GOVERNMENT OF ANDHRA PRADESH

HEAT WAVE ACTION PLAN - 2019

ANDHRA PRADESH STATE DISASTER MANAGEMENT AUTHORITY
REVENUE (DM) DEPARTMENT.

Contents

EXECUTIVE SUMMARY

Heat wave is also called a “silent disaster” as it develops slowly injures, kills humans and animals statewide. Higher daily peak temperatures of longer duration and more intense heat waves are increasing frequently, globally due to climate change.

As stated in the State Level Climatic Monologue (IMD) “State averaged summer mean maximum temperatures have increased over Andaman and Nicobar, **Andhra Pradesh**, Goa, Himachal Pradesh, Karnataka, Kerala, Lakshadweep, Maharashtra, Mizoram, Rajasthan, Sikkim and Tamil Nadu.” The figure is as below.

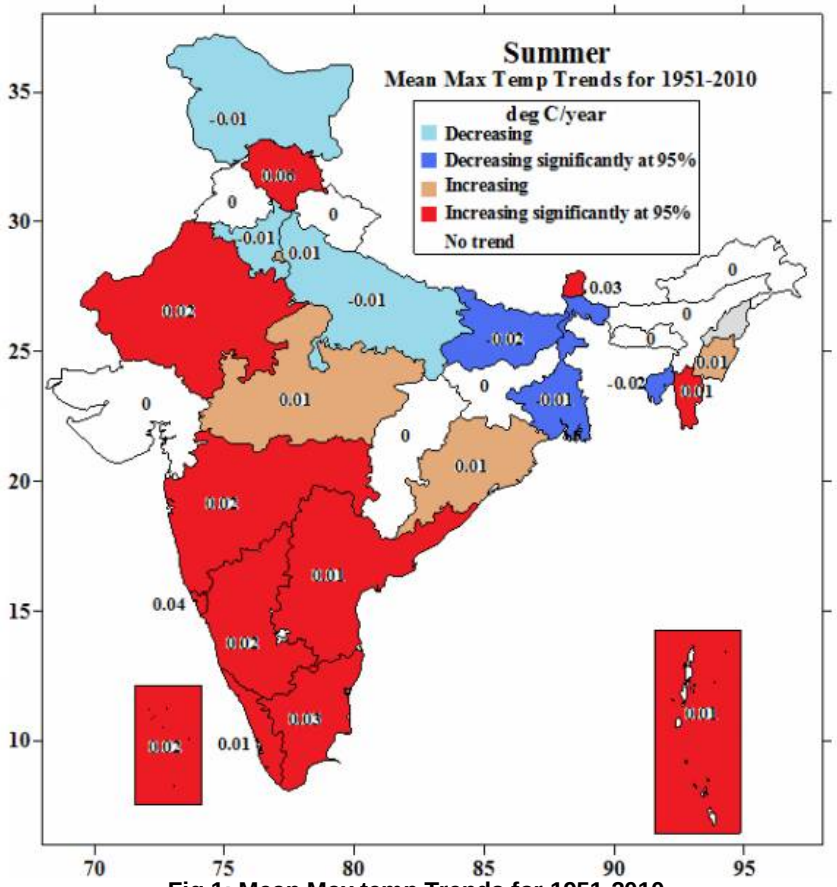


Fig 1: Mean Max temp Trends for 1951-2010

The extreme temperatures combined with high humidity and resultant atmospheric conditions adversely affect people living in these regions leading to physiological stress, sometimes even death. This unusual and uncomfortable hot weather can impact human and animal health and also cause major disruption in community infrastructure such as power supply, public transport and other essential services. The heat wave action plan is formulated to enable administrators to take appropriate measures and action for being in a state of preparedness for the heat wave during the months of March, April and May.

1. INTRODUCTION

There is a strong and global scientific consensus that the climate is changing and this change will cause an increase in average global temperatures, as well as the number and intensity of heat-waves. Heat-waves are a significant cause of death and morbidity across the world, and the impacts of heat events are likely to increase due to changing frequency, severity, and intensity of heat-waves caused by climate change.

India too is feeling the impact of climate change in terms of increased instances of heat waves which are more intense in nature with each passing year, and have a devastating impact on human health thereby increasing the number of heat wave casualties. Heat waves have contributed to more deaths than any other natural disaster in Andhra Pradesh and represent a significant risk to public health.

Heat wave action plan of AP adopted two criteria to identify the heat wave affected areas; one based on the criteria suggested by IMD using observed maximum daily temperature and its deviation from normal and second one using a Thermal index computed in combination of temperature and humidity taking the threshold values for heat index based on bio-climatic charts suitable to areas in Andhra Pradesh region.

Increased occurrences of summer heat wave conditions in recent years are fettle to the human life. Prior information about the possible heat wave conditions will help in reducing the risk to human life also helps in taking precautionary action, also the government agencies to be vigilant and allow them to plan outreach activities to save the lives of the public.

2. HEAT WAVE

What is a Heat Wave?

There is no universally excepted definition for heat wave, it is generally defined as a prolonged period of temperature above normal (excessive heat). As per World Meteorological Organization (WMO) heat wave is defined as “when the daily maximum temperature of more than five consecutive days exceeds the average maximum temperature by 5°C.

As per India Meteorological Department (IMD) for heat wave to be declared,
Following criteria to be met:

When maximum temperature reaches **40°C in plains** and at least **30°C in hilly Regions.**
i) Based on Departure from Normal ➢ **Heat Wave:** Departure from normal is **4.5°C to 6.4°C.** ➢ **Severe Heat Wave:** Departure from normal is **>6.4°C** or **more.**
ii) Based on Actual Maximum Temperature ➢ **Heat Wave:** When actual maximum temperature **≥ 45°**C. ➢ **Severe Heat Wave:** When actual maximum temperature **≥47°C.**
iii) Criteria for describing Heat Wave for coastal stations When maximum temperature departure is **4.5°C or more** from normal, Heat Wave may be described provided actual maximum temperature is **37°C or more**.

To declare a heat wave, the above criteria should be met at least at two stations in a Meteorological sub-division for at-least two consecutive days. A heat wave will be declared on the second day.

