

TNSMART

**Tamil Nadu System for Multi-hazard Potential
Impact Assessment, Alert, Emergency
Response Planning & Tracking**

Tamil Nadu Disaster Risk Reduction Agency

TNSMART- Co Creation of RIMES & TNSDMA

- TNSMART- an operational information-driven decision-support system:
 - **For** policy makers, disaster managers and communities
 - **To** manage disaster risks holistically
 - **By** transforming generic weather forecast data into actionable, impact-based early warning information
- Utilizes cutting-edge technological advances to facilitate decision-making during all phases of the Disaster Management- Early Warning, Preparedness, Emergency Response, Mitigation and Recovery
- Co-developed by RIMES with Government of Tamil Nadu's Commissionerate of Revenue Administration, Disaster Management

TNSMART

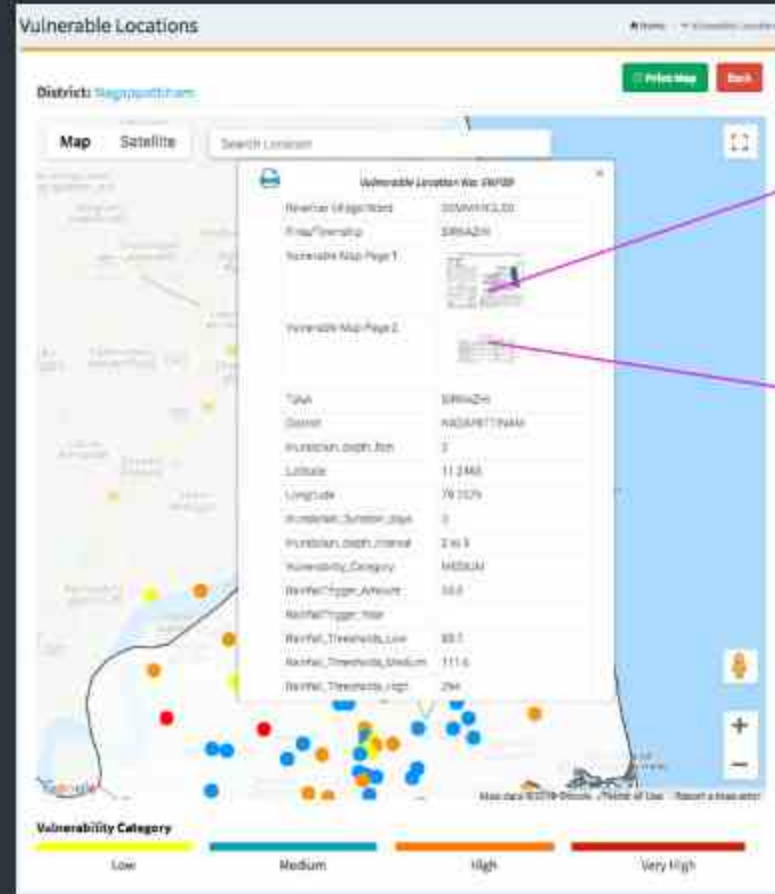


A web-GIS based Decision Support System to support the complete disaster management cycle

Operational tool for understanding past, monitoring present and predicting future

Module 1 - Database

Vulnerable locations



SI Analysis of Vulnerability

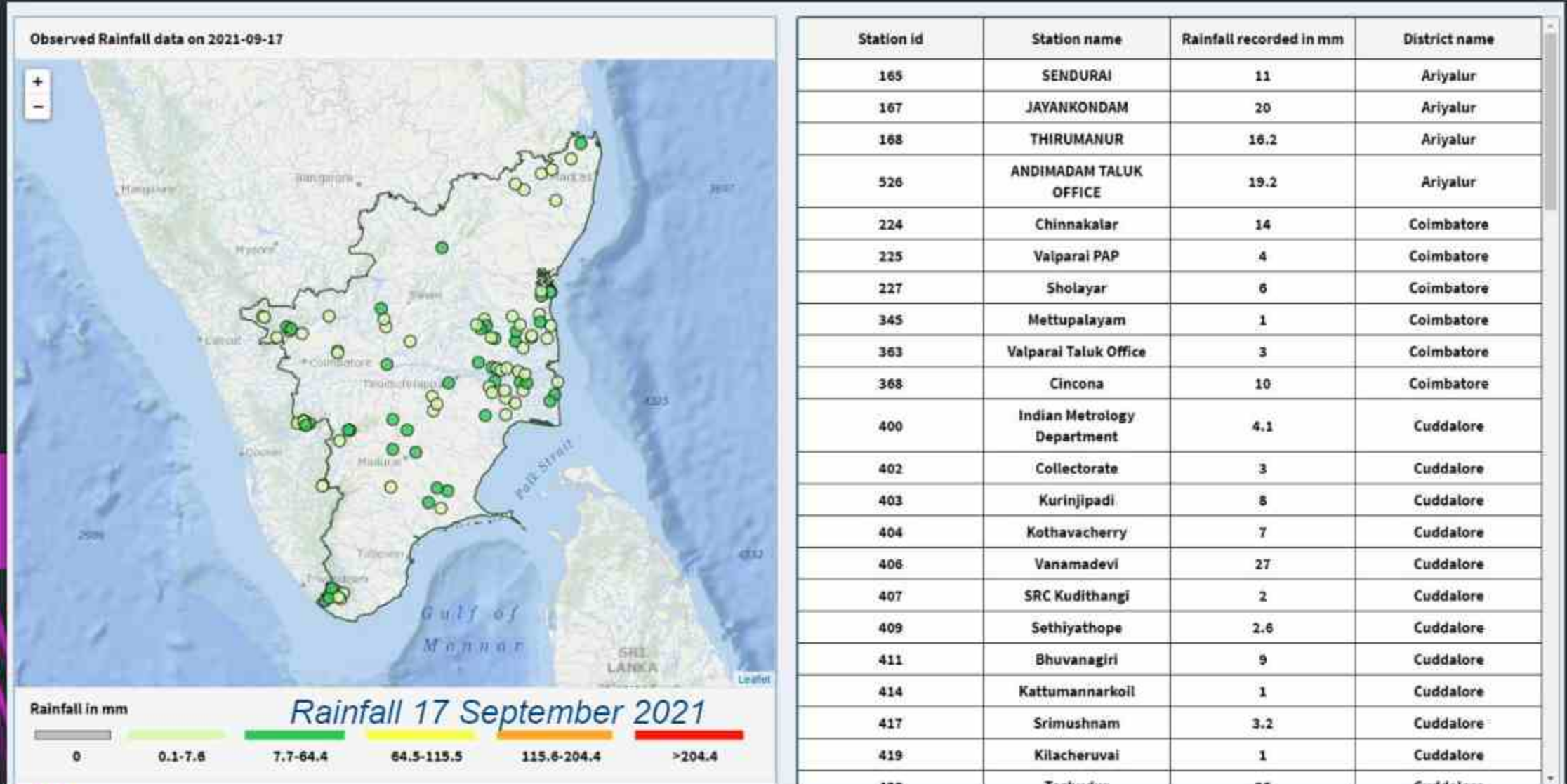
Parameter	Value	Weight	Score	Category
...

