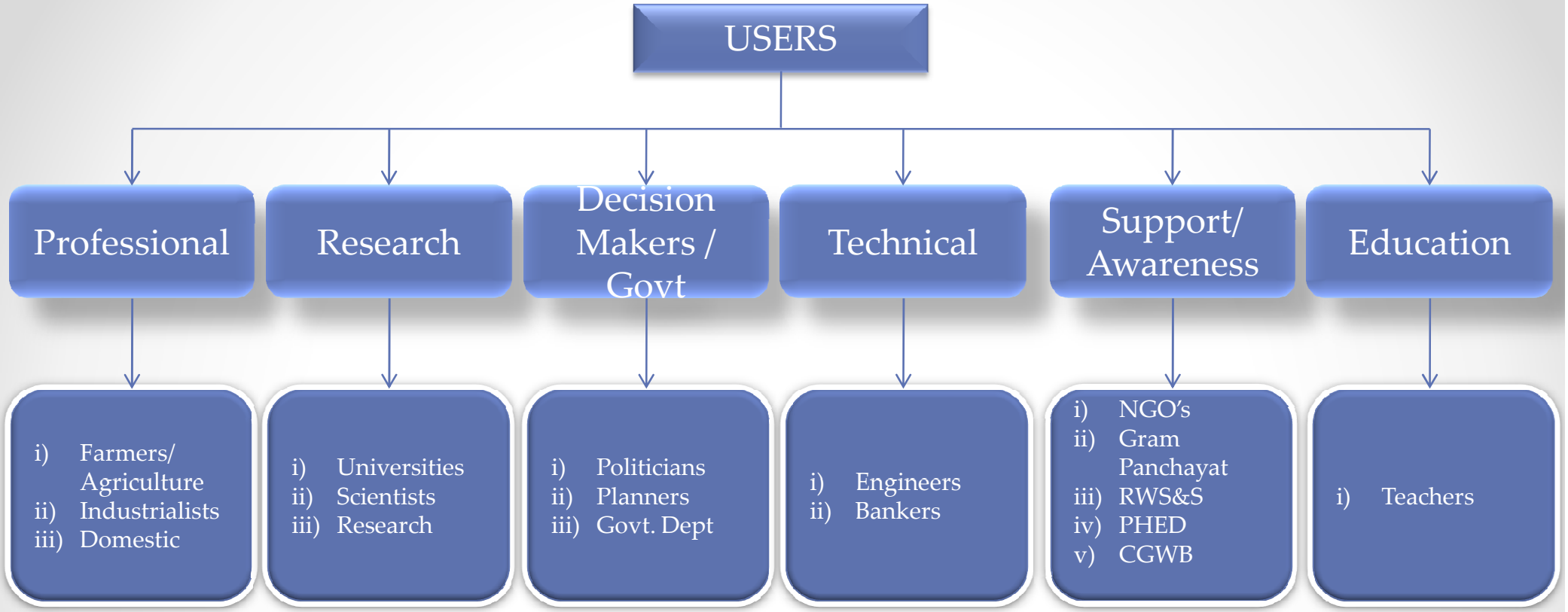
2. Mapping the Prospective zones for ground water occurrence and selection of tentative locations for constructing recharge structures

3. Mapping the status of ground water quality with respect to its suitability for human consumption

4. Development and usage of Open Source for publishing different maps of Rural Water Supply & Sanitation Department, Government of Telangana on to web portal

LIST OF MAPS PUBLISHED

1. An application for downloading Grid wise (1:50,000 scale) Ground Water Prospects Maps which are in pdf format
2. Visualization and selection of suitable sites for availability of Ground Water Prospects which were prepared using Remote Sensing & GIS techniques
3. Visualization of Average Ground Water Quality Maps at Village / Mandal / District levels for Pre and Post Monsoon seasons
4. Visualization of administrative boundaries like Circle/District, Division and Sub Division, and up to habitation level along with updated staff particulars and the status of a habitation with respect to availability for drinking in lpcd
5. Visualization of laboratories locations and its jurisdiction at Circle, Division, Sub-Division along with updated staff particulars



Issues:

1. Health
2. Pollution
3. Quality & Quantity
4. Exploitation

Target Support:

1. Teachers
2. Politicians
3. Gram Panchayat
4. Engineers

Why Open source GIS ?

Advantages

- **Cost effective**
- **Flexibility**
- **Editable**
- **Full control of developer**
- **Open to all….**

FOSS4G:
Free and Open Source Software for Geospatial

OSGEO:
The Open Source Geospatial Foundation

- **Best way to create geo-spatial enterprise at grassroots level.**

- **Very effective to enhance the range and application of geo-spatial data…**

I. Ground Water Prospects Mapping

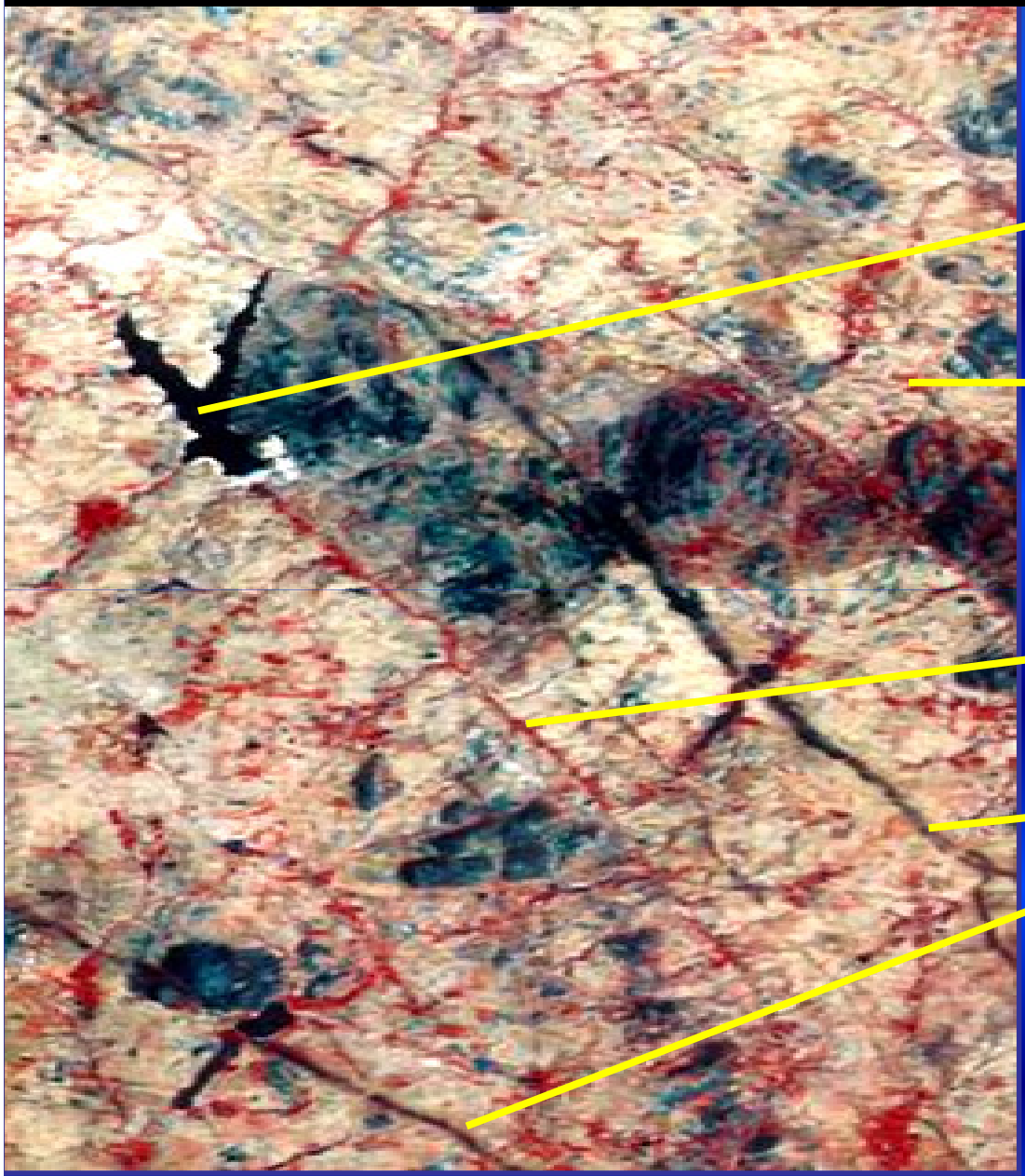
OBJECTIVE

PREPARATION OF GROUND WATER PROSPECTS MAPS –

- **Showing prospective ground water zones**
  (to facilitate selection of sites for drilling of new wells)

- **Help in planning for recharge structure**
  (Prioritizing the areas for water harvesting through different types of recharge structures)

Advantages of satellite data



Hydrologic information
(Surface water bodies)

G.W.over exploitation
(Ground water irrigated area)

Conduits for GW.movement
(Fracture / Lineament)

Barriers for G. W. movement
(Dolerite dyke)

Methodology for ground water prospects mapping

Toposheets

Satellite Data

Existing maps/Data

Source of information

On-screen interpretation of satellite data

Ground truth Data

Habitations

Litho logy

Landform

Structure-2

Waterbodies

Springs

Roads

Structure-1

Drainage

Rainfall

Railways

Canals

Wells

Admn units

Irrig. areas

Creation of layer-wise data on parameters

Integration of layers & Overlay analysis

Delineation of hydro-geomorphic units

Well Data

Hydrogeology layer (polygon)

Hydrogeology layer (Line)

Estimation of prospects

Recharge structures layer (line)