Color Signals for Heat wave Alert

The Heat alerts based on thresholds determined by the IMD using the following color signal system shall be issued

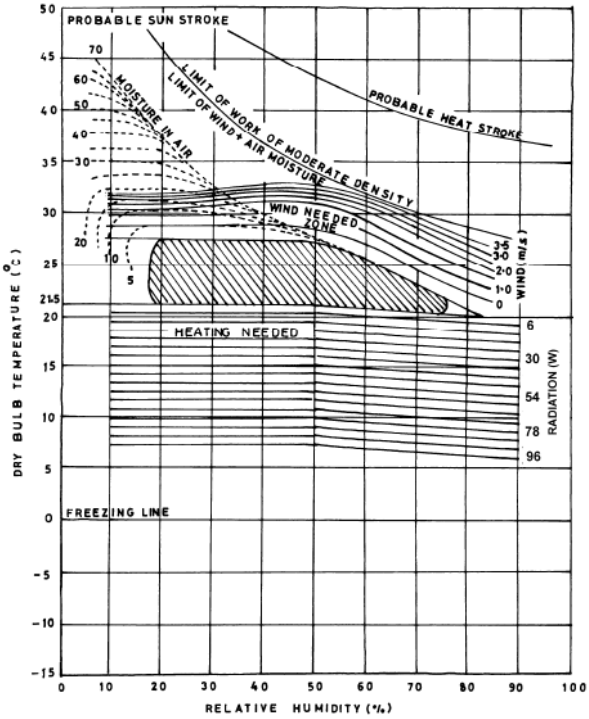
Red Alert (Severe Condition)	**Extreme Heat Alert for the Day**	**Normal Maximum Temp increase 6º C to more**
Orange Alert (Moderate Condition)	**Heat Alert Day**	**Normal Maximum Temp increase 4º C to 5º C**
Yellow Alert (Heat-wave Warning)	**Hot Day**	**Nearby Normal Maximum Temp.**
White (Normal)	**No Alert**	**Below Normal Maximum Temp.**

Table: 1. Classification of Heat wave

3. THERMAL HEAT INDICES

Globally, a combination of maximum temperature and relative humidity are used to assess the impact of 'Heat Wave' conditions.

For Indian conditions, the hand book of Energy **Conscious Buildings by Ministry of New and Renewable Energy, GOI,** indicates the zones of human comfort based on ambient temperature and humidity, mean radiant temperature, wind speed, solar radiation and evaporative cooling.



Bio-climatic chart

Reference: BIO-CLIMATE Reference **Center for Renewable Energy Sources and Saving (CRESS)**

4. THE HEAT INDEX AND HEAT HEALTH TEMPERATURE THRESHOLD

The combination of high temperature and high relative humidity serves to reduce the thermal comfort defined as the ability to tolerate the stress generated by this combination of temperature and humidity. A combined effect of Temperature and Humidity is defined as the Heat Index as a measure of Human Discomfort. Normally the temperature around 25º C and the humidity >45% are the comfort zones. Any increase in this values leads to different levels of discomfort.

Classification of Heat Index (HI) and health impacts

.Heat Index	Category	Health Effects
22 – 33^0 C	Slightly Warm	**Caution**- Fatigue possible with prolonged exposure and/or physical activity. Continuing activity could result in heat cramps
34 – 45^0 C	Warm	**Extreme caution**- Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
46 - 69^0 C	Hot	**Danger**- Heat cramps or heat exhaustion likely and heatstroke possible with prolonged exposure and/or physical activity
>70^0 C	Very Hot	**Extreme danger**- Heatstroke highly likely with continued exposure

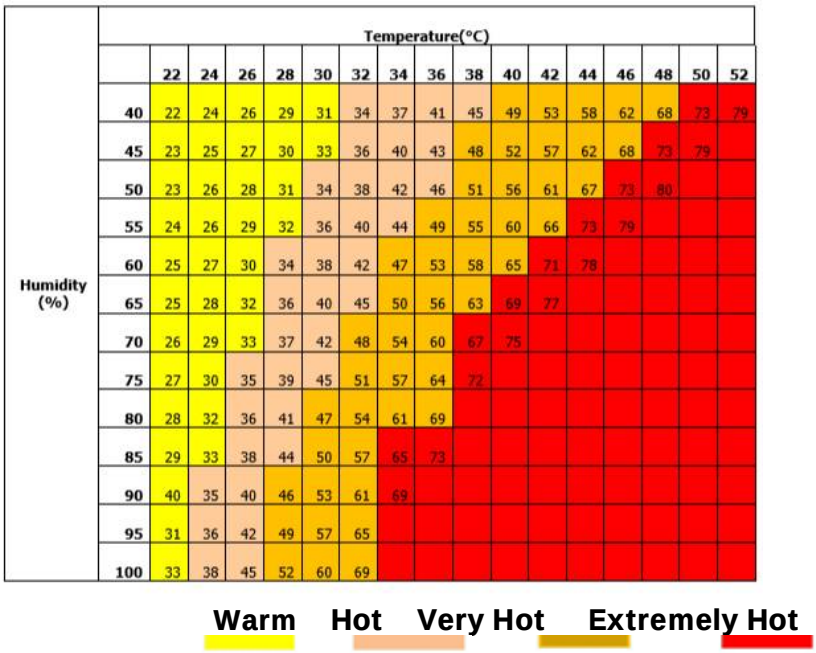
Table: 2. Classification of Heat Index (HI) and health impacts

The heat health threshold temperature is based on the average or mean, temperature using the forecast day maximum and the forecast overnight temperature for the following day.

EXTRACT FROM TENNIS NATIONAL WEATHER SERVICE PUBLISHED GUIDELINES

The Heat Index was devised for shady, light wind conditions and does not take into account radiant heat. Direct sunshine and strong, hot, dry winds can significantly increase the “apparent temperature” and thus the risk of heat stress.

On the chart, dry bulb temperature is used as the ordinate, and relative humidity as the abscissa. The above chart developed for Indian conditions, shall be adopted for identifying the threshold conditions for discomfort/ alert / critical levels due to increased temperature and humidity levels.



5. History of Heat Wave in AP

The governments of Andhra Pradesh have a dense network of weather observation network to continuously monitor temperatures across the state, these data provide the spatial distribution of temperatures in real-time monitoring. Numerical model temperatures are useful in forecasting of heat wave conditions to disseminate the information to all stakeholders. Since 2016, Government of AP have adopted heat wave action plan for monitoring heat wave conditions based on observed temperature data and weather forecast information is a part. In the past Six years, AP has endured heat waves almost every year and duration of heat period is increasing in every part of the state. Data on the daily maximum temperature recorded at AWS stations, each representing a Mandal in the state, ranged from 40°C to 45°C showing deviations of 3–6°C from the climatic normal during 01 March – 6 June 2018