- Database**
- Vulnerability Profile
 - Reservoir Monitoring
 - Tank Level Monitoring
 - Rainfall Monitoring
 - MIS Visualization
 - Past disaster data
 - Response Resources

- Response Resources:**
- Relief Centres
 - Evacuation route
 - Phone numbers of nodal officers
 - Phone numbers of first responders

Module 1 - Database

Monitoring rainfall and water level



Module 1 - Database

Monitoring rainfall and water level

Drinking water status (2021-09-16)

The total capacity of reservoirs supplying drinking water to Chennai (Poondi, Cholavaram, Redhills, Chembarampakkam, Thervoy kandigai)

9586 / 11757



Reservoir	Total Capacity in mcf	Percentage of capacity(%)
Poondi	2709 / 3231	83.84
Cholavaram	646 / 1081	59.76
Sengundram (Redhills)	2992 / 3300	90.67
Chembarampakkam	2773 / 3645	76.08
Thervoy kandigai	466 / 500	93.2

Reservoir details - (2021-09-16)



Reservoir	Total Capacity in mcf	Percentage of capacity(%)
Veeranam	1006 / 1465	68.67
Mettur	36400 / 93470	38.94
Bhavani	30317 / 32800	92.43
Amaravathi	3928 / 4047	97.06
Aliyar	3847 / 3864	99.56
Sholayar	5133 / 5046	101.72
Parambikulam	13318 / 13408	99.33
Thirumurthi	1099 / 1744	63.02
Sathanur	1801 / 7321	24.6
Krishnagiri	1468 / 1666.3	88.1
Periyar dam	4896 / 7666	63.87
Vaigai	3054 / 6091	50.14
Papanasam	2139 / 5500	38.89
Manimuthar	1151 / 5511	20.89
Pechipparai	3667 / 4350	84.3
Perunchani	1520 / 2890	52.6

16 September 2021

figshare.com

Percentage of capacity(%)

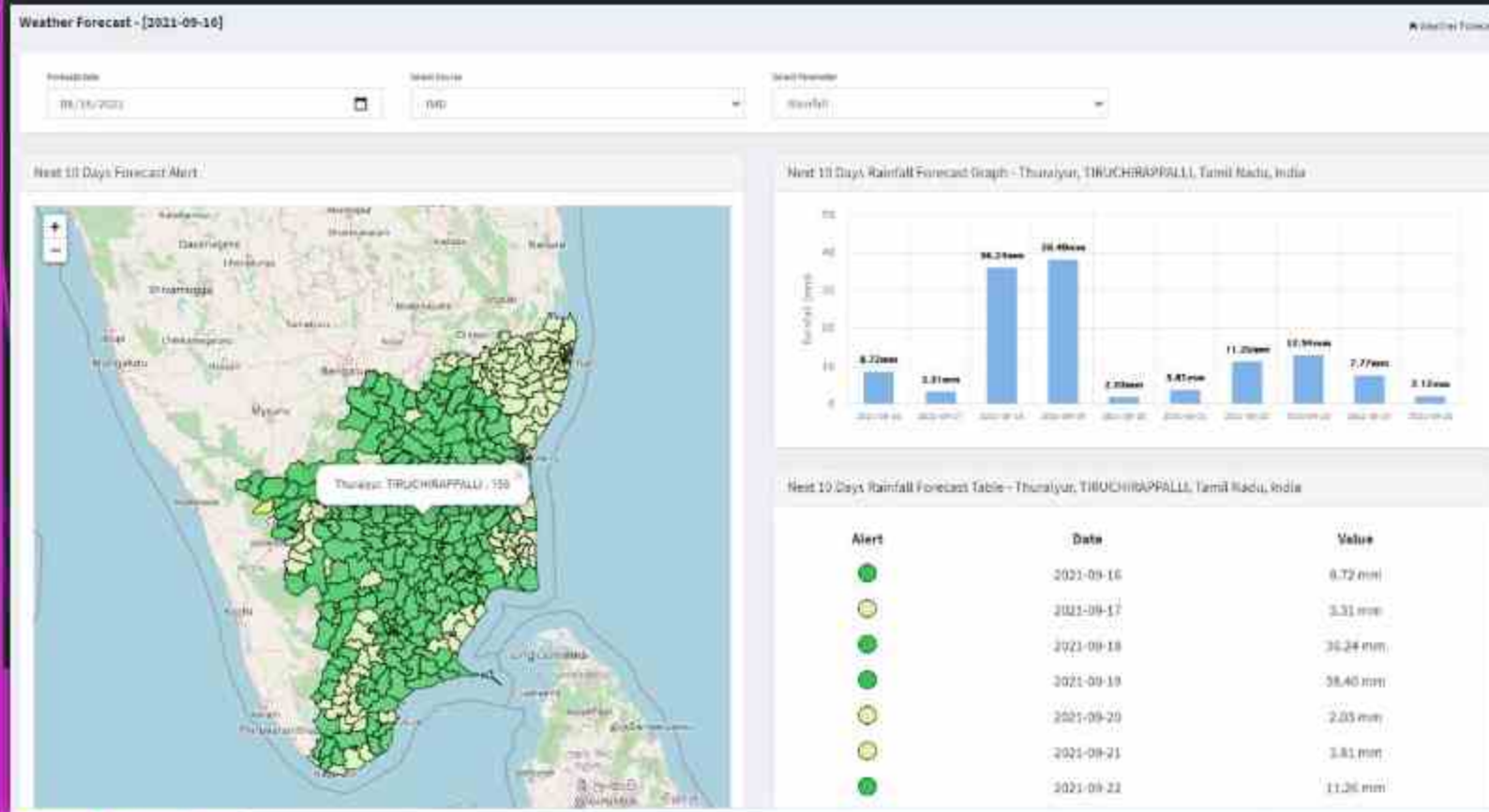


Module 2 – Thresholds



- Rainfall thresholds that triggered floods in the past
- Preceding days water levels/ rainfall and forecasts
- Extreme rainfall events in a day that caused flooding
- Wind speed that caused destruction (eg: thatched and tiled houses)
- Temperature thresholds : heat wave
- Deficit rain, dry spells : droughts

Module 3 – Hazard Forecasts



Forecast sources

- IMD (12km)

Additional references:

- ECMWF(12km)
 - RIMES (9km)
- (visualized at Taluka level)

Under development:
Ensemble and extended and seasonal forecast

Module 4 - Forecasting risk

TNSMART uses 3 parameters to predict flood level in vulnerable areas.

- IMD rainfall forecast
- Rainfall received during Northeast Monsoon season,
- Water level in the reservoir and tanks

- **Drought Monitoring**

- Generating rainfall deviation based on percentage of normal and actual rainfall on Monthly, Fortnightly & weekly basis.

- **Lightning Forecasting system**

- Lightning Alert for the registered and favourite locations 5 min in advance.
- Also receive the Dangerous thunderstorm Alerts over polygon received from Earth Networks Sensors.
- Integrated IMD Now cast Products