Recharge structures layer (point)

identification of site-specific RS

Lithology map

Structural map

Geomorphology map

Hydrology map

Base map

Ground water prospects map

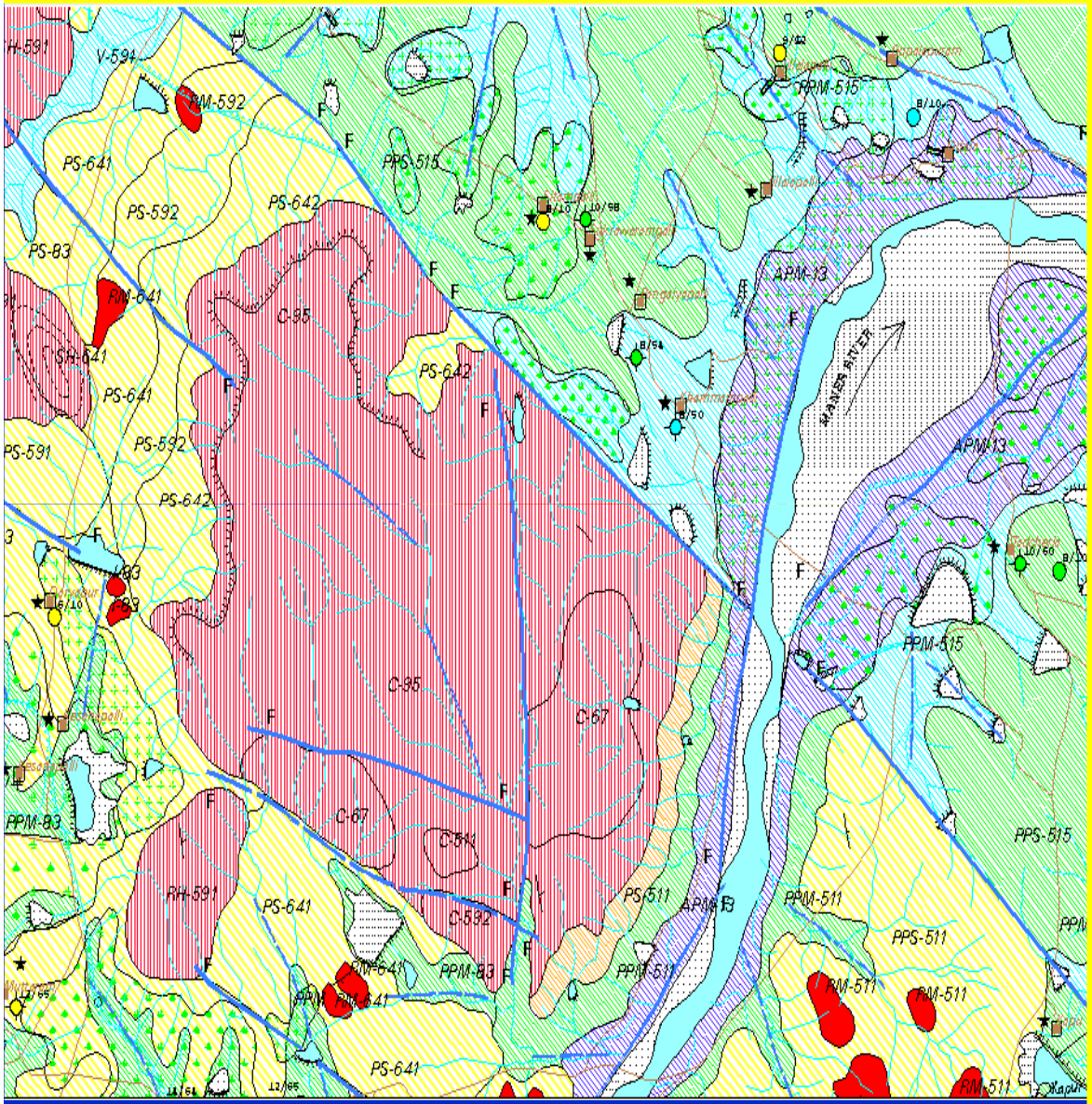
Generation of ground water prospect map

GROUND WATER PROSPECTS MAP

(PREPARED FROM SATELLITE IMAGE INTERPRETATION WITH LIMITED FIELD CHECKS)