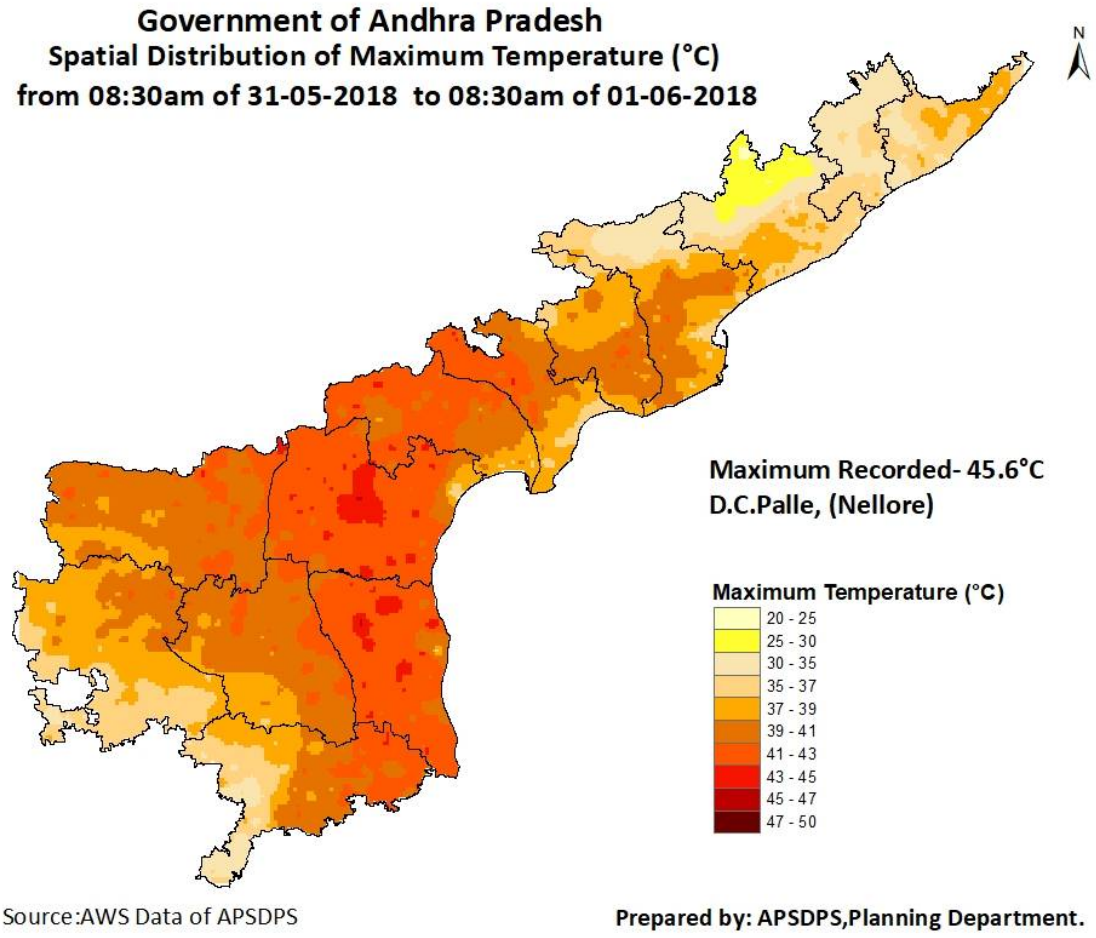


Fig: 2. Highest Temperature Recorded Day is 31-05-2018

Season Highest Temperature recorded from 2016-2018

S.No	Year	District	Mandal	Date	Highest Max.Temperatures
1	2016	Prakasam	Veligandla	02.05.2016	48.6 °C
2	2017	Prakasam	Tanguturu	17.05.2017	47.8 °C
3	2018	Nellore	Marripadu,Dachepalle(location)	31.05.2018	45.6 °C

Table: 3. season highest maximum temperatures from 2016-2018

District wise Season Highest Temperature recorded from 2018

S.no	District	Mandal	Location	Date	Season Max Temperature^{0}C
1	Srikakulam	Meliaputti	Meliaputti	04-Jun-18	43.7
2	Vizianagaram	Therlam	Therlam	16-Apr-18	43.0
3	Visakhapatnam	Madugula	Madugula	30-May-18	43.4
4	East Godavari	seethanagaram	Muggaulla	30-May-18	44.6
5	West Godavari	Tadepalligudem	Pedatadepalle	04-Jun-18	44.6
6	Krishna	G Konduru	G Konduru	30-May-18	44.1
7	Guntur	Dachepalle	Nadikudi	29-May-18	44.9
8	Prakasam	Konakanamitla	Konakanamitla	31-May-18	45.3
9	Nellore	Marripadu	D.C.Palle	31-May-18	45.6
10	Chittoor	Renigunta	Renigunta	30-Apr-18	44.7
11	Kadapa	Chitvel	Timmayagaripalle	30-Apr-18	44.6
12	Anantapur	Putlur	Ellutla	22-Apr-18	43.9
13	Kurnool	Allagadda	Allagadda	22-Apr-18	44.7

Table:4. Season maximum temperature - 2018

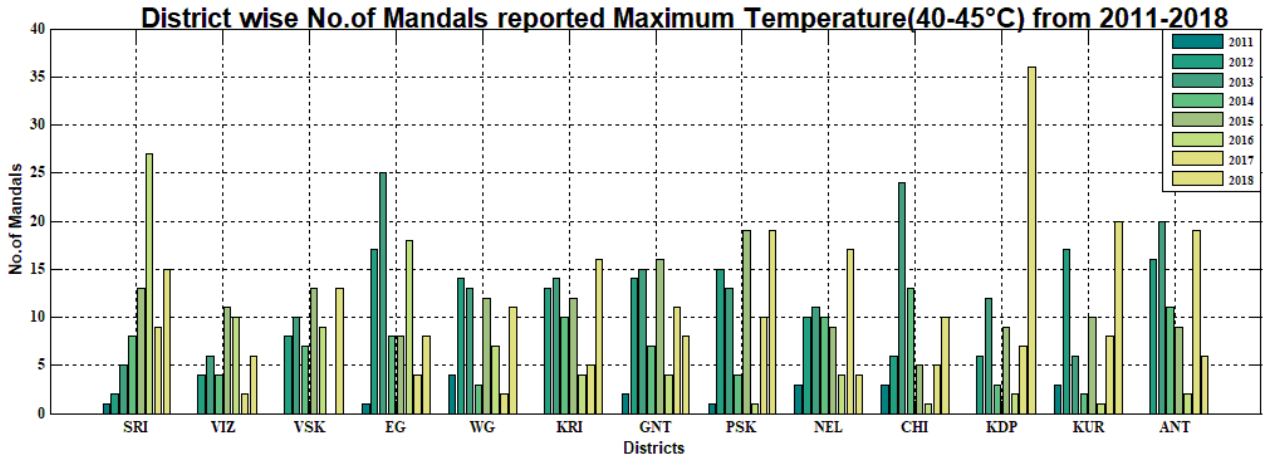


Figure:4 Maximum temperature (40-45°C)

District wise no. of Mandals recorded in between (40°C - 45°C) and above 45°C Maximum temperature for the period from 2014-18.