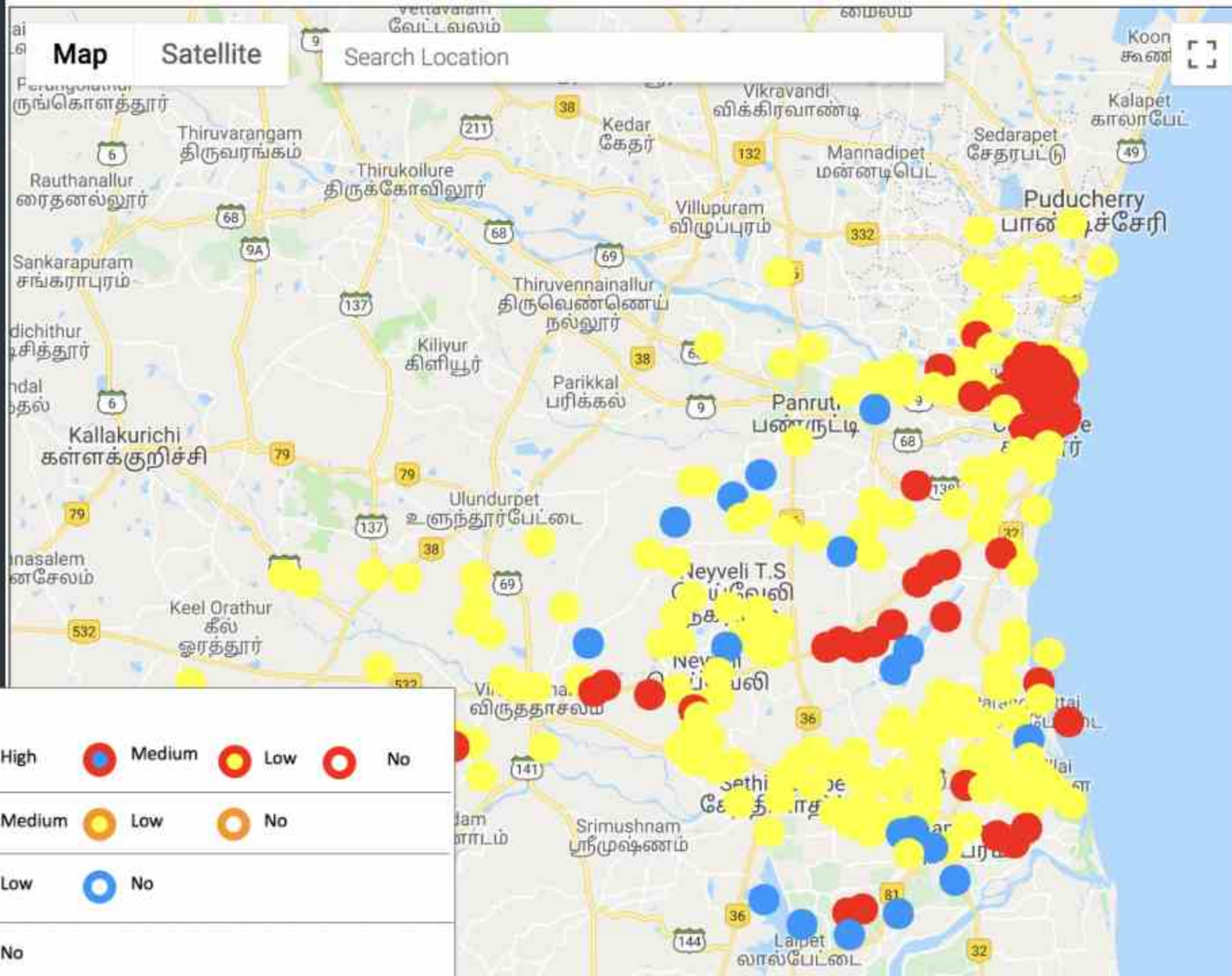
Flood Risk

Scenario 1

- Northeast monsoon received as of date - **90 to 95%**

- Water bodies status - **90 to 100%**

- Rainfall forecast - **Extremely heavy rainfall**



Legend

Impacts in Very High Vulnerable location	● Very High	● High	● Medium	● Low	○ No
Impacts in High Vulnerable location	● High	● Medium	● Low	● No	
Impacts in Medium Vulnerable location	● Medium	● Low	● No		
Impacts in Low Vulnerable location	● Low	● No			

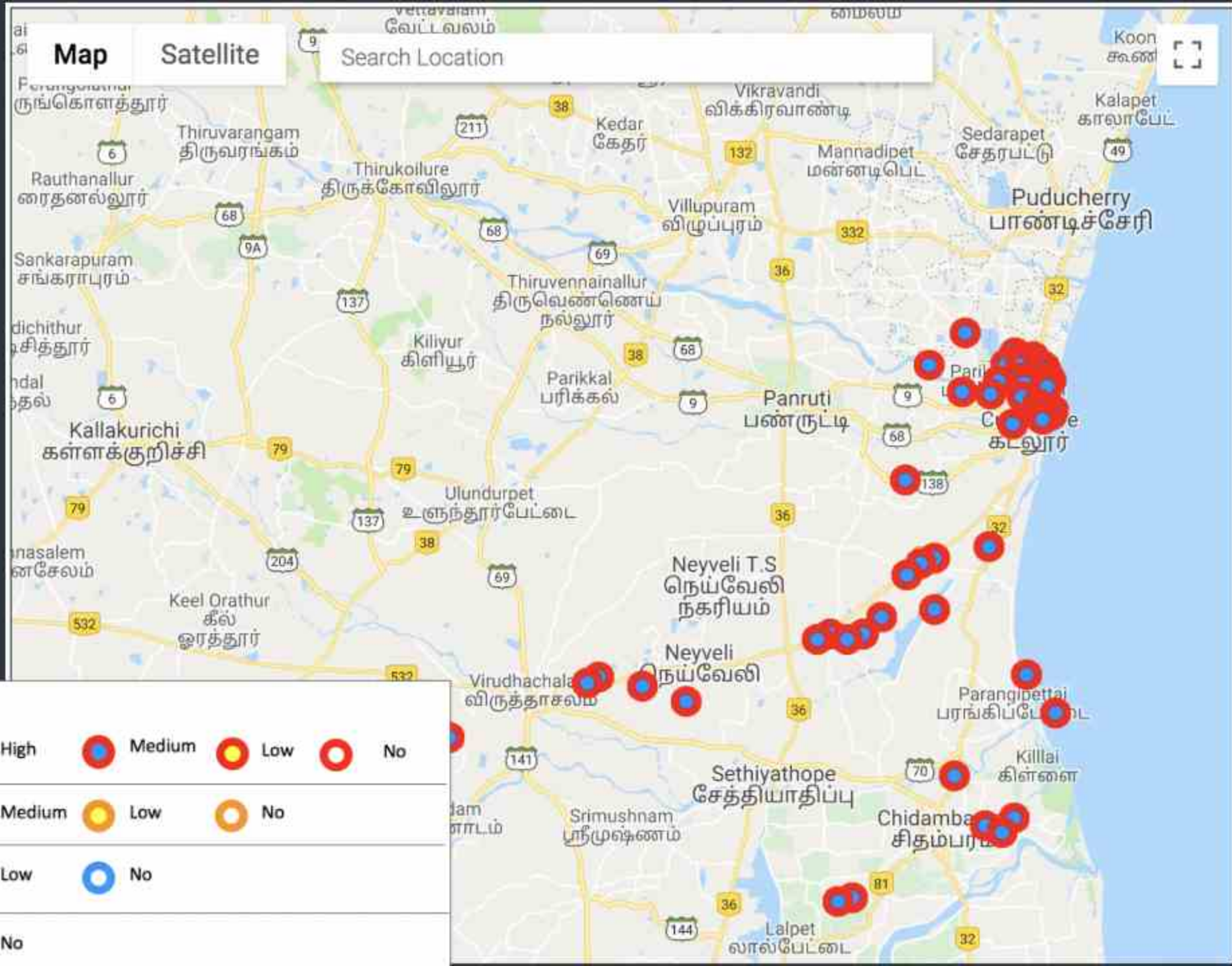
Flood Risk

Scenario 2

Northeast monsoon received as of date - **75 to 80%**

Water bodies status - **70 to 80%**

Rainfall forecast – **Extremely Heavy rainfall**



Legend

Impacts in Very High Vulnerable location	● Very High	● High	● Medium	● Low	○ No
Impacts in High Vulnerable location	● High	● Medium	● Low	● No	
Impacts in Medium Vulnerable location	● Medium	● Low	● No		
Impacts in Low Vulnerable location	● Low	● No			