SCALE - 1:50,000

KARIMNAGAR ADILABAD DISTRICTS ANDHRA PRADESH

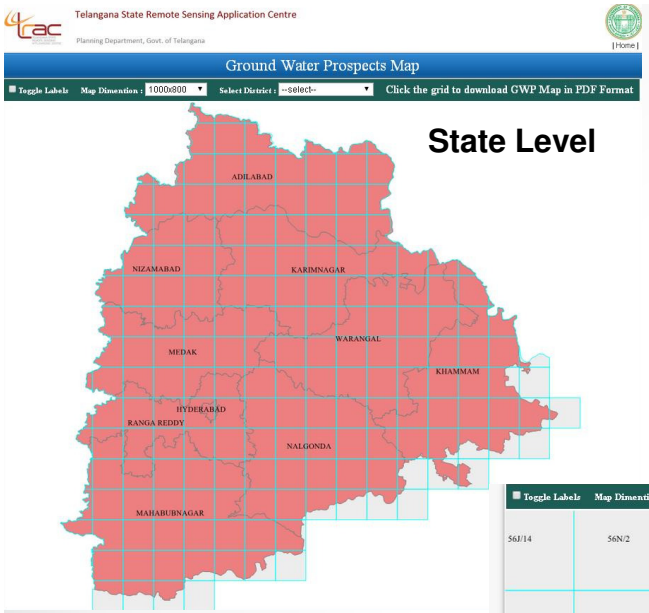


LEGEND

GROUND WATER PROSPECTS

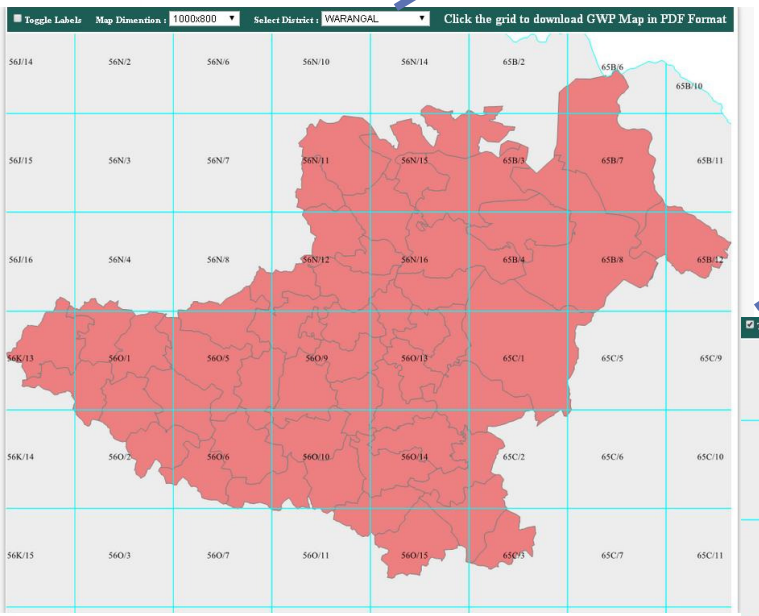
COMMON MAP INDEX

1. Downloading Ground Water Prospects Maps (.pdf)

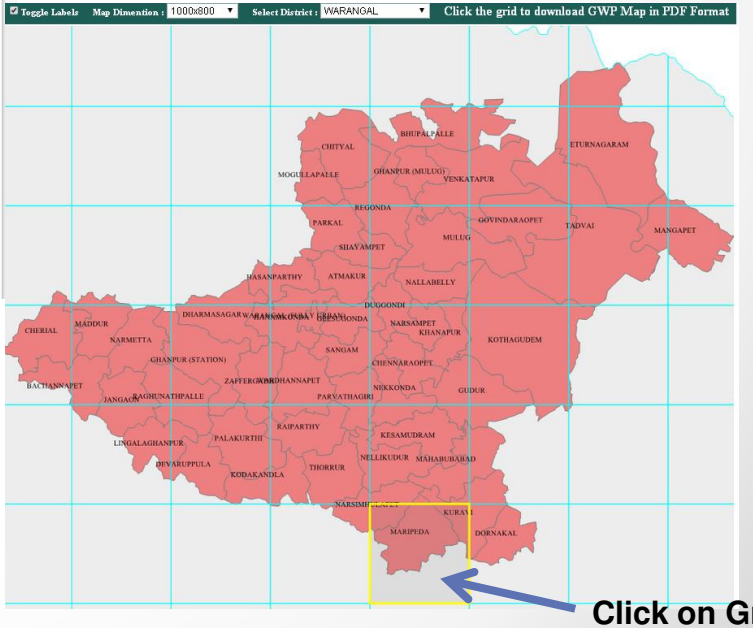


State Level

Select District



Toggle for Taluq /Mandal



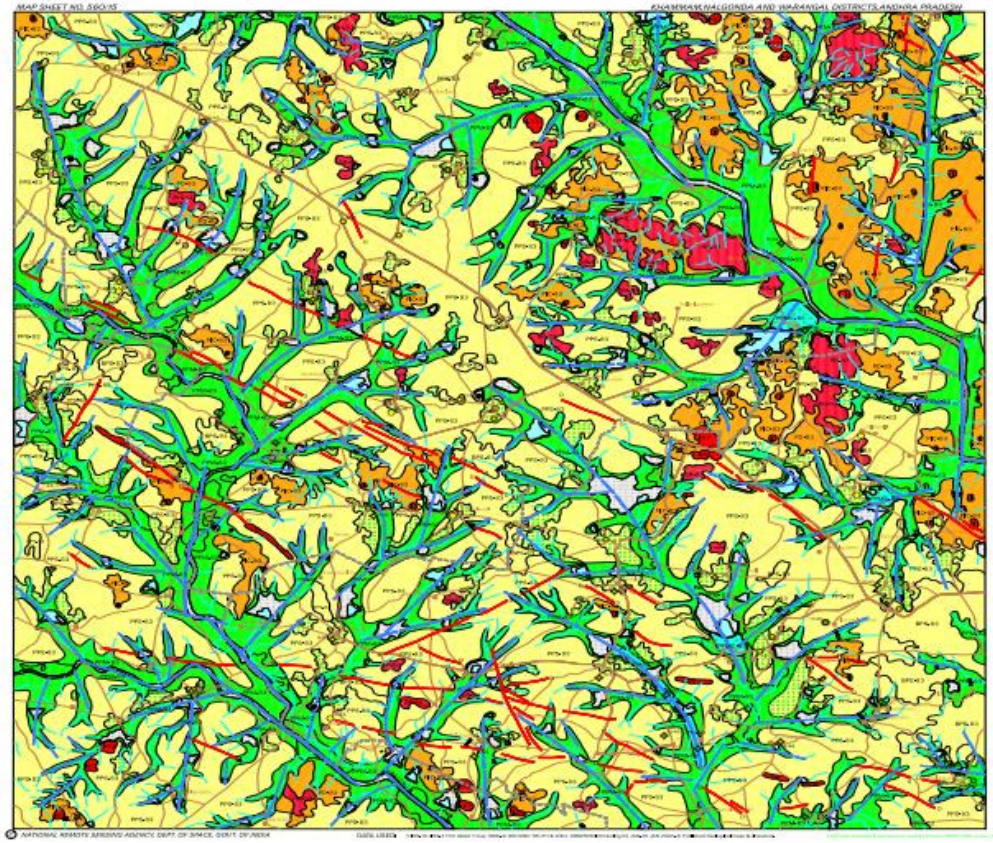
Click on Grid

GROUND WATER PROSPECTS MAP

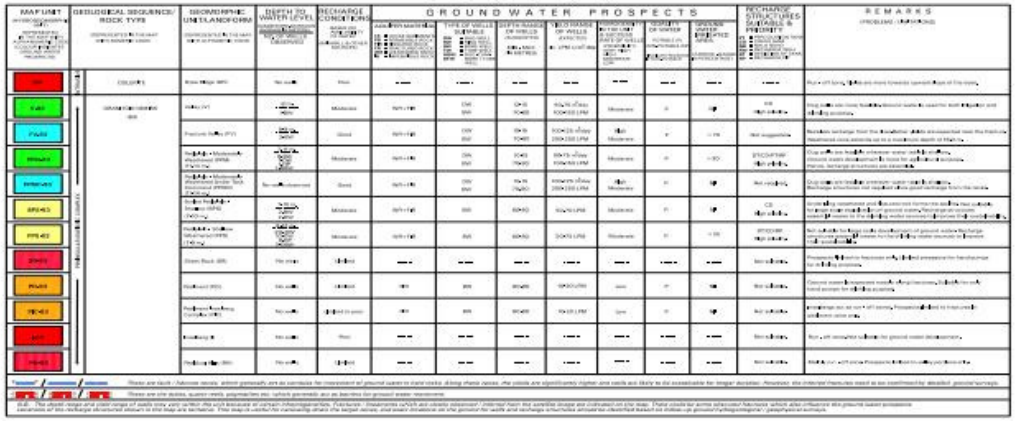
(PREPARED FROM SATELLITE IMAGE INTERPRETATION WITH LIMITED FIELD CHECKS)

1 0 1 2 3 4 5 Kilometers

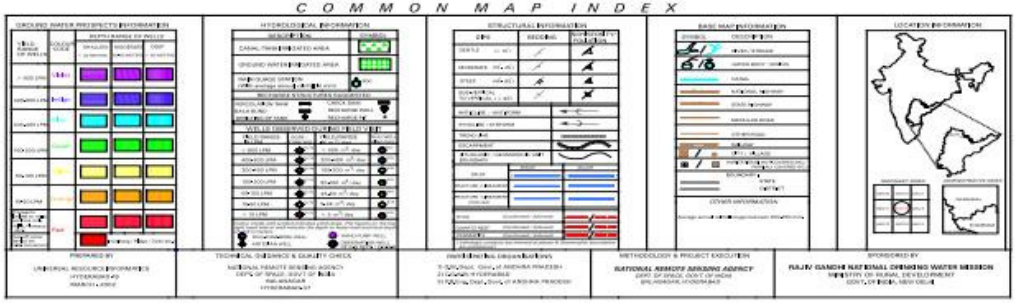
SCALE - 1:50,000



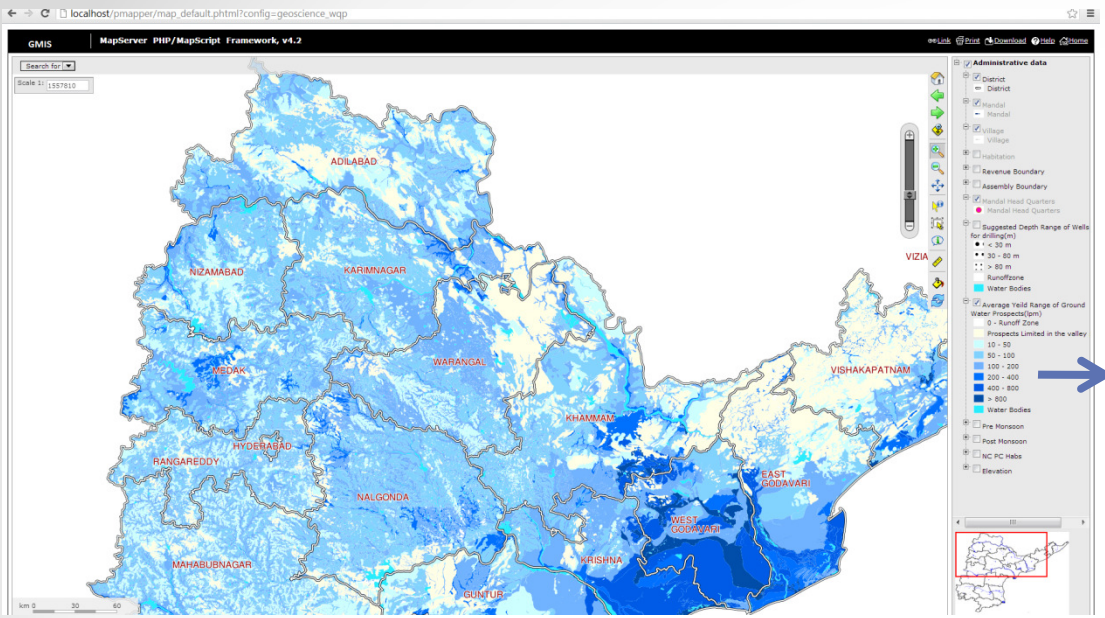
L E G E N D



C O M M O N M A P I N D E X

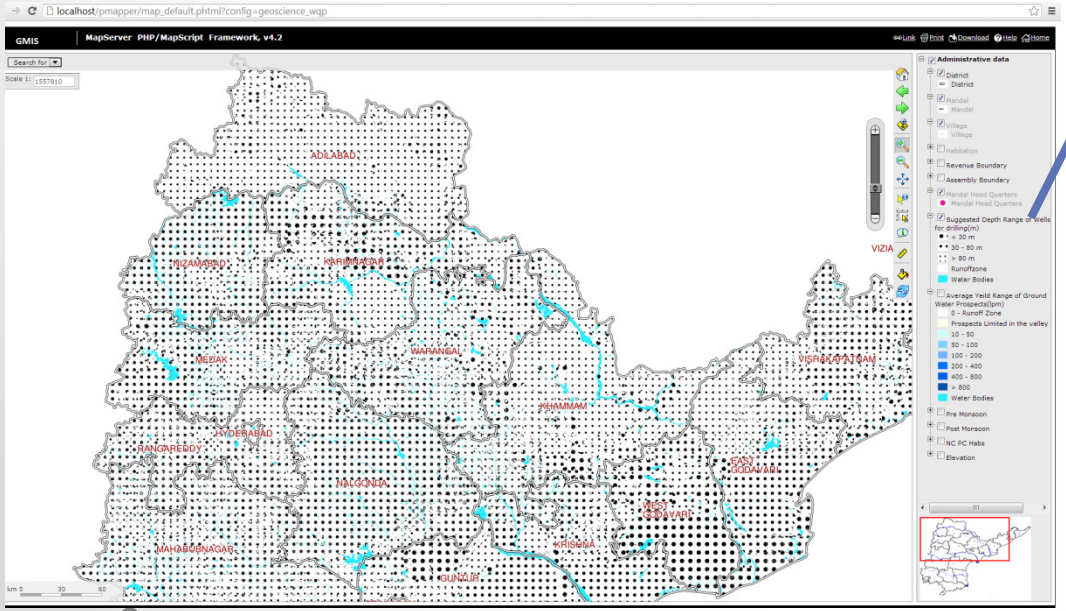


2. Ground Water Prospects Mapping on to web portal



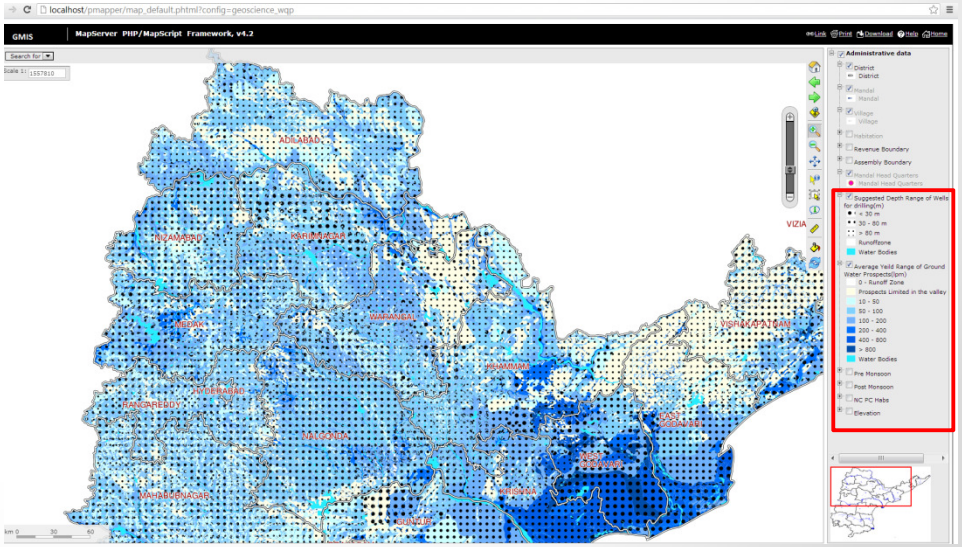
Yield Range of wells

- 0 - Run Off Zone
- Prospects Limited to Valley
- 10 - 50 lpm
- 50 - 100 lpm
- 100 - 200 lpm
- 200 - 400 lpm
- 400 - 800 lpm
- > 800 lpm
- Waterbody