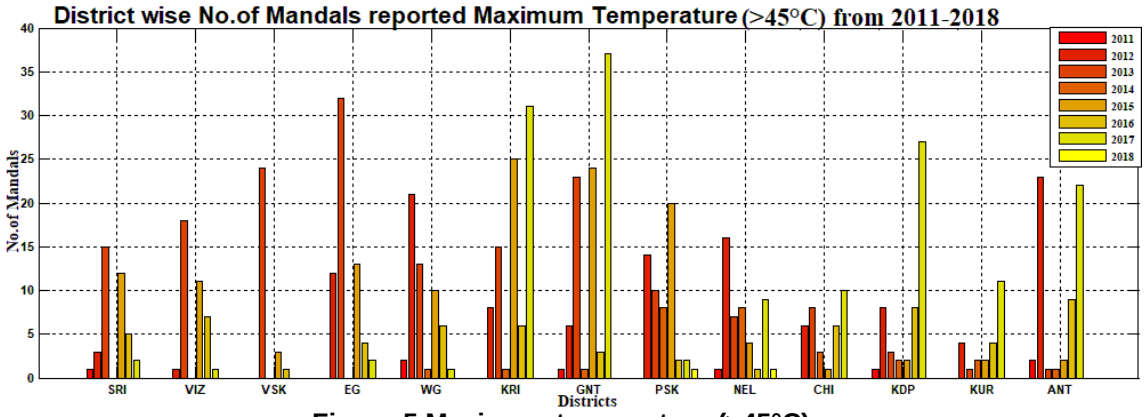


Figure:5 Maximum temperature (>45°C)

The no. of maximum temperature Mandals showed an increasing trend from about (> 45°C) in the coastal districts. Subsequently 2015 and 2017, the (40°C - 45°C) temperatures showed a progressive increase in all the districts. However, the maximum temperature days recorded Krishna, Guntur, Prakasam, Kadapa and Kurnool in the recent 2018.

This requires a close monitoring of weather data to provide warnings to people about the possible heat wave conditions such an advance notification about the possible heat wave conditions greatly reduce the risk of deaths.