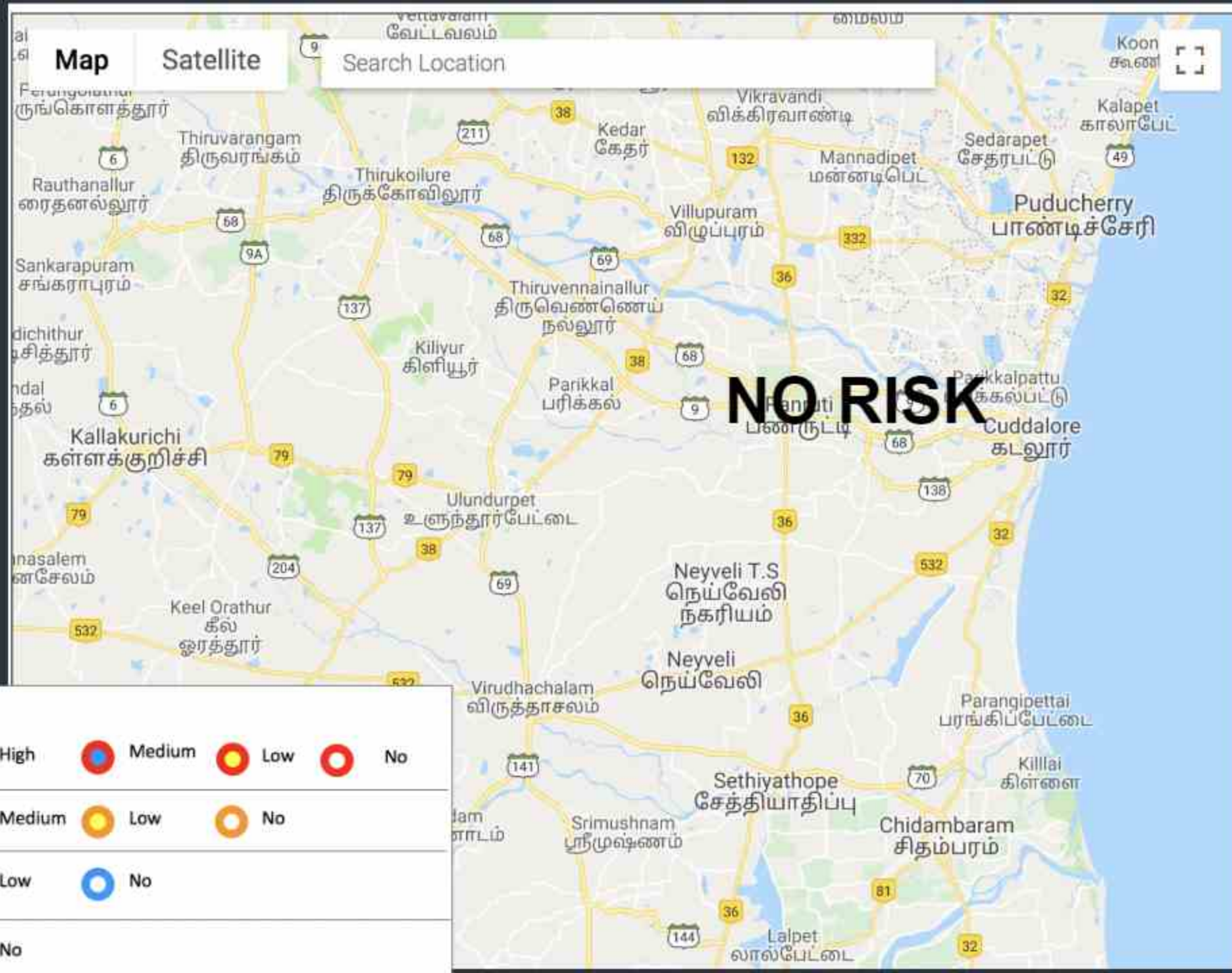
Flood Risk

Scenario 3

Northeast monsoon received as of date -
50 to 70%

Water bodies status -
50 to 60%

Rainfall forecast –
Extremely Heavy rainfall



Legend	
Impacts in Very High Vulnerable location	● Very High ● High ● Medium ● Low ● No
Impacts in High Vulnerable location	● High ● Medium ● Low ● No
Impacts in Medium Vulnerable location	● Medium ● Low ● No
Impacts in Low Vulnerable location	● Low ● No

Module 5 – Advisory



For State & District administration

- Magnitude of the hazard and its likely impacts
- Likely affected villages and population
- Link to SOP

For public

- Course of actions to be taken
- Do's and Don'ts

TN SMART Cyclone Advisory

~~Vardah~~ Cyclone 13 November 2017

Cyclone Forecast



A very severe cyclonic storm is likely to cross Chennai coast with wind speed 118-166 ~~kmph~~ (64-89 knots).

~~Cyclone~~ Track of ~~Vardah~~

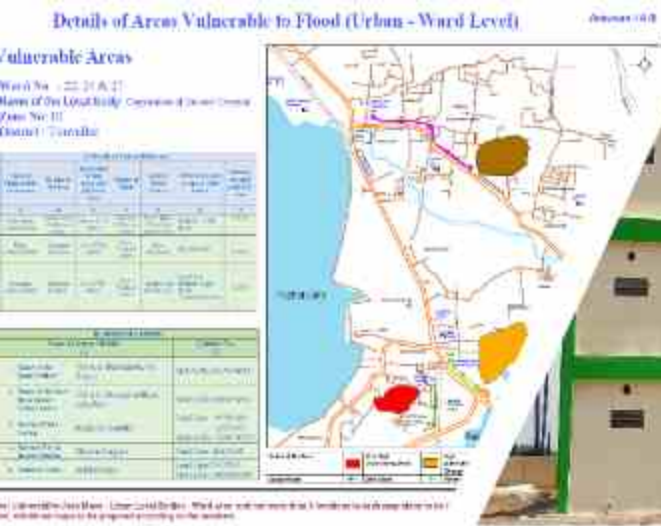
Potential Impacts

- Extensive damage to kutcha houses.
- Partial disruption of power and communication line.
- Minor disruption of rail and road traffic.
- Potential threat from flying debris.

Elements at Risk

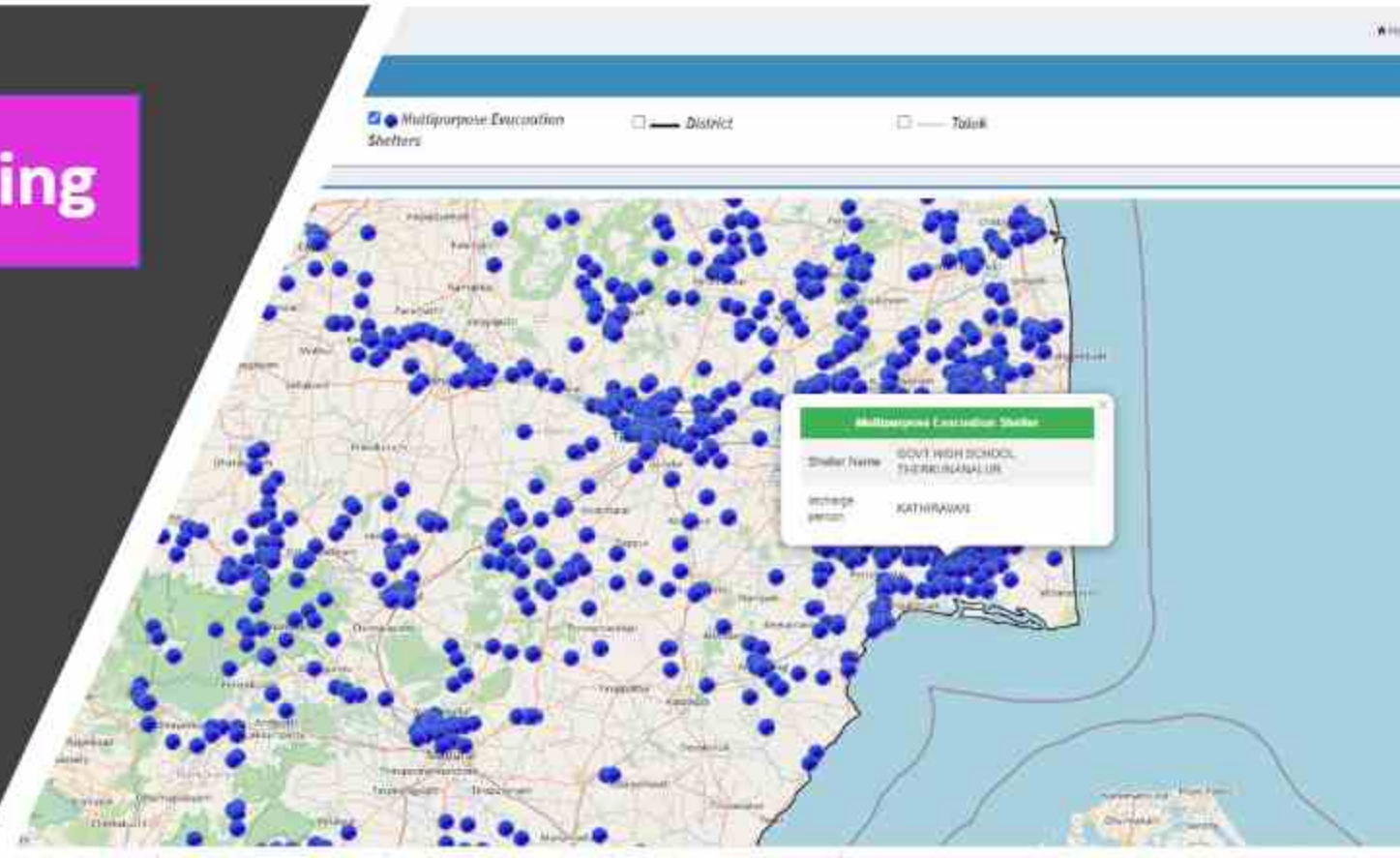
Villages

District	Very High	High	Medium	Low
Thiruvallur	420	822	12	2
Kancheepuram	522	950	328	40
Chennai	254	254	0	0



Module 6 – Response planning

- Response Resources
- Evacuation routes
- Relief shelters
- Details of Response Forces, First Responders, Equipment, Machinery, Ambulance etc.