Suggested Depth Range of Wells for Drilling (m)

- < 30m
- 30-80m
- >80m



II. Ground Water Quality Mapping

Groundwater Quality Mapping

NRDWP [Rajiv Gandhi National Drinking Water Mission (Phase IV)]

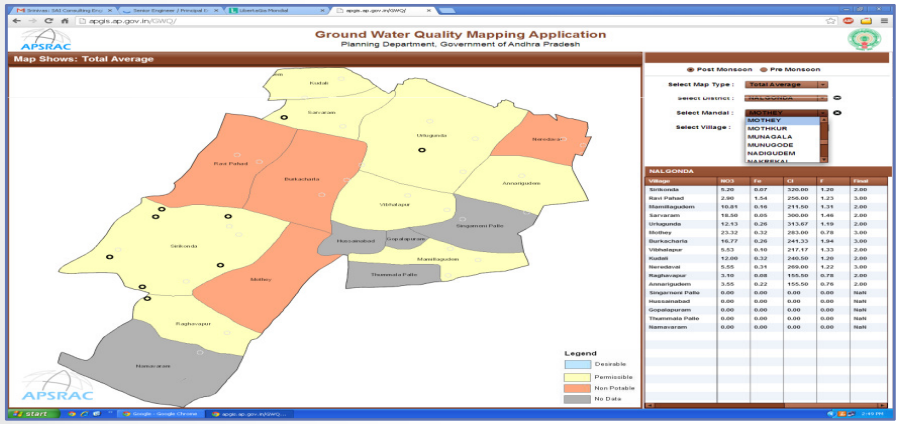
Objective:

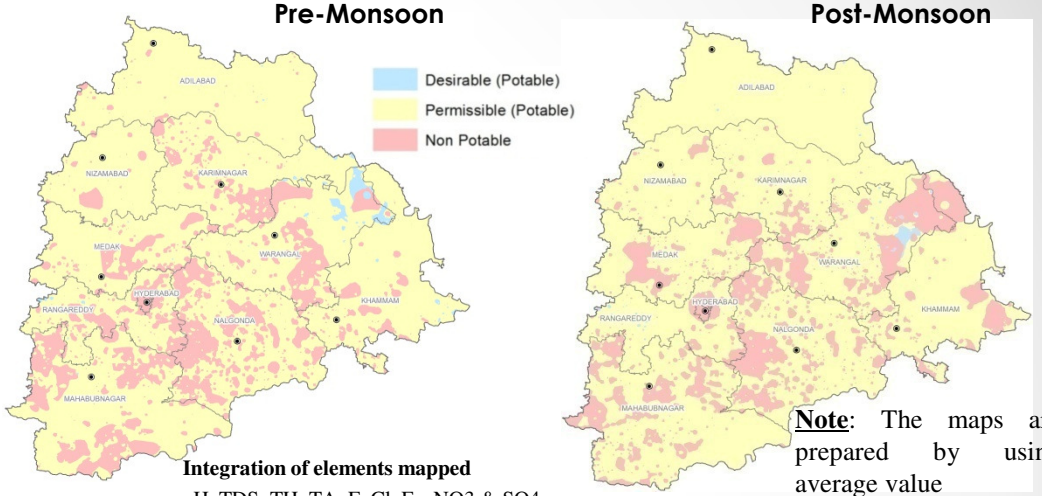
Preparation of Ground water quality map on 1:50,000 scale by integrating all the parameters (elements) showing variations in space and time

Outcome:

Element wise and integrated Ground water quality layer corresponding to Ground water prospects maps on 1:50,000 scale

Village, mandal, district wise average ground water quality maps for pre and post monsoon seasons are prepared **and disseminated on to web portal**





Integration of elements mapped

pH, TDS, TH, TA, F, Cl, Fe, NO3 & SO4

Note: The maps are prepared by using average value

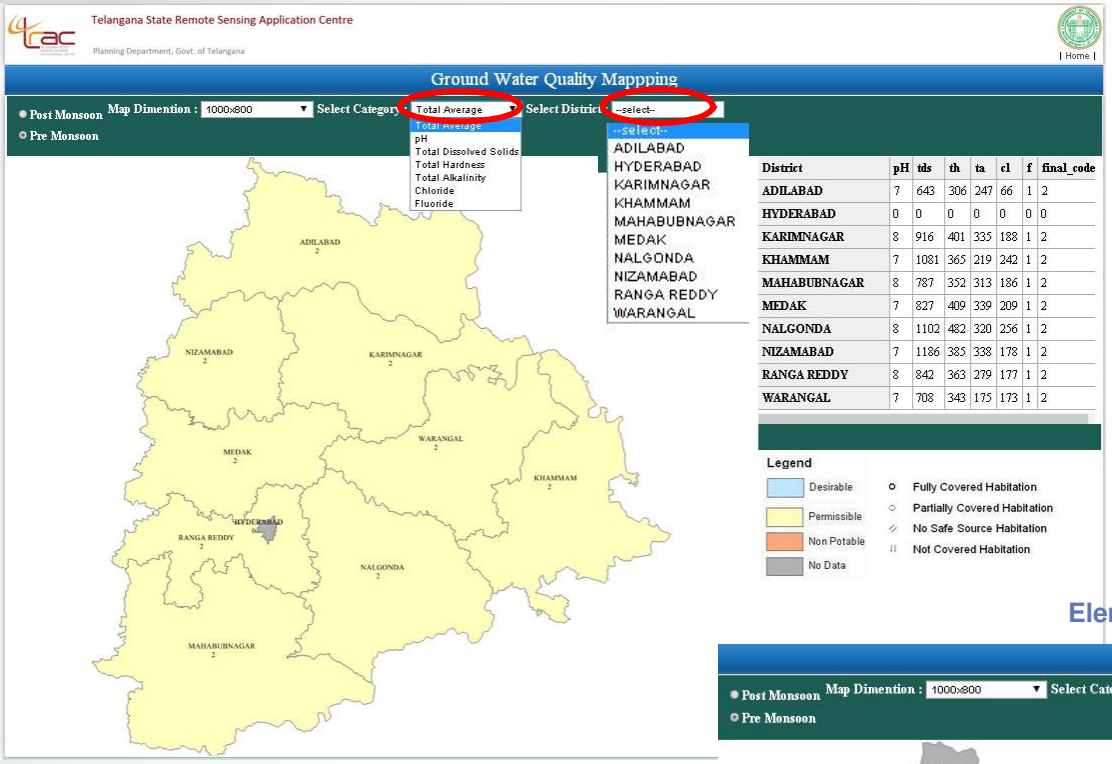
Sl. No	Element	Potable		Non-Potable
		Desirable	Permissible	
1.	pH	6.5 to 8.5	--	<6.5 to >8.5
2.	Total Hardness (as $CaCo_3$) mg/l	< 200	200-600	> 600
3.	Iron (as Fe) mg/l	< 0.3	--	> 0.3
4.	Chlorides (as Cl) mg/l	< 250	250-1000	> 1000
5.	Total Dissolved solids mg/l	< 500	500-2000	> 2000
6.	Nitrate (as NO_3) mg/l	< 45	--	> 45
7.	Sulphate (as SO_4) mg/l	< 200	200-400	> 400
8.	Fluoride (as F) mg/l	< 1.0	1.0-1.5	> 1.5
9.	Alkalinity mg/l	< 200	200-600	> 600

Habitation Status (State Statistics)

Habitation status	Level of service	Habitations		Population	
		Nos	Percentage	Total	Percentage
Fully Covered (FC)	55 lpcd	8,307	33.17	54,30,760	22.68
Not Covered (NC)	No service	16	0.06	3,643	0.02
No Safe Source (NSS)	Source is not protected	1,242	4.96	19,30,517	8.06
Partially Covered (PC)	< 55 lpcd	15,475	61.80	1,65,80,201	69.24
Total		**25,040**		**2,39,45,121**	