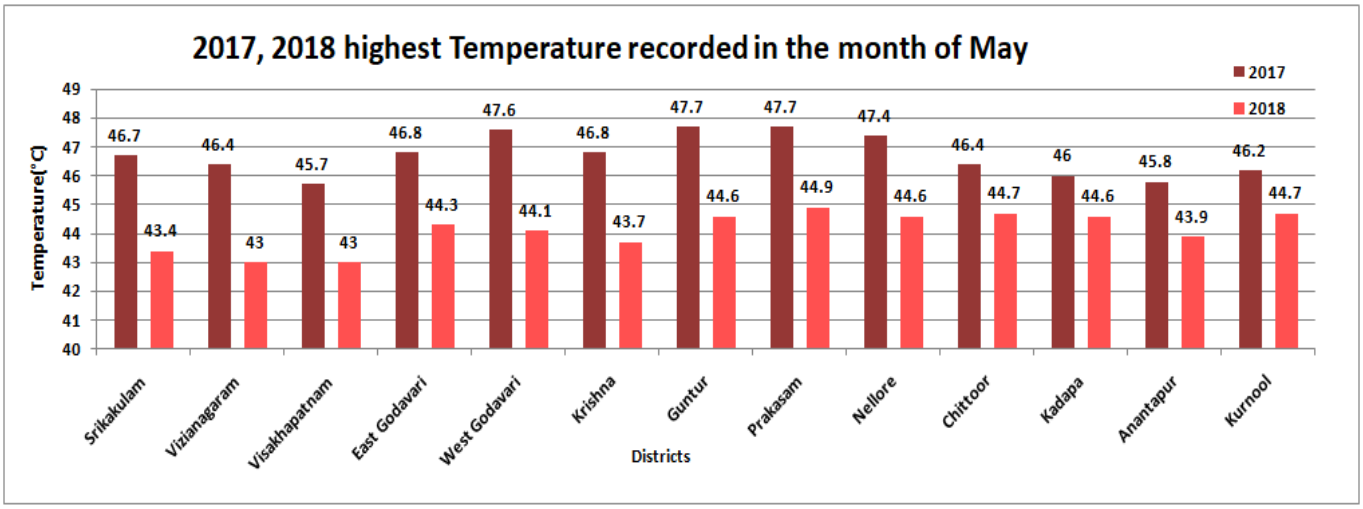


Figure:6 Maximum temperature 2017 & 2018

District– wise Sun stroke Deaths form 2014-2018

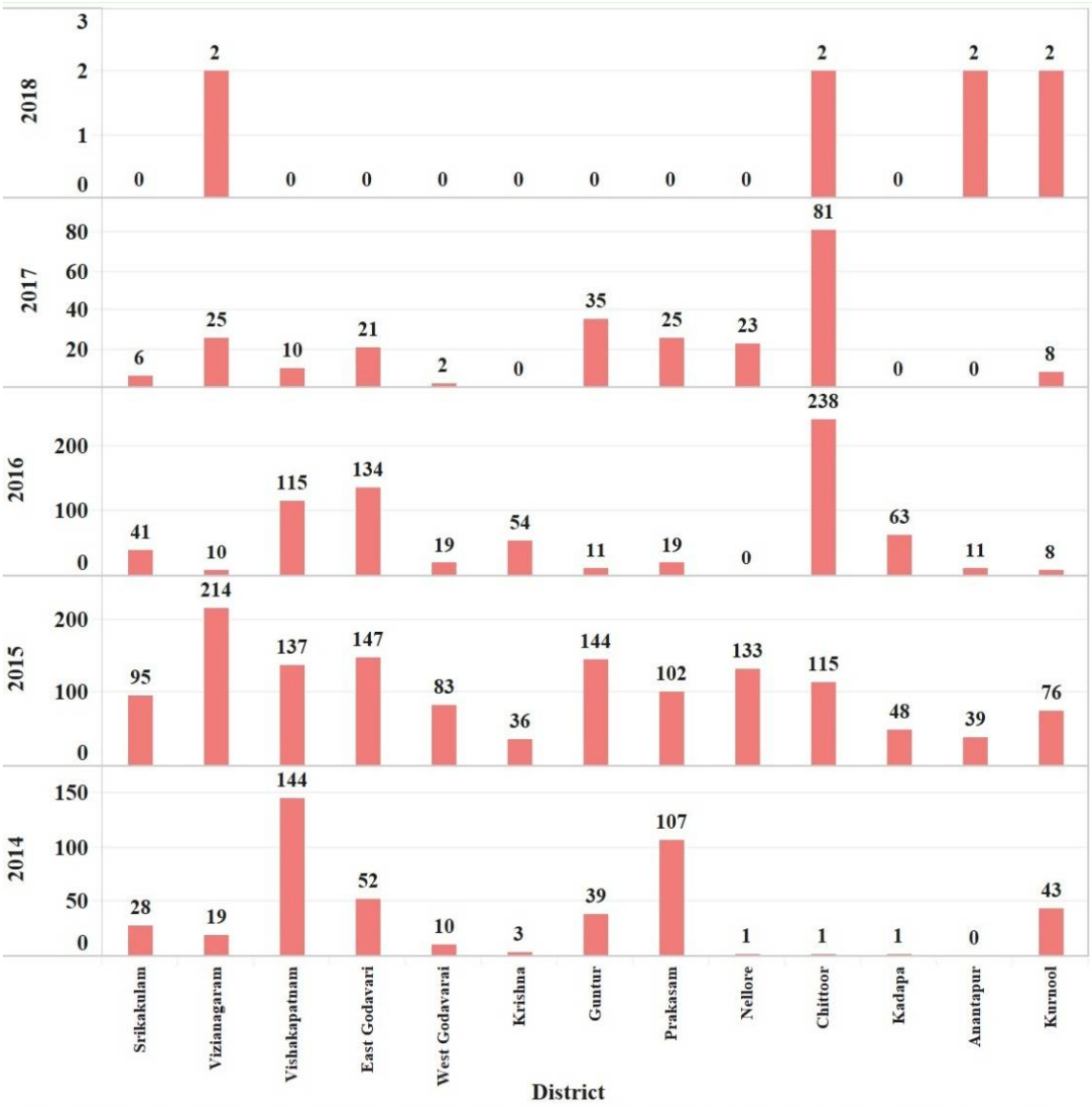


Figure: 7 District-wise heat-wave related deaths in Andhra Pradesh during 2014 – 2018

The evidence about the risks to health from heat waves is extensive and consistent from around the world. Excessive exposure to high temperatures can kill. During the summer heat wave of 2014, 15, 16 &17 in Andhra Pradesh. Unprecedentedly high day and night-time temperatures Resulted in 2776 deaths.

After consequent, collaboration efforts of Government of Andhra Pradesh, through implementation of heat wave action plan by Andhra Pradesh State Disaster Management Authority, and line departments, efforts on continuous monitoring and early warning has significantly reduced the death of sunstroke in the year 2018, to a single digit of 8 deaths.

6. NECESSITY OF HEAT WAVE ACTION PLAN

There is a need of a coordinated multi-agency approach to the state's management of heat waves. At present, the problem of heat waves is being managed at an operational level but it needs to be managed at a strategic level. There is the need for clear roles and responsibilities in the management of heat waves, sufficient strategic monitoring, and greater clarity around triggers for activation and sharing of data across multiple systems and mapping or analysis of the extreme heat impacts across the community.

Earlier efforts of the State Government to reduce mortality and mitigate the suffering of General Public due to Heat waves even after implementing some of the recommendations of the State Level Committee headed by Director General, TERI, New Delhi, (Early Warning System, and Public Awareness Campaigning etc.) have not proved sufficient. This may be seen from the fact that 448 deaths were reported due to Heat Wave / Sun Stroke during summer-2014 which increased to 1369 in Summer-2015, 723 in Summer -2016, 236 in Summer-2017, 08 in the year 2018.

Taking cognizance of the serious situation arising out of the intense Heat Waves on general public leading to high fatalities, the Government have issued Orders constituting a Committee with eleven (11) Principal Secretaries/Director rank officers as members under the Chairmanship of the Principal Secretary to Government, Revenue (Land & DM) to prepare a Comprehensive Heat Wave Action Plan for Andhra Pradesh State vide G.O. Ms. No.14, Revenue (DM.II) Department, dt.03.12.2015.

The Committee, after deliberations on studying the Heat wave Action Plans of other states and best practices worldwide, prepared a Comprehensive 'The Andhra Pradesh State Heat wave Action Plan.

7. OBJECTIVE OF THE PLAN

The primary objective of the Plan is to reduce heat-related morbidity and deaths through issuing **heat-health warnings**, with particular emphasis on the most vulnerable population groups, provide timely advice and announcements of upcoming

Heat-waves raise awareness amongst the public and health workers to take appropriate precautions and coordinate and mobilize all available resources in a timely manner to prevent

and reduce the negative health consequences of heat-waves. It aims to achieve this objective by providing a framework for implementation, coordination of an integrated response and continuous evaluation of extreme heat response activities.

8. KEY COMPONENTS OF THE PLAN

To monitor climate conditions and Initiating an Early Warning System and Inter-Agency Coordination to alert stakeholders of predicted high and extreme temperatures.
Building Public Awareness and increasing Community Outreach to communicate the risks of heat waves and implement practices to prevent heat-related deaths and illnesses. Special efforts will be made to reach vulnerable populations through inter-personal communication as well as other outreach methods which include posters, brochures and information sheets etc.

- Identifying vulnerable populations and the health risks specific to each group.
- Developing effective strategies, agency coordination and response planning that addresses heat-health risks.
- Heat Health Information Surveillance System—to monitor and assess the impact of heat waves on human health.
- Capacity Building among Health Care Professionals to recognize and respond to heat-related illnesses, particularly during extreme heat events.
- Reducing Heat Exposure and Promoting Adaptive Measures by launching new efforts including mapping of high-risk areas, assess to potable drinking water and cooling spaces during extreme heat days.
- Collaboration with non-governmental organizations as a means to expand outreach and communication with the most vulnerable communities. Evaluating and updating the Heat Action Plan regularly.

9. HEAT WAVE ALERT WARNING SYSTEMS (HWAWS)

Accurate and timely alert systems are essential. Collaboration with India Meteorological Department (IMD) is needed to develop heat wave warning systems (HWS), trigger a warning,

determine the threshold for action and communicate the risks. It is important that a HAWS is targeted to the local needs and is accurate and timely.

India Meteorological Department (IMD) is forecasting Heat Waves, as defined by forecasts of day and night temperatures and their duration well in advance and communicating the details of forecasts, in addition to posting them on their web site (www.imdhyderabad.gov.in).
Also Governments of Andhra Pradesh have installed Automated Weather Stations (AWS) across the state. These weather stations report temperature and Relative Humidity on hourly basis. The data from these stations are uploaded on real-time.

In addition Possible 'Heat Wave' impact maps generated by India Meteorological Department (IMD) / Andhra Pradesh State Development Planning Society (APSDPS) based on the simulations made shall be used as guidance maps for taking precautionary measures by various departments.

A new system of exclusively heat-related warnings has been introduced with effect from 01 March 2016. Numerical Weather Prediction temperatures for identifying areas prone to heat wave conditions in next 24hours and 48 hours using the criteria suggested by IMD as well as Heat Index. Mandal level advisories about possible heat wave conditions in the next 48 hours have been generated and compared with the actual areas affected by heat wave conditions. IMD NWP models data (9 km x 9 km resolution) has been used to prepare the advisories at Mandal (sub-district) level. These warnings, valid for the next two days, are issued around 04:00 PM daily and are provided to all concerned authorities for taking suitable action at their end.