Module 7 – Risk Communication

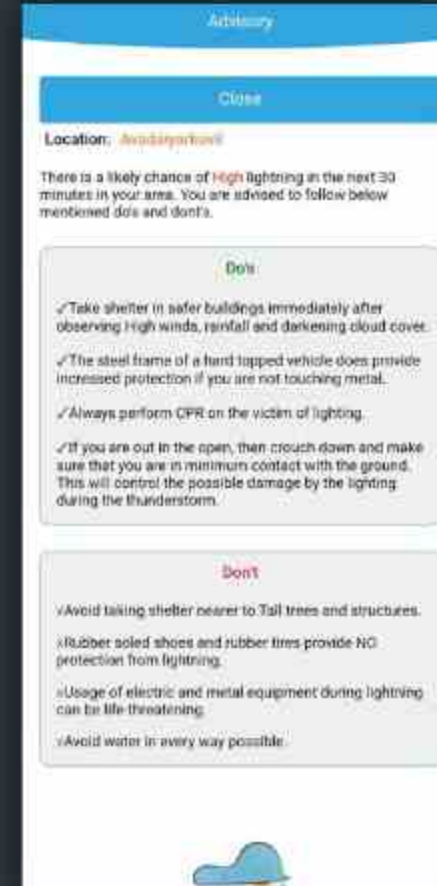


Risk communication - Communicate risk through email, SMS, App message with alarm, social media and website

Public	178626
First Responder	12160
Interdepartmental Team	27072
Nodal Officers	2814
Administrator State	1424
Administrator District	4481
Administrator Division	1542
Administrator Taluk	5116
Administrator Firka	1897
Administrator Village	15196
Media	986
Total	251343

TNSDMA sends from
web-portal directly

As of Jan 2022



TNSDMA sends via
mobile app



Module 8 -Emergency call and Message Registry 1070/ 1077/ via App



To attend to calls/information needs from community.
Forwarded to concerned focal point (DM Tahsildar) and follow up by DRO, PA(G) and the District collector.

Complaint Registry

Dashboard Add Complaint View Complaint Locations Summary Daily Complaints

Individual details

Name*

Phone Number*

E-mail

Address*

Specify, you are a

Source*

Complaint details

District*

Taluk*

Village*

Complaint Category*

Complaint Sub Category*

Message*

Upload Photo No file chosen

Report Emergency

Please fill the following form to report any emergency

Individual Details

Name

Nichanthi

Phone Number

Address

Address Detail

Demanded Service

District

Taluk

Village

Complaint Category

Emergency contacts

District

State

Tirovalur
Circle

Chennai
Circle

Ranchipuram
New Circle

Module 8 -Emergency call and Message Registry



Dashboard

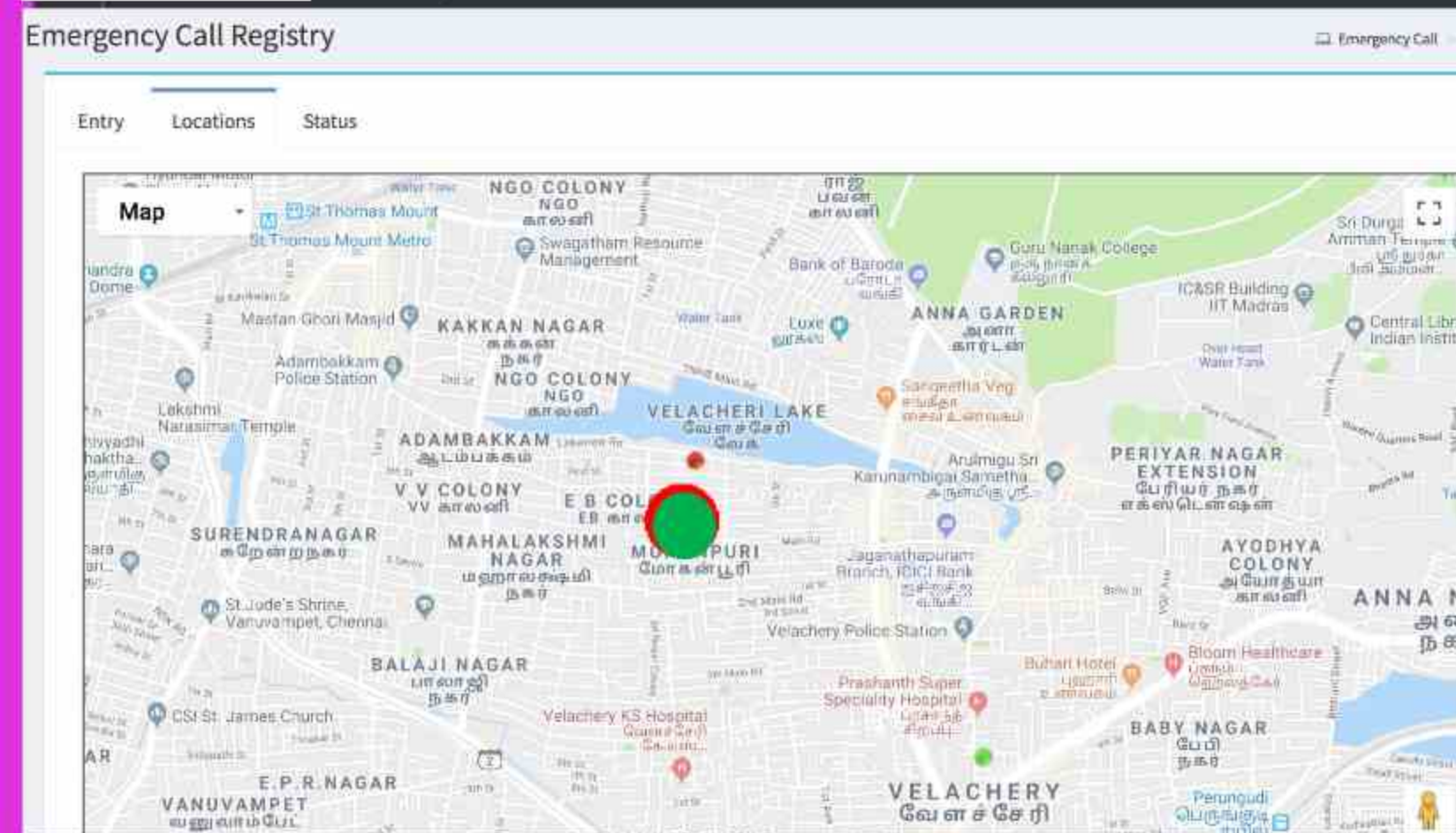
User Service Requests

Sl. No.	Subject of the complaint	Details of the complaint	Completed registry status	Action taken/remarks	Attached Image
1	Completed	...	...
2	Completed	...	...
3	Completed	...	...
4	Completed	...	...
5	Completed	...	...
6	Water pipe was damaged	...	Completed	Damage was done the complaint resolved	...
7	Completed	...	...