3. Element wise and integrated Ground water Quality Maps At 3 levels

1. District
2. Mandal
3. Village

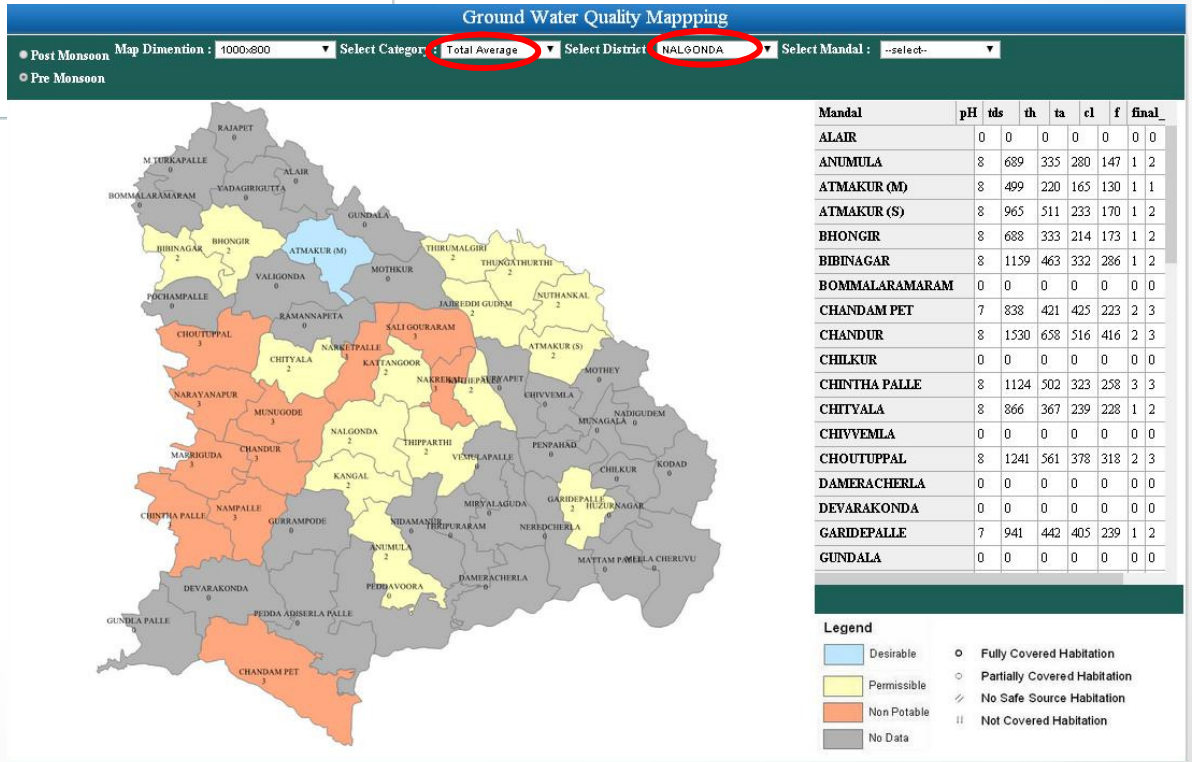


District	pH	tds	th	ta	cl	f	final_code
ADILABAD	7	643	306	247	66	1	2
HYDERABAD	0	0	0	0	0	0	0
KARIMNAGAR	8	916	401	335	188	1	2
KHAMMAM	7	1081	365	219	242	1	2
MAHABUBNAGAR	8	787	352	313	186	1	2
MEDAK	7	827	409	339	209	1	2
NALGONDA	8	1102	482	320	256	1	2
NIZAMABAD	7	1186	385	338	178	1	2
RANGA REDDY	8	842	363	279	177	1	2
WARANGAL	7	708	343	175	173	1	2

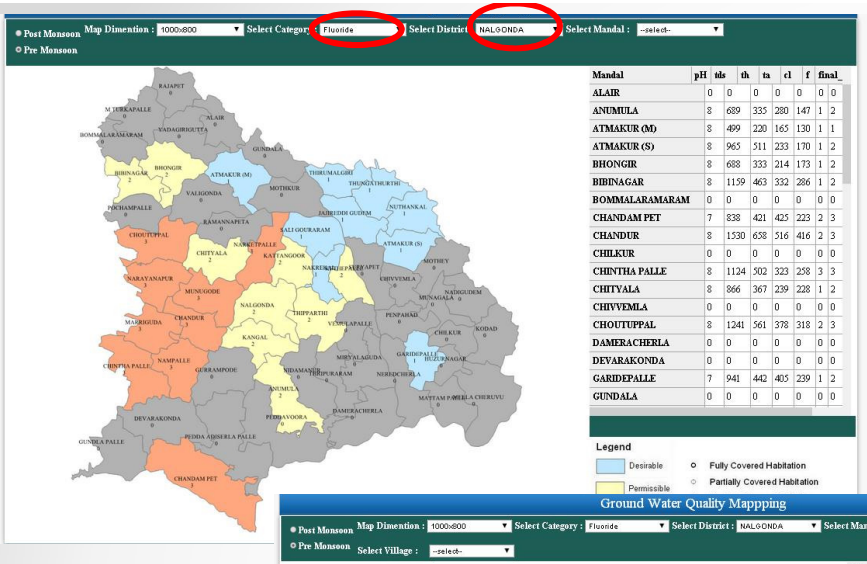
Drop Down list

1. Element
2. District

Elements integrated



Mandal	pH	tds	th	ta	cl	f	final_
ALAIR	0	0	0	0	0	0	0
ANUMULA	8	689	335	280	147	1	2
ATMAKUR (M)	8	499	220	165	130	1	1
ATMAKUR (S)	8	965	511	233	170	1	2
BHONGIR	8	688	333	214	173	1	2
BIBINAGAR	8	1159	463	332	286	1	2
BOMMALARAMARAM	0	0	0	0	0	0	0
CHANDAM PET	7	838	421	425	223	2	3
CHANDUR	8	1530	658	516	416	2	3
CHILKUR	0	0	0	0	0	0	0
CHINTHA PALLE	8	1124	502	323	258	3	3
CHITYALA	8	866	367	239	228	1	2
CHIVVEMLA	0	0	0	0	0	0	0
CHOUTUPPAL	8	1241	561	378	318	2	3
DAMERACHERLA	0	0	0	0	0	0	0
DEVARAKONDA	0	0	0	0	0	0	0
GARIDEPALLE	7	941	442	405	239	1	2
GUNDALA	0	0	0	0	0	0	0



Mandal	pH	tds	th	ta	cl	f	final_
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ANUMULA	8	689	335	280	147	1	2
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CHANDAM PET	7	838	421	425	223	2	3
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CHOUTUPPAL	8	1241	561	378	318	2	3
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DEVARAKONDA	0	0	0	0	0	0	0
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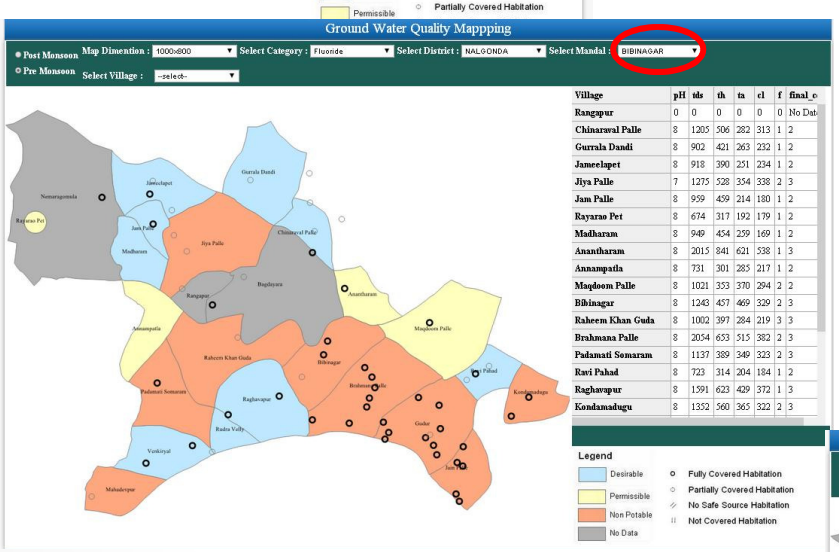
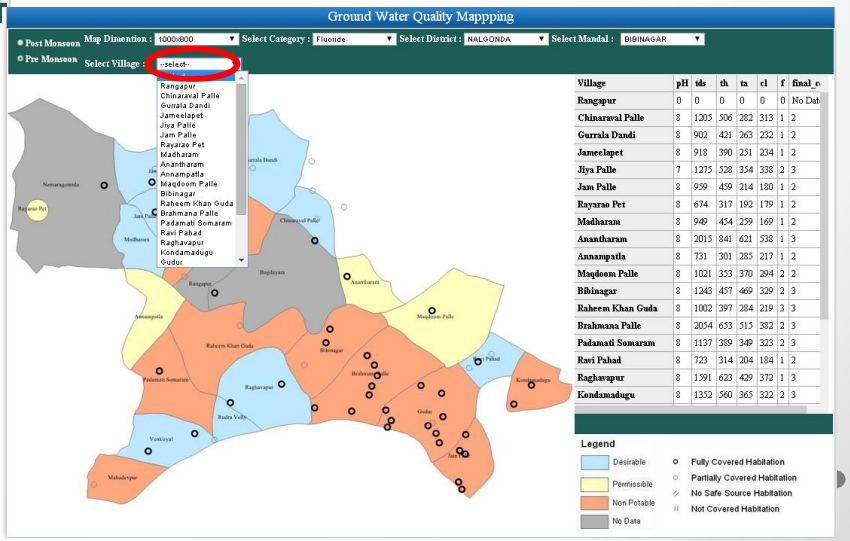
GUNDALA	0	0	0	0	0	0	0



Village	pH	tds	th	ta	cl	f	final_c
Rangapur	0	0	0	0	0	0	No Dat
Chinaraval Palle	8	1205	506	282	313	1	2
Gurrala Dandi	8	902	421	263	232	1	2
Jameelapet	8	918	390	251	234	1	2
Jiya Palle	7	1275	528	354	338	2	3
Jam Palle	8	959	459	214	180	1	2
Rayarao Pet	8	674	317	192	179	1	2
Madharam	8	949	454	259	169	1	2
Anantharam	8	2015	841	621	538	1	3
Annampatla	8	731	301	285	217	1	2
Maqdoom Palle	8	1021	353	370	294	2	2
Bibinagar	8	1243	457	469	329	2	3
Raheem Khan Guda	8	1002	397	284	219	3	3
Brahmana Palle	8	2054	653	515	382	2	3
Padamati Somaram	8	1137	389	349	323	2	3
Ravi Pahad	8	723	314	204	184	1	2
Raghavapur	8	1591	623	429	372	1	3
Kondamadugu	8	1352	560	365	322	2	3