Government of Andhra Pradesh
Andhra Pradesh State Disaster Management Authority (APSDMA),
Revenue (DM) Department.

Daily Forecast on Heat wave Condition

26-05-2018

Heat Wave (Based on Max Temperature & Using IMD Criteria)

Total Mandals	Observed AWS Data 26.05.2018			Forecast for Next 24hr (Valid from 08.30am 27.05.2018 to 08.30am of 28.05.2018)			Forecast for Next 48hr(Valid from 08.30am 28.05.2018 to 08.30am of 29.05.2018)		
	Severe Heat Wave	Moderate Heat wave	No Heat Wave	Severe Heat Wave	Moderate Heat wave	No Heat Wave	Severe Heat Wave	Moderate Heat wave	No Heat Wave
670	0	0	670	0	0	670	0	2	668
* Based on Observed AWS data				* Based on WRF Model Simulations made at IMD					

Heat wave Criteria Reference India Meteorological Department (IMD)

IMD criteria	Normal Temp <40°C	Normal Temp >40°C
Moderate Heat Wave	5°C to 6°C	4°C to 5°C
Severe	>7°C	>6°C
No Heat Wave	<= normal	<= normal

Discomfort Index (Based on Max Temperature & Max Humidity)

Total Mandals	Observed AWS Data 26.05.2018				Forecast for Next 24hr (Valid from 08.30am 27.05.2018 to 08.30am of 28.05.2018)				Forecast for Next 48hr(Valid from 08.30am 28.05.2018 to 08.30am of 29.05.2018)			
	Very Hot	Hot	Warm	Slightly Warm	Very Hot	Hot	Warm	Slightly Warm	Very Hot	Hot	Warm	Slightly Warm
670	156	496	18	0	172	451	47	0	105	422	143	0
	* Based on Observed AWS data				* Based on WRF Model Simulations and using Temperature and Humidity Combination							

Sample: 1. State Wise Heat Wave Bulletin

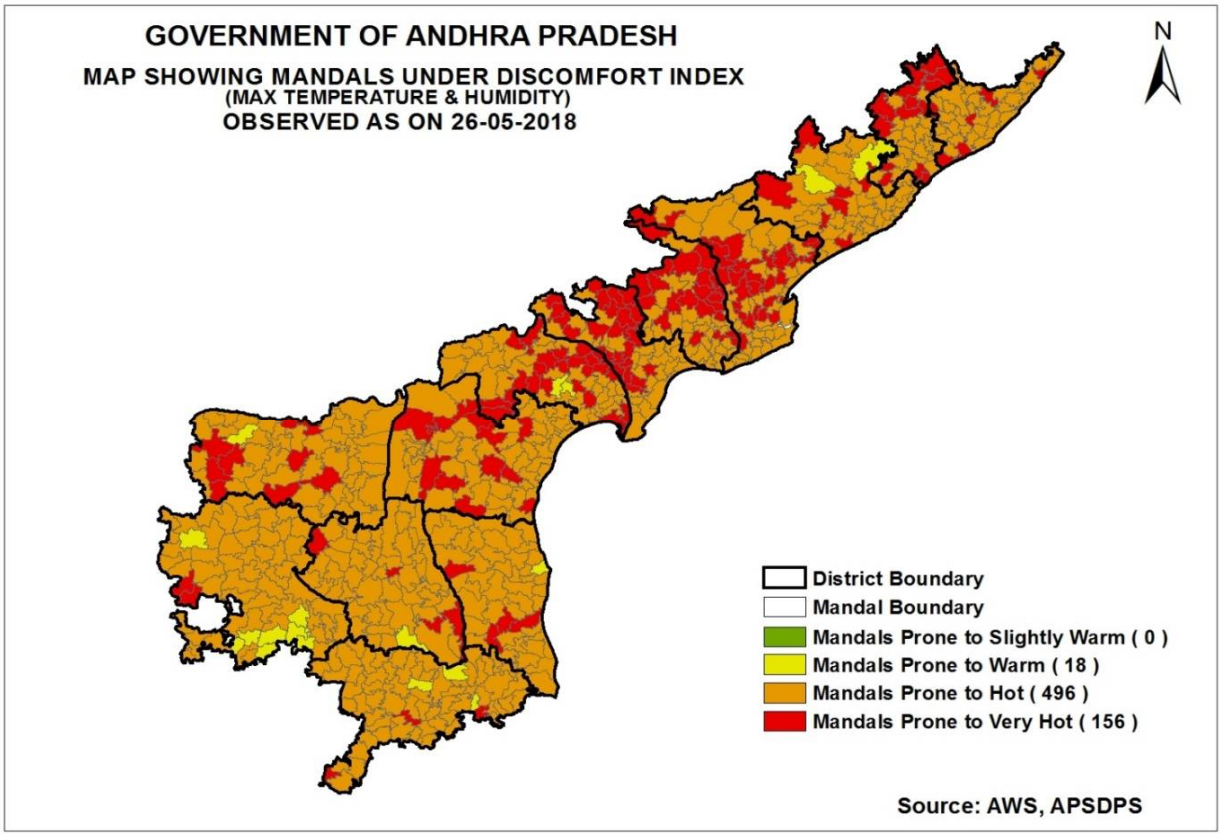


Figure: 8 spatial map on Heat Index

District wise Discomfort Index (Max Temperature & Max Humidity)

Districts	Total Mandals	Observed AWS Data 26.05.2018				Forecast for Next 24hr (Valid from 08.30am 27.05.2018 to 08.30am of 28.05.2018)				Forecast for Next 48hr(Valid from 08.30am 28.05.2018 to 08.30am of 29.05.2018)			
		Very Hot	Hot	Warm	Slightly Warm	Very Hot	Hot	Warm	Slightly Warm	Very Hot	Hot	Warm	Slightly Warm
Srikakulam	38	6	32	0	0	17	21	0	0	4	32	2	0
Vizianagaram	34	14	20	0	0	16	18	0	0	8	26	0	0
Visakhapatnam	43	7	34	2	0	11	32	0	0	9	34	0	0
East Godavari	64	27	37	0	0	4	57	3	0	3	47	14	0
West Godavari	48	22	26	0	0	8	40	0	0	4	32	12	0
Krishna	50	24	26	0	0	11	39	0	0	1	47	2	0
Guntur	57	23	32	2	0	25	32	0	0	8	43	6	0
Prakasam	56	12	44	0	0	22	34	0	0	8	45	3	0
Nellore	46	4	41	1	0	0	31	15	0	0	9	37	0
Chittoor	66	3	60	3	0	6	33	27	0	1	29	36	0
Kadapa	51	4	46	1	0	3	46	2	0	2	26	23	0
Anantapuramu	63	2	53	8	0	22	41	0	0	29	27	7	0
Kurnool	54	8	45	1	0	27	27	0	0	28	25	1	0
	670	156	496	18	0	172	451	47	0	105	422	143	0
* Based on Observed AWS data						* Based on WRF Model Simulations and using Temperature and Humidity Combination							

Sample: 2. State Wise Heat Wave Bulletin

Three target groups were suggested to receive different, but coherent messages:

- **People (individuals) at risk (general population)**
- **The voluntary care takers of the people at risk**
- **The professional care and health system**

Public information services are necessary for disseminating information to the population in a timely and adequate manner. Communication with the media needs to be ongoing and aimed at providing enough coverage in informative programmes for topics related to protection from heat-waves.