Module 9 - Alert call/ Distress call - Response Tracking



- Track action taken on **distress calls** through feedback mechanism
- Integrated with the Emergency call registry
- Fully Automated process: Compliant registered > Forward to District DM Tahsildar > if no action Forward to DRO > PA (G) to Collector for action



- Emergency call registered
- Information forwarded to concerned officer for necessary action
- Action taken

Module 10 - Tracking Risk Reduction

Temporary Mitigation Measures

Kudimaramathu View progress

Date of progress

Select Date

Submitted progress - Date wise

Sl.No	District	Desiltation of tanks/supply channels (PWD)			Desiltation of tanks/supply channels (Localbody)			Desiltation of tanks/supply channels (Total)			Desiltation of river/irrigation canals (Total)	
		Completed (Nos)	Inprogress (Nos)	Encroachments removed (Nos)	Completed (Nos)	Inprogress (Nos)	Encroachments removed (Nos)	Completed (Nos)	Inprogress (Nos)	Encroachments removed (Nos)	Length Completed (Kms)	Length of encroachments removed (Kms)
1	Krishnagiri	11 / 87 (12.64%)	4 / 87 (4.6%)	3284	133 / 429 (31%)							
2	Kanniyakumari	13 / 27 (48.15%)	14 / 27 (51.85%)	0	0 / 151 (0%)							
3	Thiruvananthapuram	0 / 0	0 / 0	0	0 / 0							
4	Nagapattinam	0 / 0	0 / 0	0	501 / 797							

Permanent Mitigation Measures

Kudimaramathu View progress

Date of progress

Select Date

Submitted progress - Date wise

Sl.No	District	Check dams created		Pipe Culverts converted to Box Culverts		Percolation points created		Recharge pits created	
		Vulnerable Area	Other Areas	Vulnerable Area	Other Areas	Vulnerable Area	Other Areas	Vulnerable Area	Other Areas
1	Thiruvananthapuram	0	0	0	0	0	0	0	0
2	Coimbatore	305	55	50	59	0	1	52	122
3	Kanniyakumari	0	127	0	0	0	38	0	6
4	Thiruvallur	42	34	0	70	84	22	44	183
5	Thiruvallur	0	472	186	0	0	86	1	127
6	Perambalur	89	0	176	0	0	0	0	0
7	Tamil Nadu	0	1	0	0	0	0	0	0
8	Ramanathapuram	15	487	47	96	725	952	140	176
9	Thiruvallur	0	219	0	10	0	0	0	0
10	Wudhhothar	0	0	0	0	0	0	0	0
11	Thiruvallur	15	198	0	0	37	295	58	42
12	Kanniyakumari	0	107	0	0	0	2	4	67
13	Wiyelur	0	274	0	18	0	0	65	126
14	Chengalpattu	242	129	92	10	286	206	112	36
15	Nagapattinam	120	0	112	308	0	0	71	0

- Policy level decisions for risk reduction.
- Review vulnerable locations annually based on mitigation measures taken

Modules 12-14 – Report Generation

Automated Rainfall analysis report

Office of the Principal Secretary/Commissioner of Revenue
Administration and State Relief Commissioner
RAINFALL STATISTICS ABSTRACT - 10-Jan-2022
(8:30 a.m. of previous day to 8:30 a.m. of today)

Details	No. of Districts
Rainfall above 20 mm	0
Rainfall - 10 mm to 20 mm	0
Rainfall - 5 mm to 10 mm	0
Rainfall below 5 mm	3
No rain	35
Total	38

Note: Rainfall has occurred in **3** Districts with the State Average of **0.03** mm. **Tenkasi** District has recorded the highest amount of rainfall of **1.60** mm. **Tirunelveli** District has recorded the lowest amount of rainfall of **0.13** mm.

Status report of Raingauge stations as on 10-Jan-2022					
Sl. No	District Name	Raingauge Station		Rainfall (in mm)	
		Available (in Nos)	Updated (in Nos)	Recorded (in mm)	Average (in mm)
1	Tenkasi	5	5	8.00	1.60
2	Kanniyakumari	16	16	4.00	0.25
3	Tirunelveli	8	8	1.00	0.13
4	Tiruvallur	15	15	0.00	0.00
5	Chennai	12	12	0.00	0.00
6	Kancheepuram	5	5	0.00	0.00
7	Vellore	6	6	0.00	0.00
8	Dharmapuri	7	7	0.00	0.00
9	Tiruvannamalai	12	12	0.00	0.00
10	Villupuram	21	21	0.00	0.00
11	Salem	15	15	0.00	0.00
12	Namakkal	11	11	0.00	0.00
13	Erode	8	8	0.00	0.00
14	The Nilgiris	29	29	0.00	0.00
15	Coimbatore	14	14	0.00	0.00
16	Dindigul	10	10	0.00	0.00
17	Karur	12	12	0.00	0.00
18	Thiruchirappalli	24	24	0.00	0.00
19	Perambalur	11	11	0.00	0.00
20	Ariyalur	5	5	0.00	0.00

21	Cuddalore	25	25	0.00	0.00
22	Nagapattinam	7	7	0.00	0.00
23	Thiruvarur	9	9	0.00	0.00
24	Thanjavur	21	21	0.00	0.00
25	Pudukkottai	25	25	0.00	0.00
26	Sivagangai	7	7	0.00	0.00
27	Madurai	20	20	0.00	0.00
28	Theni	12	12	0.00	0.00
29	Virudhunagar	12	12	0.00	0.00
30	Ramanathapuram	16	16	0.00	0.00
31	Thoothukudi	19	19	0.00	0.00
32	Krishnagiri	12	12	0.00	0.00
33	Tiruppur	17	17	0.00	0.00
34	Kallakurichi	21	21	0.00	0.00
35	Chengalpattu	8	8	0.00	0.00
36	Tirupathur	7	7	0.00	0.00
37	Ranipet	7	7	0.00	0.00
38	Mayiladuthurai	5	5	0.00	0.00
Total		496	496	13	0.03



Modules 12-14 – Report Generation

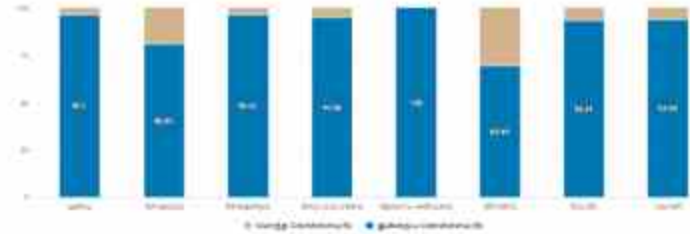
- Rainfall analysis, next 2 days forecast, Reservoir details, Losses and damages, and other incidents are generated as a report (Tamil)

2. வானிலை முன்னறிவிப்பு

இன்று 02.01.2022, நாகப்பட்டினம், மயிலாடுதுறை, தஞ்சாவூர், திருவாரூர் மற்றும் கடலூர் மாவட்டங்களில் ஓரிகு இடங்களில் இடியுடன் கூடிய கன மழையும், பிற மாவட்டங்களில் ஒரு சில இடங்களில் இடியுடன் கூடிய வேசானது முதல் மிதமான மழையும் பெய்யக்கூடும்.

3. முக்கிய அளவைகள் / நீர்த்தேக்கங்களில் நீர் வரத்து மற்றும் நீர் வெளியேற்ற விபரம்

வ. எண்.	அளவை / நீர்த்தேக்கம்	மொத்த கொள்ளளவு (மி.கூ.அ.)	நீர் இருப்பு (மி.கூ.அ.)	நீர் இருப்பு சதவீதம் (%)	வரத்து (கன அடி)	வெளியேற்றம் (கன அடி)
1	புண்டி	3231	3118	96.5	1117	1082
2	சொழவரம்	1081	874	80.85	622	850
3	செங்குன்றம்	3300	3182	96.42	629	1151
4	செம்பரம்பாக்கம்	3645	3465	95.06	900	1107
5	தேர்வாய் தண்டியை	500	500	100	216	216
6	வீரானம்	1465	1018	69.49	1163	350
7	மேட்டுநீர்	93470	87217	93.31	4138	1603
8	பவளி	32800	30830	93.99	1768	2900



4. நிவாரண முகாம்கள்

பாதிப்பிற்குள்ளான பகுதிகளில் வசித்து வந்த 206 நபர்கள் பாதுகாப்பாக மீட்கப்பட்டு 2 நிவாரண முகாம்களில் தங்க வைக்கப்பட்டு அவர்களுக்கு தேவையான உணவு, பாதுகாப்பான குடிநீர் உள்சிட்ட அடிப்படை வசதிகள் வழங்கப்பட்டுள்ளது.