Mandal Level

Village Level



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Gurrala Dandi	8	902	421	263	232	1	2
Jameelapet	8	918	390	251	234	1	2
Jiya Palle	7	1275	528	354	338	2	3
Jam Palle	8	959	459	214	180	1	2
Rayarao Pet	8	674	317	192	179	1	2
Madharam	8	949	454	259	169	1	2
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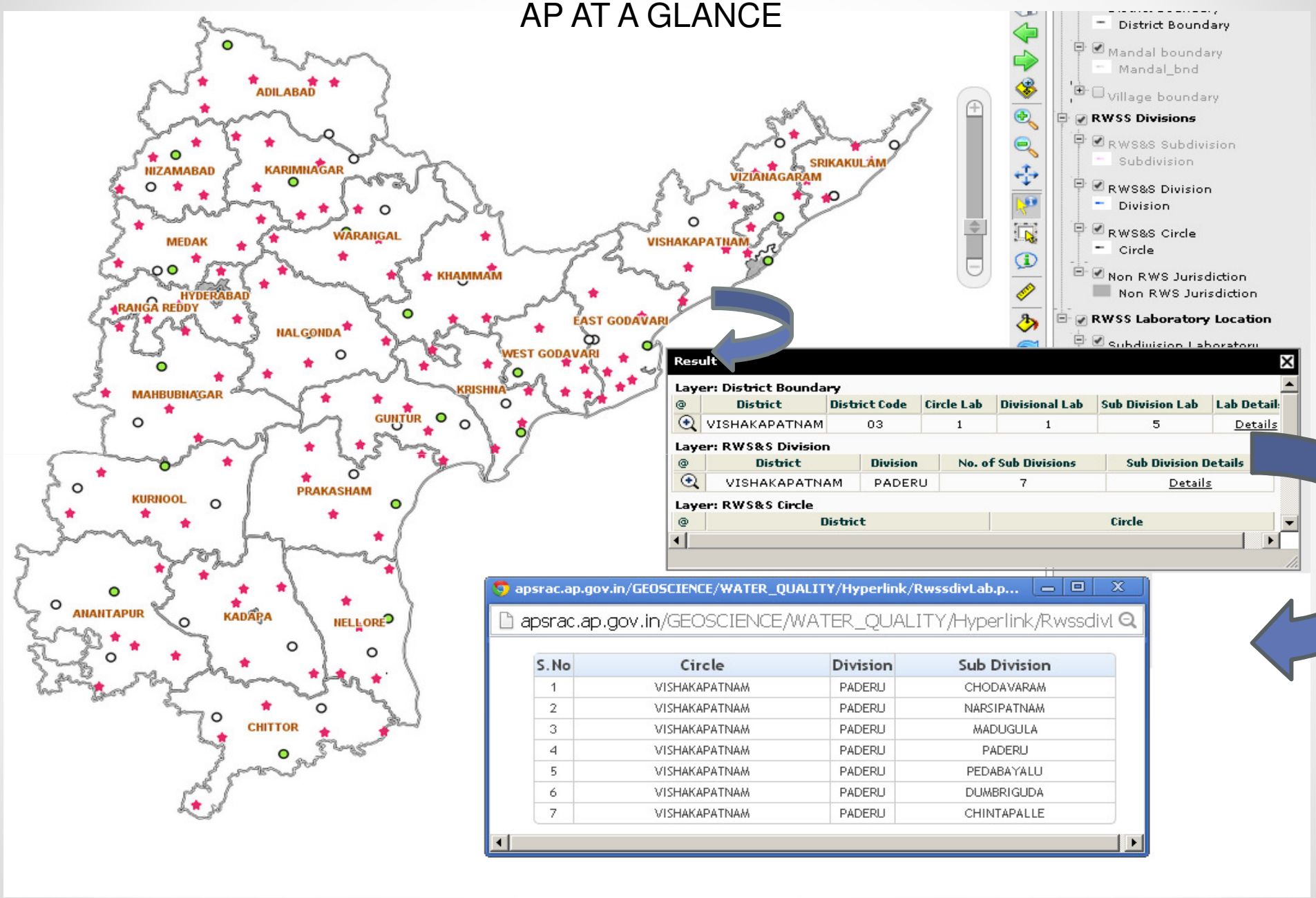
Kondamadugu	8	1352	560	365	322	2	3

4. RWS&S Admin Jurisdiction & Lab Locations on to web portal

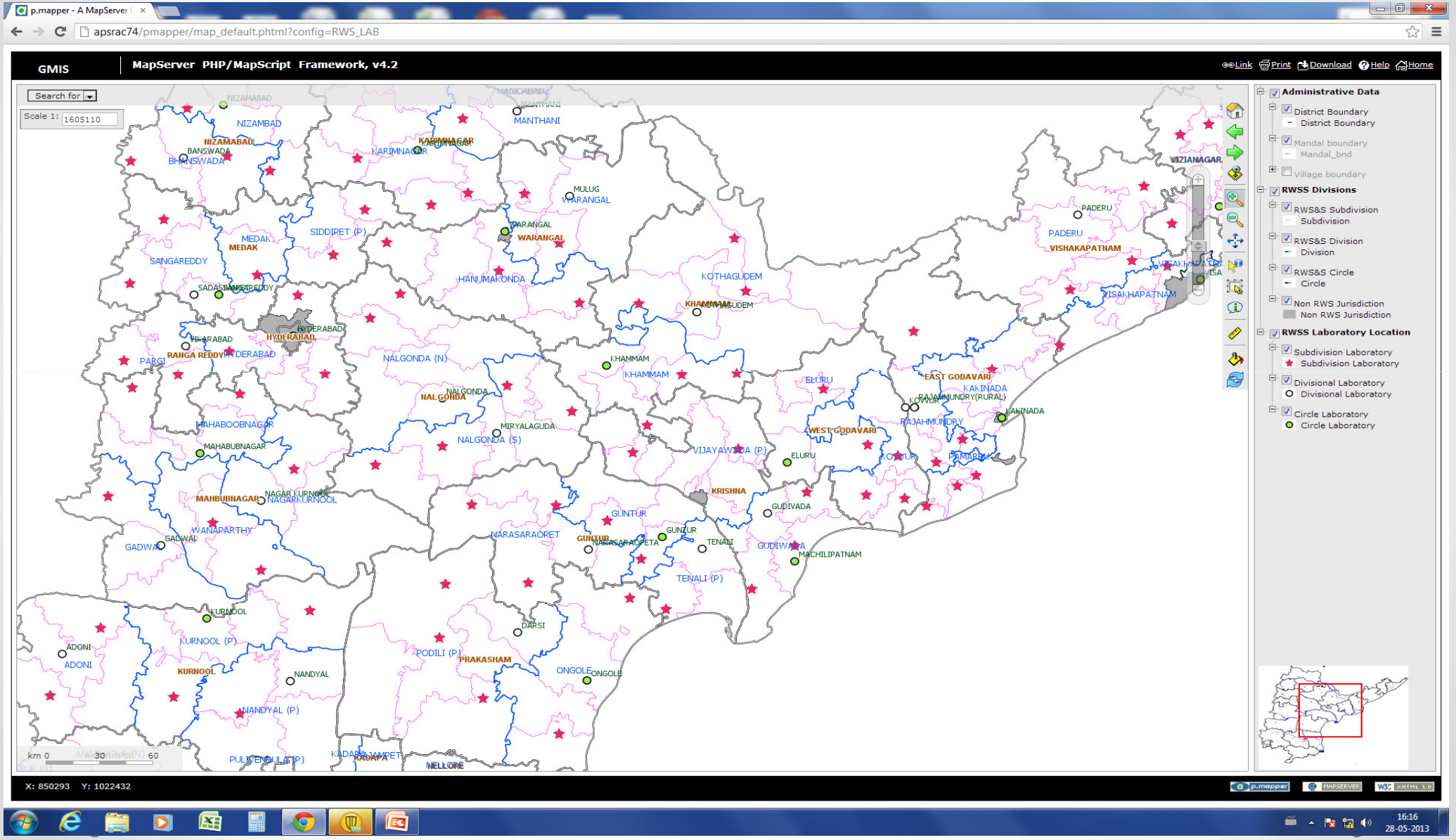
RWS&S Administrative Units & Laboratories

Circle	Divisions, Nos	Sub-Divisions, Nos	Mandals, Nos	Laboratories, Nos		
				Circle	Divisional	Sub Division
Adilabad	2	10	52	1	1	5
Anantapur	3	15	63	1	2	6
Chittor	3	18	66	1	2	5
East Godavari	2	14	58	1	1	7
Guntur	3	12	57	1	2	6
Kadapa	3	11	51	1	2	6
Karimnagar	2	11	57	1	1	6
Khammam	2	10	46	1	1	6
Krishna	2	12	49	1	1	5
Kurnool	3	13	54	1	2	5
Mahbubnagar	4	14	64	1	2	6
Medak	3	10	46	1	1	5
Nalgonda	2	12	60	1	1	6
Nellore	2	9	46	1	1	5
Nizamabad	2	7	36	1	1	5
Prakasham	2	9	57	1	1	5
Ranga Reddy	2	8	33	1	1	5
Srikakulam	2	10	38	1	2	5
Vishakapatnam	2	12	39	1	1	5
Vizianagaram	1	9	34	1	1	5
Warangal	2	10	51	1	1	5
West Godavari	2	9	46	1	1	5
Total	**51**	**245**	**1103**	**22**	**29**	**119**