During heat-wave season, daily announcements will be contain information on the daily temperatures, the consequences for the population's health of the same, the activities undertaken, recommendations for the public, and recommendations.
Heat Wave Monitoring Cell at APSDMA-SEOC activates are Listed In **Annexure 1.**

10. ROLES AND RESPONSIBILITIES OF DEPARTMENTS / AGENCIES IN RESPONDING TO HEAT WAVES

There needs to be greater clarity around the roles and responsibilities in the management of Heat wave, for that matter any disaster. Preparation and response to Heat wave is to be managed in

an integrated manner for which clear leadership to anchor the process is necessary. A control agency leads the response to a particular type of emergency. Support agencies provide resources, such as personnel, essential services and materials, to support or assist a control agency or affected person.

Disaster Management Authority is the control agency for the response to heat wave, and that other agencies, including the Department of Health, have a support role. Commissioner Disaster Management as the Incident Controller and Nodal Officer for

A heat wave—is responsible for strategic management of the incident at the State Level.
The District Collector is the Incident Controller and Nodal Officer at District Level, Commissioner (Municipal) –Nodal Officer for Respective Municipalities.

Generally the Responsibilities of Incident Controller and Nodal Officer include:

- Managing all response activities
- Notifying support agencies
- Establishing incident and emergency management teams
- Collecting, analyzing and disseminating information regarding the emergency
- Leading multi-agency response planning
- Issuing timely information and warnings to the community
- Developing incident action plans.

10.1 IMPLEMENTATION OF HEAT WAVE ACTION PLAN

Successful implementation of the Heat Wave Action Plan requires coordinated action between many diverse stakeholders, including Government Departments / Agencies, health care professionals including emergency medical personnel, health center staff, and hospital staff and community groups.

Following the forecasting of a heat wave event, immediate notification of the public and all those participating in the response is critical to ensure the plan is activated.

The Heat Wave Action Plan shall be implemented in 3 Phases annually.

Phase-I: – Pre -Heat Wave Season (January to February)

Pre-Heat Season is devoted to develop early warning systems, communication plan of alerts to the general public, health care professionals and voluntary groups (care givers) with emphasis on training and capacity building of these groups.

Phase-II: - During the Heat Wave Season (March to July)

High alert, continuous monitoring of the situation, coordination with all the departments / agencies concerned on one hand and general public & media on the other hand is the focus of this phase.

Phase-III: – Post -Heat Wave Season (August to December)

In Phase – III concentration is on evaluation and updating of the plan. It is important at the end of the summer to evaluate whether the heat health action plan has worked. Continuous updation of plan is a necessity. Global climate change is projected to further increase the frequency, intensity and duration of heat-waves and attributable deaths. Public health prevention measures need to take into consideration the additional threat from climate change and be adjusted over time. Measures that are effective now, might not be effective anymore in future decades to come. Development of appropriate Heat Index suitable for Andhra Pradesh by analyzing temperature and mortality data by involving IMD, APSDPS, Medical & Health Department is necessary to evaluate and update the plan.

11. PHASE WISE RESPONSIBILITIES OF VARIOUS DEPARTMENTS / AGENCIES

11.1 Phase-I: Pre Heat Wave Season (January to February)

I. Incident Controller / Nodal Officer

CDM & EOS - Nodal Officer for State District Collector – Nodal officer for District Commissioner (Municipal) –Nodal Officer for Respective Municipalities

- Preparation of a list of High risk areas in the State / District vulnerable to Heat waves for more focus in planning to mitigate adverse effects of Heat wave.
- Identification of vulnerable groups of population.
- Convene meetings with the concerned Departments/ Agencies/ NGOs involved in response mechanism to Heat waves to review the action plan periodically. Designation of a single officer as point of contact for each department.

- Organize training for health workers, link workers, school children, and the local community in preventive measures and treatment protocol involving the Medical & Health Department
- Distribute pamphlets and posters with tips to prevent heat stress in local language also to hospitals, schools, and professional associations.
- Establish Heat Wave Action Web Page on Disaster Management / District Web site.

II. I & PR Department

Identification of areas to post warnings and information during heat wave season.

ii. Securing advertisement / scrolling slots for announcements regarding Heat waves.

iii. Designing information and awareness material in the form of pamphlets, posters etc. on Heat waves in local language for distribution to the general public, especially focusing on identified high risk areas in the State and vulnerable groups of population.

III. Medical & Health Department and Medical Professionals

- Designing and initiating targeted training programs, capacity building efforts and communication on heat illness for medical staff at Public Health Centres (PHCs) / local hospitals and Urban Health Centers (UHCs), including nursing staff, paramedics, field staff and link workers (ANMs, ASHA Workers, Aarogya Mitras etc.), while paying special attention to the susceptibility of particular wards.
- Updating of admissions and emergency case records in Hospitals to track heat-related morbidity and mortality and also to create simple, user-friendly means to track daily heat-related data and behavioral change impacts. Train hospitals to record information On education & communication (IEC) efforts and to ensure recording of cause of death in death certificates.
- Adopt heat-focused examination procedures at local hospitals and urban health centers.
- Developing of SMS facility to reach the field level staff during emergency periods.
- Checking of inventories of medical supplies including ORS powder in PHCs and other Local Hospitals.
- Purchase and distribute reusable soft plastic ice packs for the citywide UHCs, 108 emergency centers, ambulances and hospitals.

- Explore creation of ice pack dispensaries to increase access to vulnerable communities in high risk areas.

To provide following services through 108 / 104 Emergency Service

a. Ensure adequate supply of IV fluids.

b. Prepare handouts for paramedics about heat related illness.

c. Create displays on ambulances to build public awareness during major local events.

d. Identifying routes to high risk areas and to reach vulnerable sections of population in shortest time possible by utilizing the list of high-risk areas.

IV. MA & UD Department / Corporations / Municipalities & Panchayat Raj Department / Panchayats/ RWS

- High Risk Area mapping and identification of vulnerable groups particularly destitute, homeless, beggar homes and old age homes to concentrate on mitigation efforts during heat alert period.
- Identification of areas to provide shelters and drinking water during heat alert period.
- Urban forestry, avenue plantation and encouraging roof gardens to increase the green cover in urban areas to reduce heat levels.
- Special care in restricting outdoor activities and functions during heat period.
- Identification of NGOs / Rotary Clubs / Lions Clubs and Corporate houses (under Corporate Social Responsibility) to provide shelters, drinking water, medical supplies and temporary homes during heat days.