வ.எண்.	மாவட்டம்	நிவாரண முகாம்கள்	நபர்களின் எண்ணிக்கை
1	சென்னை	1	167
2	வேலூர்	1	39
	மொத்தம்	2	206

5. சேத விபரம்

வ.எண்.	சேத விபரம்	எண்ணிக்கை
1	குடிசை வீடுகள்	
	பகுதியாக	20
	முழுமையாக	1
	மொத்தம்	21
2	வீடுகள்	
	பகுதியாக	9
	முழுமையாக	0
	மொத்தம்	9

6. இதர சேதங்கள்

நாகப்பட்டினம் மாவட்டத்தில் பெய்த மழையின் காரணமாக சில இடங்களில் விளை நிலங்களில் மழை நீர் தேங்கியுள்ளது எனவும் மூதற்கட்ட ஆய்வின்படி சுமார் 400 ஹெக்டேர் பரப்பில் உள்ள பயிர்கள் சேதமடைந்துள்ளது எனவும் நாகப்பட்டினம் மாவட்ட ஆட்சியர் தெரிவித்துள்ளார்.

7. குறிப்பிடத்தக்க நிகழ்வுகள்

பெருநகர சென்னை மாநகராட்சி பகுதியில் மழை நீர் தேக்கியுள்ள 311 இடங்களில், 171 இடங்களில் மழை நீர் வெளியேற்றப்பட்டு, ஏதேனும் 140 இடங்களில் 350 பயிர்கள் உபயோகப்படுத்தப்பட்டு மழை நீரை வெளியேற்றும் பணி நடைபெற்று வருகிறது. 22 சுரங்கபாதைகளில், 20 சுரங்கபாதைகளில் மழை நீர் வெளியேற்றப்பட்டு ஏதேனும் 2 சுரங்கபாதைகளில் மழை நீர் வெளியேற்றும் பணி தொடர்ந்து நடைபெற்று வருகிறது.

02-01-2022 க்கான வானிலை முன்னறிவிப்பு



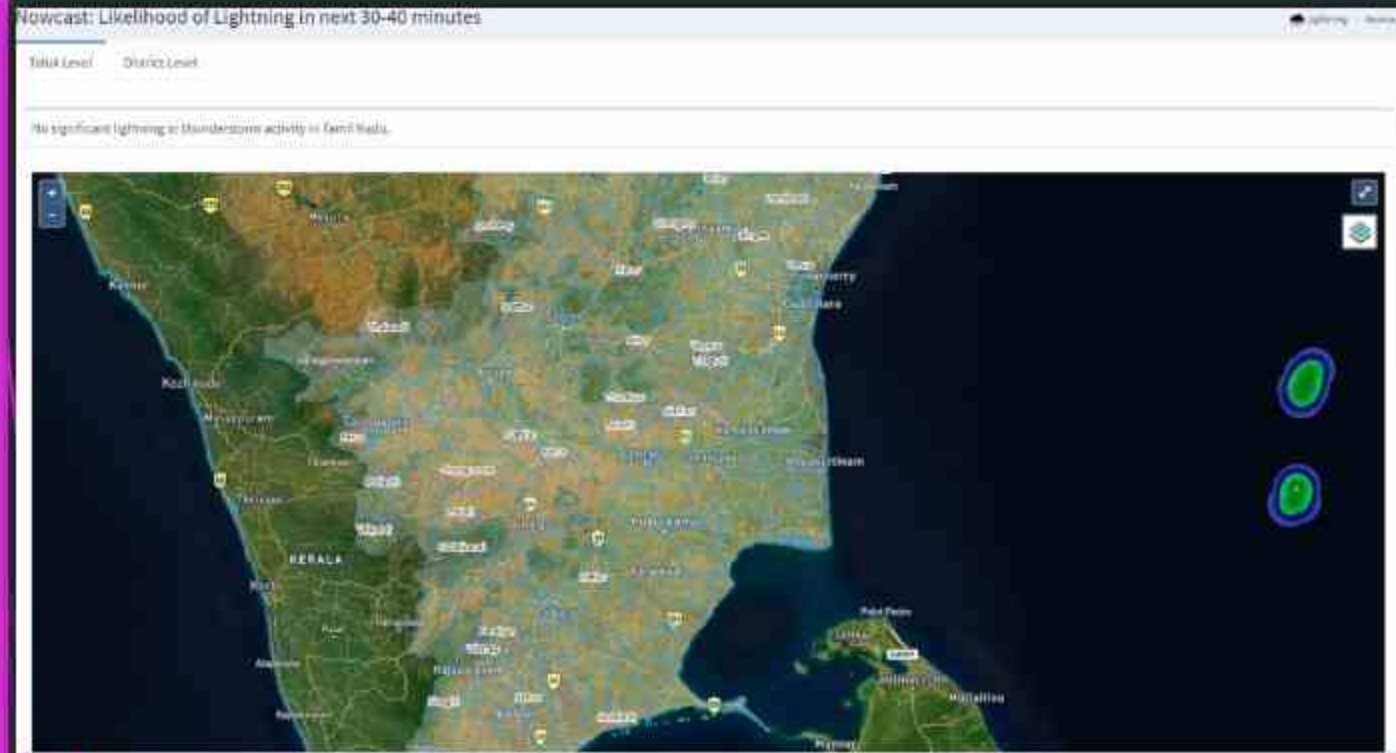
இதற்கு வானிலை அபிவிருத்தி

Modules 12-14 – Report Generation

- Automated 90 Reservoir details report

BASIN WISE SURFACE WATER STORAGE POSITION OF TAMILNADU (as on 10-01-2022)								
Sl. No.	Name of the River Basin	WRD Dams / Reservoirs in the River Basin						
		District	Name of the Dam / Reservoir	Full reservoir depth in feet	Full storage capacity in Mcft	Level in feet as on 10-01-2022	Storage as on 10-01-2022 in Mcft	Percentage of Storage
1	Chennai river	Tiruvallur	1.Poondi	35.00	3231.00	34.92	3122	96.6
1	Chennai river	Tiruvallur	2.Redhills	21.20	3300.00	20.49	3110	94.2
1	Chennai river	Tiruvallur	3.Cholavaram	18.86	1081.00	17.87	882	81.6
1	Chennai river	Kancheepuram	4.Chembarampak kam	24.00	3645.00	23.05	3387	92.9
1	Chennai river	Tiruvallur	5.Thervoy Kandigai	36.61	500.00	36.61	500	100
			Total		11757		11001	465.3
2	Palar	Tiruvannamalai	6.Kuppanatham	59.04	700.00	59.05	700	100
2	Palar	Tiruvannamalai	7.Mirugandanadhi	22.37	87.23	20.01	70.71	81.1
2	Palar	Tiruvannamalai	8.Shenbagathope	62.40	287.00	56.09	224.6	78.3
2	Palar	Vellore	9.Mordhana	37.73	261.36	37.73	261.36	100
2	Palar	Vellore	10.Rajathopekana r	24.57	20.52	24.57	20.52	100
			Total		1356.11		1277.19	459.4
3	Varahanathi	Vilupuram	11.Vidur	32.00	605.00	31.87	595.24	98.4
			Total		605		595.24	98.4
4	Pennaiyar	Dharmapuri	12.Thumbalahalli	14.76	131.00	0	0	0
4	Pennaiyar	Dharmapuri	13.Vaaniar	65.27	418.00	64.75	412.79	98.8
4	Pennaiyar	Dharmapuri	14.Varattar Valima	34.45	110.33	34.45	110.33	100
4	Pennaiyar	Krishnagiri	15.Kelavarapalli	44.30	481.00	40.02	333.88	69.4
4	Pennaiyar	Krishnagiri	16.Krishnagiri	52.00	1666.30	51.75	1638	98.3
4	Pennaiyar	Krishnagiri	17.Pambar	19.60	280.00	19.32	274.02	97.9
4	Pennaiyar	Krishnagiri	18.Sulagirichinnar	32.80	81.20	32.32	74.65	91.9
4	Pennaiyar	Tirupathur	19.Andiappanur Odai	26.25	112.20	26.24	112.2	100
4	Pennaiyar	Tiruvannamalai	20.Sathanur	119.00	7321.00	99	3609	49.3
			Total		10601.03		6564.87	705.6
5	Vellar	Salem	21.Kariakovil	53.00	190.00	52.49	190	100
5	Vellar	Salem	22.Anaimadavu	67.25	267.00	67.25	267	100
5	Vellar	Kallakurichi	23.Gomuki	46.00	560.96	46	560.96	100
5	Vellar	Kallakurichi	24.Manimukthana dhi	36.00	736.50	34.5	628.5	85.3