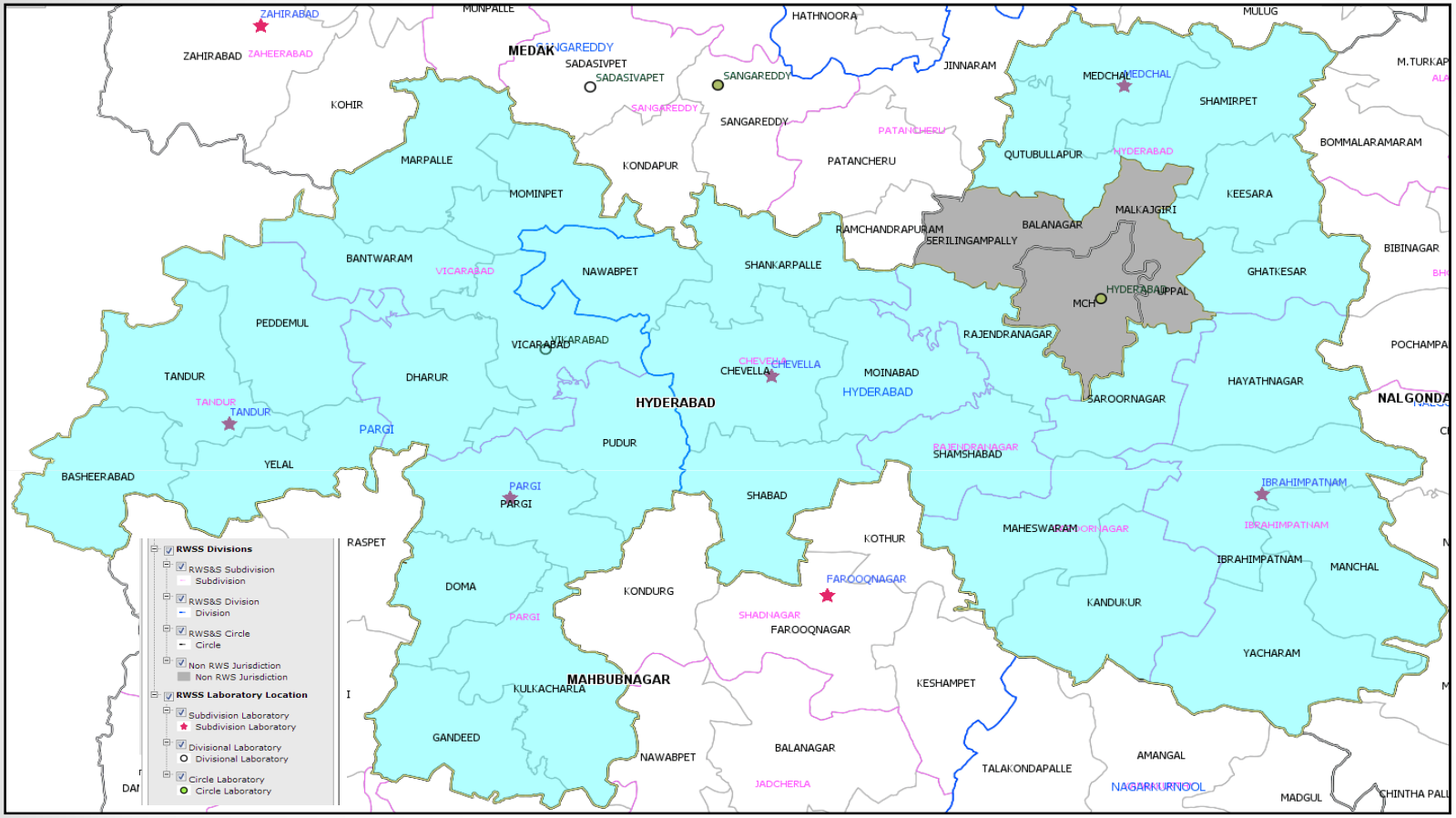
AP AT A GLANCE



Division, Sub-Divisional boundaries with Laboratory locations

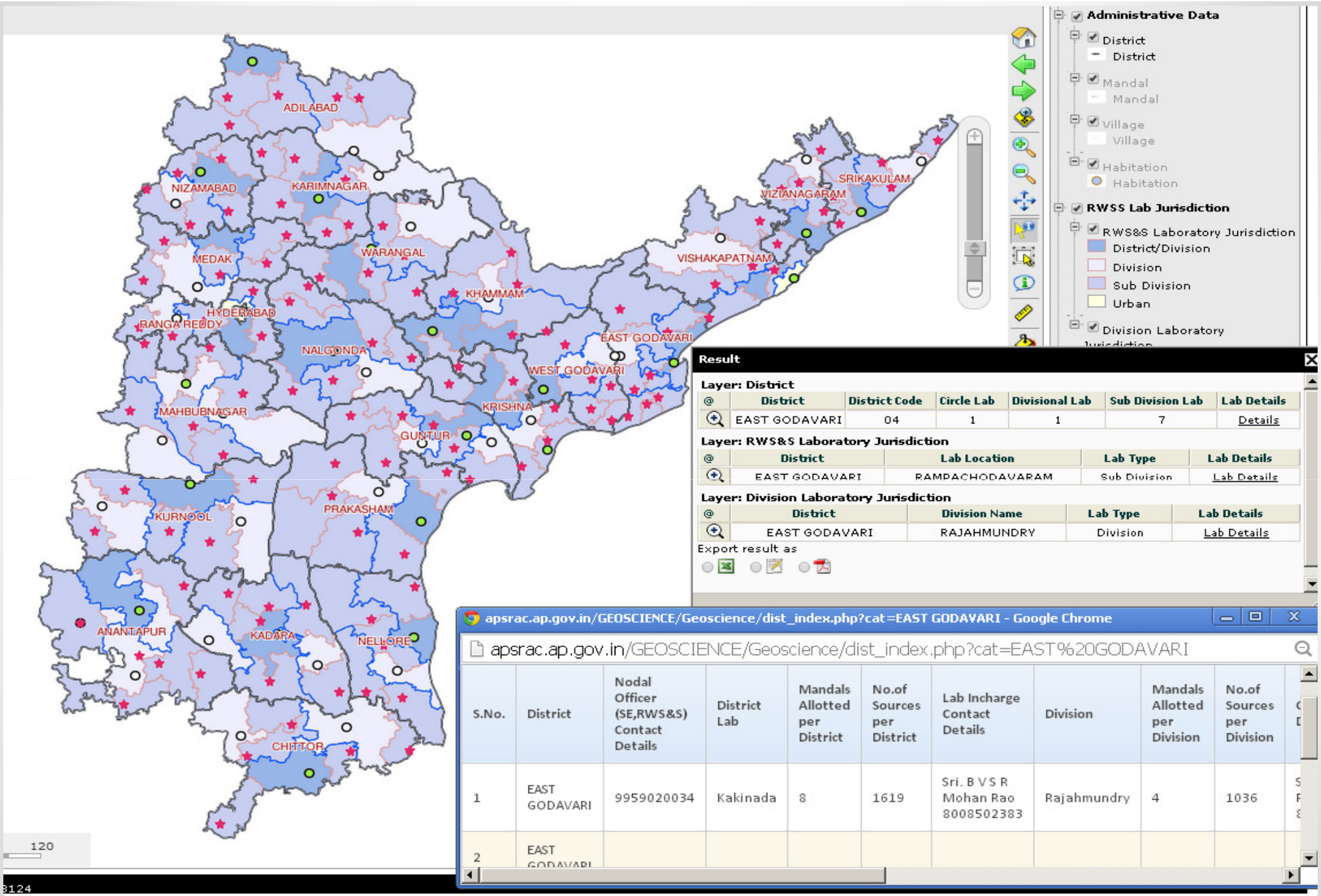


RWS&S Administrative Units & Laboratories of Ranga Reddy District



Division	Subdivision	Mandal
HYDERABAD	CHEVELLA	NAWABPET
		SHANKARPALLY
		MOINABAD
		CHEVELLA
		SHABAD
	HYDERABAD	QUTHBULLAPUR
		MEDCHAL
		SHAMEERPET
		KEESARA
		GHATKESAR
	IBRAHIMPATNAM	HAYATNAGAR
		IBRAHIMPATNAM
		MANCHAL
		YACHARAM
	RAJENDRANAGAR	RAJENDRANAGAR
		SHAMSHABAD
	SAROORNAGAR	SAROORNAGAR
		MAHESWARAM
		KANDUKUR
PARGI	PARGI	DOMA
		GANDEED
		KULKACHERLA
		PARGI
		PUDUR
	TANDUR	PEDDEMUL
		TANDUR
		BASHEERABAD
		YALAL
	VIKARABAD	MARPALLY
		MOMINPET
		VIKARABAD
		DHARUR
		BANTWARAM

5. RWS&S Laboratories Jurisdiction & Lab Locations on to web portal


ADILABAD
NIZAMABAD
KARIMNAGAR
MEDAK
WARANGAL
KHAMMAM
HYDERABAD
RANGA REDDY
NALGONDA
MAHBUBNAGAR
GUNTUR
PRAKASHAM
KURNOOL
ANANTAPUR
KADAPA
NELLORE
CHITTOR
EAST GODAVARI
WEST GODAVARI
KRISHNA
VISHAKAPATNAM
VIZIANAGARAM
SRIKAKULAM
120
Administrative Data
District
District
Mandal
Mandal
Village
Village
Habitation
Habitation
RWSS Lab Jurisdiction
RWS&S Laboratory Jurisdiction
District/Division
Division
Sub Division
Urban
Division Laboratory
Result
Layer: District
@ | District | District Code | Circle Lab | Divisional Lab | Sub Division Lab | Lab Details
EAST GODAVARI | 04 | 1 | 1 | 7 | Details
Layer: RWS&S Laboratory Jurisdiction
@ | District | Lab Location | Lab Type | Lab Details
EAST GODAVARI | RAMPACHODAVARAM | Sub Division | Lab Details
Layer: Division Laboratory Jurisdiction
@ | District | Division Name | Lab Type | Lab Details
EAST GODAVARI | RAJAHMUNDRY | Division | Lab Details
Export result as
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1 | EAST GODAVARI | 9959020034 | Kakinada | 8 | 1619 | Sri. B V S R Mohan Rao 8008502383 | Rajahmundry | 4 | 1036
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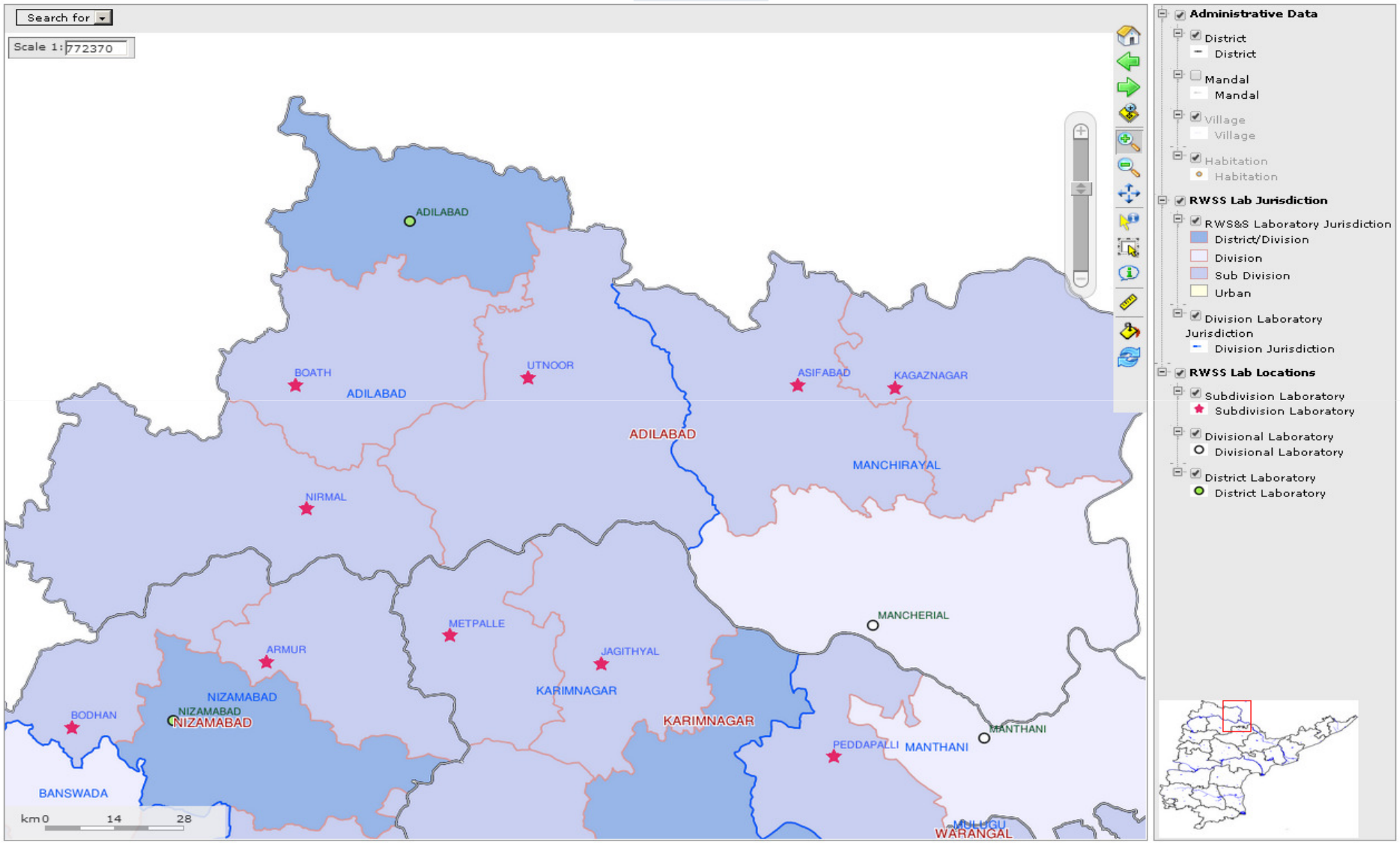

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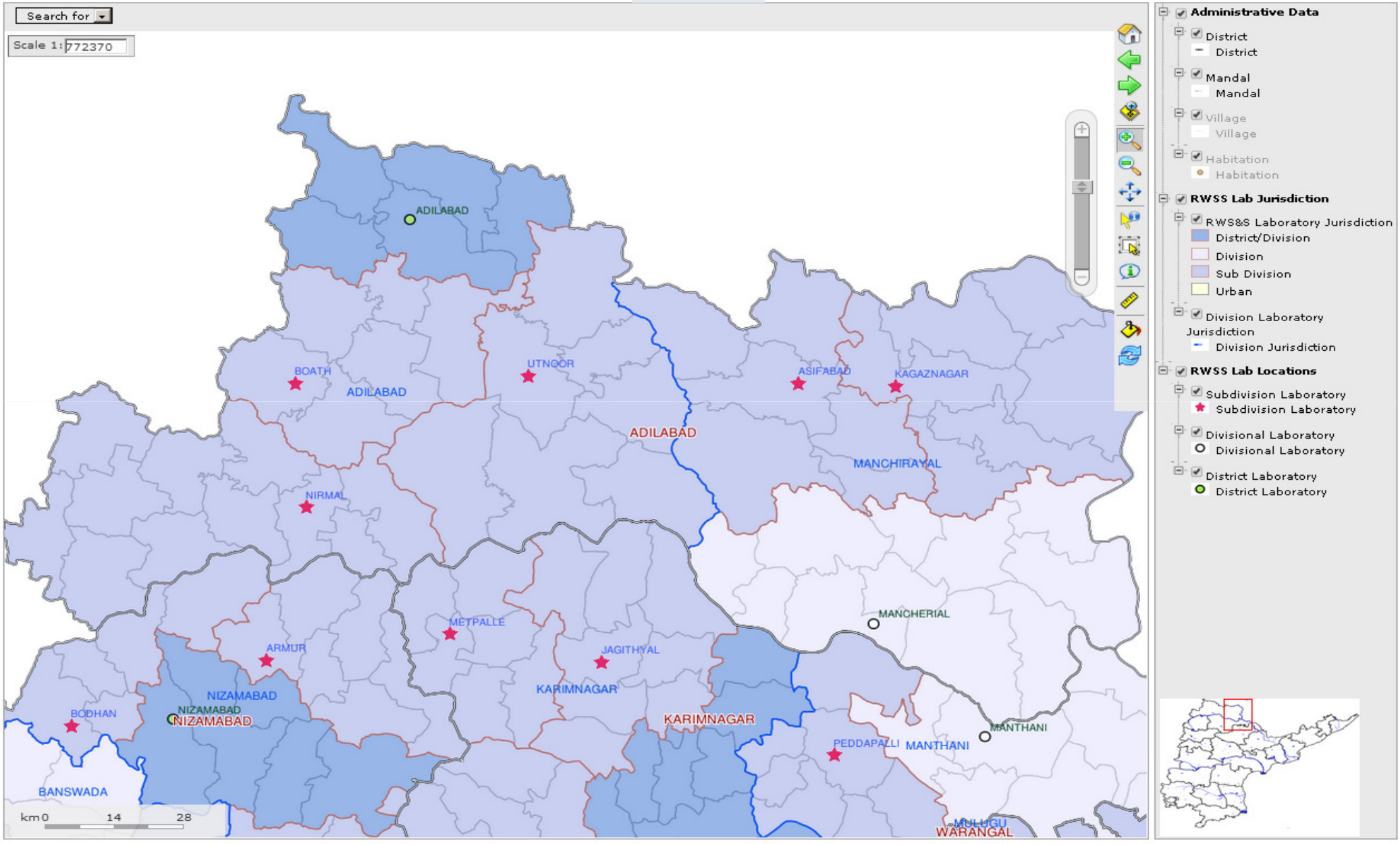
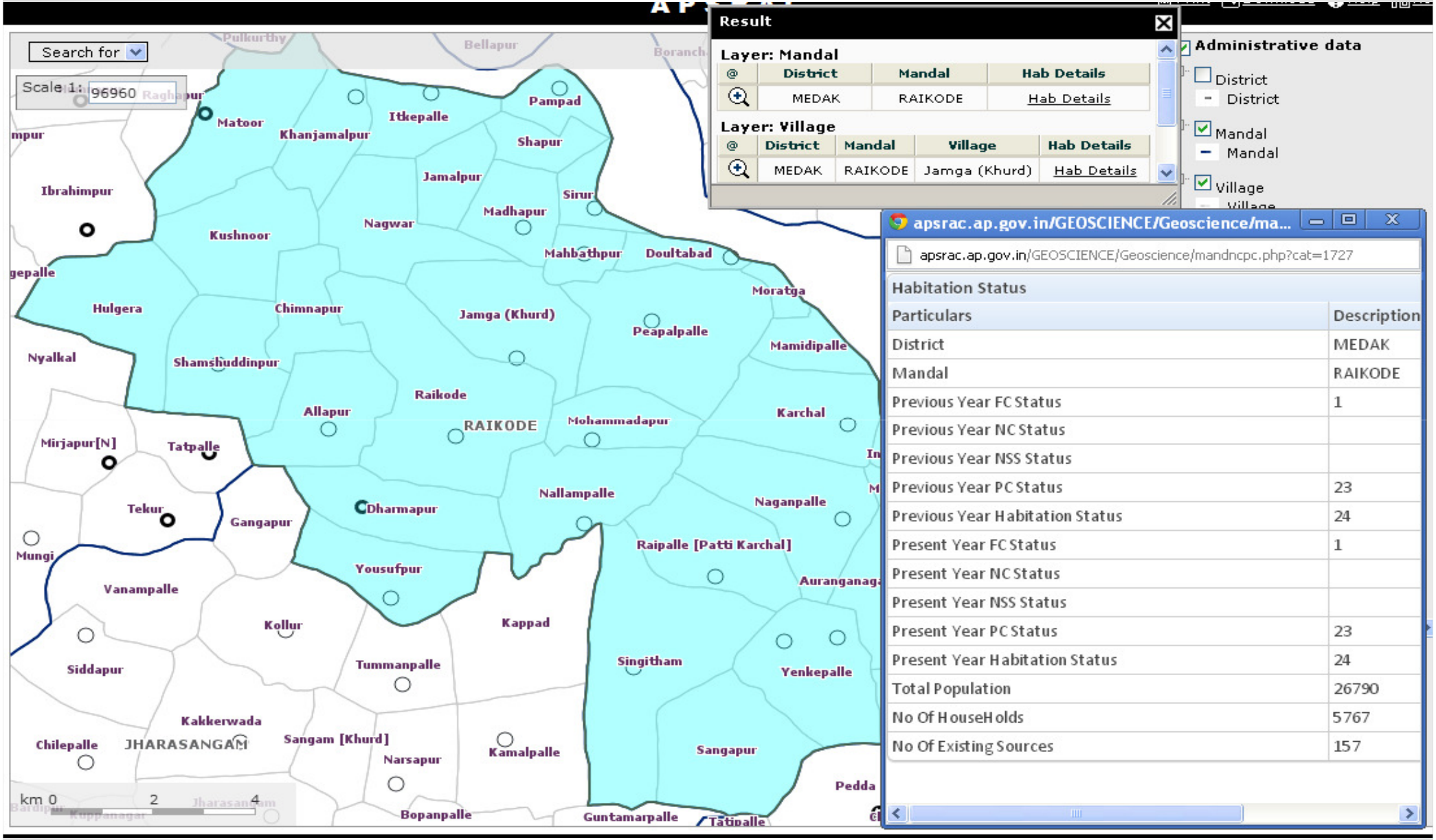


6. Habitation status mapping on to web portal

Mandal level details



Conclusion

- In geo-spatial domain the use of open source tool and data is quite mature and widely adopted in world wide for various applications including under commercial model.

- These applications would help more effective sharing of information relating to the ground water resource availability and ground water quality etc with user groups, planners, research, universities and administrators

- Web based GIS application is a useful tool for facilitating in visualizing, assessing and monitoring the scientific and other non-scientific spatial as well as non spatial data in seamless manner

THANK YOU