TNSMART: 2021 enhancements : Lightning



Lightning

● Ponneri, Tiruvallur

Current Lightning Status

No Lightning

Favourite Location

Gammidipoondi

Status No Lightning

Tiruvallur

Status No Lightning

Velacheri

Status No Lightning

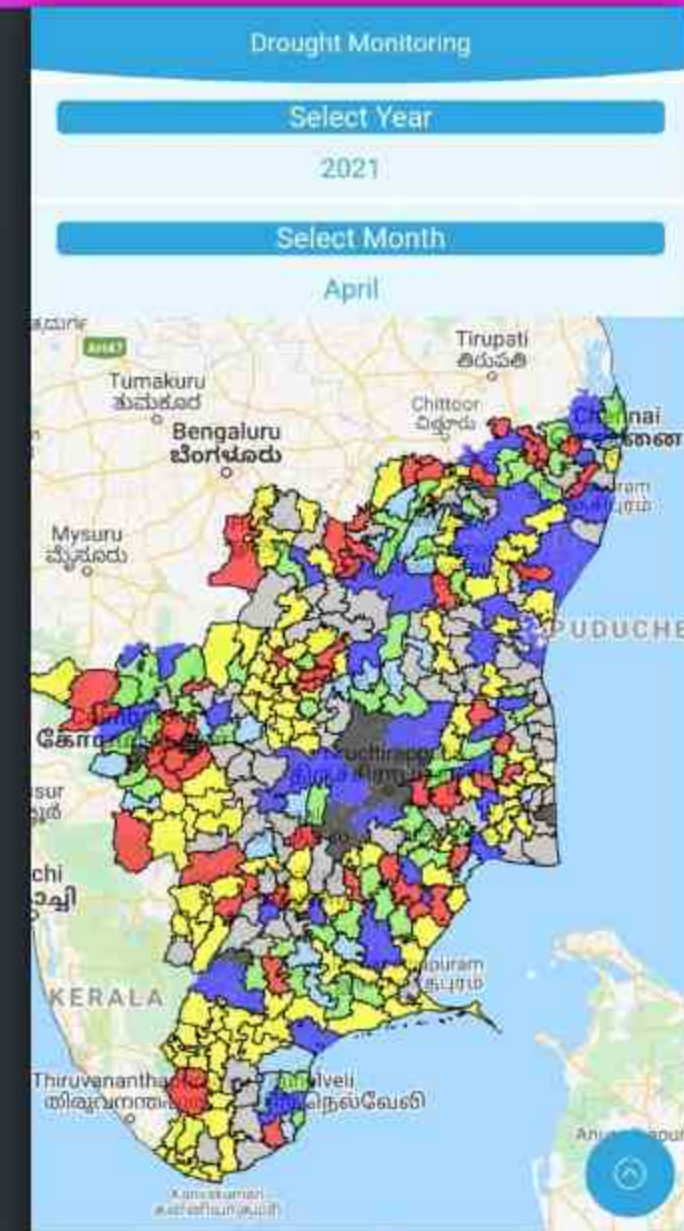
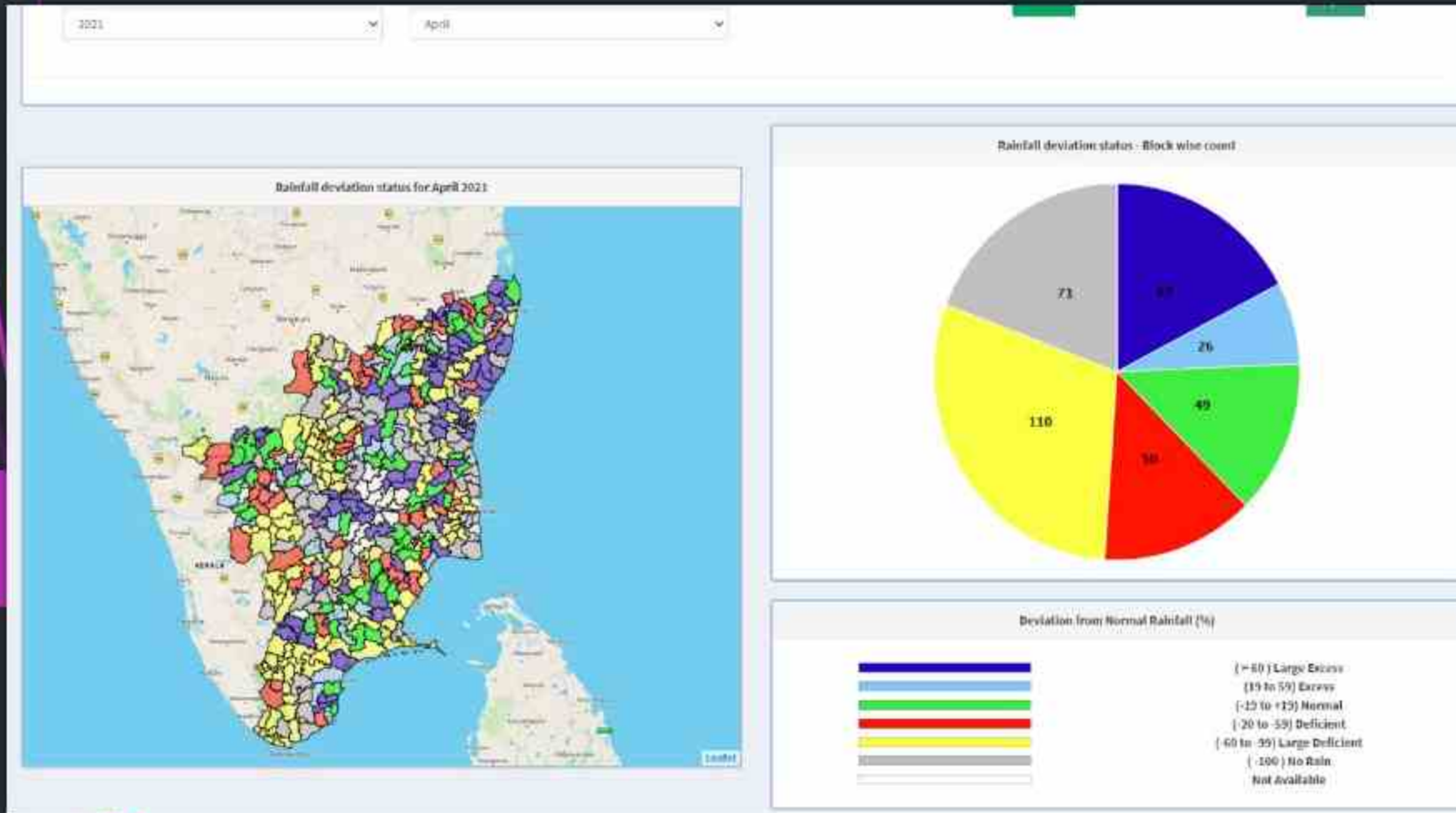


- Receive the IITM last 5 min, 10 min, 15 min datasets in a Map view form
- Also receive the Dangerous thunderstorm Alerts over polygon received from Earth Networks Sensors
- Integrated IMD Nowcast Products

TNSMART: 2021 enhancements : Drought

Auto computation of monthly, fortnightly and weekly

- Dry Spells and Rainfall deficits





Thank You