V. Labour & Employment Department

- Organize training for employers, outdoor labourers and workers on health impacts of extreme heat and protective measures to be taken during high temperature periods.
- Utilize maps of construction sites and outdoor work spots preferably overlaying with irradiation map from IMD or heat island map to identify more high-risk outdoor workers and to conduct publicity campaigns during high-risk days.
- Preparing a list of factory medical officers, contractors and house side non-factory workers to include in heat alert and action communication.

- Heat illness orientation planning for factory medical officers.

VI. Rural Development Department

- Collecting information on the works sanctioned under MGNREGS programme and other schemes in High risk areas to plan for mitigation effort during heat period.To ensure shade and supply of adequate drinking water at work spots.

VII. Animal Husbandry Department

- Preparation of Posters & pamphlets with tips to take care of cattle and poultry during heat waves.
- Publicity of protective measures to save cattle and poultry during heat periods through District heads and Farmer Training Centers.
- Checking inventory of necessary medicines for treatment of cattle and poultry. Preparation of plans to provide drinking water for cattle in case of scarcity.

VIII. Transport Department & APSRTC

- Obtaining lists of risk areas and review of Bus timings and available shelters in the high risk areas.
- Planning for shade / shelter, drinking water and fans in the waiting areas of passengers.
- Review plan with cab operator / auto / transport associations and also Highway patrol
- Display of precautionary measures (Do's and don'ts) on busses, autos, in bus stations & auto stands and distribution of pamphlets to passengers.
- Planning to provide ORS, Ice packets etc. and medical services in Bus stations.

IX. Information & Technology (IT) Department

- Development of Disaster and Emergency Management System which includes Heat waves and prepare a Dash board to monitor heat wave scenario and its impact constantly through e-pragathi.
- Mapping of Risk areas and discrimination of warnings and alerts to all
- Stakeholders automatically through web, IVRS and mobile applications.

- Prepare map on web interface with color coding system.

X. Education Department

- Designing child-friendly educational preventative trainings and distribute heat protection materials at local schools.
- Training of school teachers to equip them with knowledge of heat protection tips and activities which they can disseminate in classrooms.
- Scheduling of examinations before starting of Heat period normally.

XI. Fire Department

- To check the readiness of vehicles and firefighting equipment to face any fire emergency.

XII. Community groups / Self-help groups / ward level committees / NGOs

- Conduct training programmes, workshops and outreach sessions with community / Self help groups and mobilizes such as DWACRA groups, Mahila Arogya Samiti, ASHA workers, Anganwadis, and Ward Committees in Municipalities to help inform and get vulnerable communities more actively involved.
- Identification of NGOs, Voluntary Organizations in reaching out to the Public, especially vulnerable groups.
- Encourage discussions for finding early signs of heat exhaustion with local doctor or Health Centre.
- Inform fellow community members about how to keep cool and protect oneself from heat.

11.2 Phase-II: - During the Heat Wave Season (March to July)

I. Incident Controller / Nodal Officer

- CDM & EOS- Nodal Officer for State
- District Collector – Nodal officer for District
- Commissioner (Municipal) –Nodal Officer for Respective Municipalities

- Issue of **heat alert** when extreme heat events are forecast by IMD and APSDPS. All key Departments / Agencies, SEOC, DEOC etc. in accordance with the Communication Plan may be notified. Periodicity to be depend upon the severity forecasted.
- Monitor and increase the **heat alert** level to match the severity of the forecast and established threshold.
- Hold regular (daily, if necessary) conference to discuss reports and fresh developments during a **heat alert**. Special meetings with key agencies may be convened.
- To ensure that communication channels with all Stakeholders are functional and operating.
- Ensure presence of staff and availability of required supplies with each Department, including fresh drinking water.
- Communicate locations of emergency facilities and cooling centers / shaded areas with each Department / Organization.
- Inform power supply, Companies to prioritize maintaining power to critical facilities (such as hospitals and UHCs).
- Notify all the stakeholders when the **heat alert** is over.

II. I & PR Department

i. Release of messages to the general public and vulnerable groups about the risks and dangers of heat-related illness by the nodal officer at the State and District levels through press conferences.

ii. Wide circulation of Heat wave alerts through SMS or WhatsApp in collaboration with private sector Telecom companies in addition to traditional media during a heat alert.

iii. Circulate heat alerts in bulk to the public via centralized email databases.

iv. To send SMS alert messages directly to private practitioners in addition to the medical professionals at PHCs and UHCs.

v. Utilize local radio and FM broadcasts to disseminate heat protection tips and high temperature warnings to the vulnerable sections of populations.

vi. Using social media like Twitter, Face book etc. to increase outreach of the messages.

III. Medical & Health Department and Medical Professionals

- Display of heat-related illness prevention tips and how to stay cool around hospitals, PHCs and UHCs.
- Equip all hospitals/ PHCS/ UHCs with additional supplies of medicines and material. Ensure adoption of Heat illness treatment and prevention protocols.
- Deploy additional staff at hospitals and PHCs/UHCs to attend to the influx of patients during a heat alert, if feasible.
- Keep emergency wards ready in all PHCs / UHCs and Hospitals
- Increase outreach of community health workers in at-risk neighbourhoods during a heat alert, if feasible.
- Report Heatstroke patients to Nodal Officer on daily basis and generate weekly
- Reports on public health impacts of Heat wave for Nodal Officer, during a heat alert. Expedite recording of cause of death in death certificates.
- Ensure that Regional Health Officers visit PHCs / UHCs to confirm that proper preparation has been made for heat related illness and conduct case audits during heat season.

Ensure that 108 /104 EMERGENCY SERVICE:

(a) Activate dynamic strategic deployment plan for ambulances.

(b) Adequate supply of ice packs, IV fluids and medicines.

(c) Keep accurate records of pre-hospital care.

(d) Adequate staff on duty and restrict leave if necessary.

IV. MA & UD Department / Corporations / Municipalities &Panchayat Raj Department / Panchayats / RWS

- Disseminate SMS text messages to warn residents of high risk areas and vulnerable sections of population during a **heat alert**.
- Set up electronic scrolling boards to display temperature and forecasts at junctions and other public places.
- Activate “cooling centers,” such as public buildings, malls, temples, schools and State Government or Local body, run temporary night shelters for those without house or access to water and/or electricity at home.

- Expand access to shaded areas for outdoor workers, slum communities, and other vulnerable sections of population.
- Keep open the parks for a longer duration during evenings.
- All non-essential uses of water (other than drinking, keeping cool) may be suspended, if necessary.
- Distribution of fresh drinking water to the public by opening water centres (Chalivendrams) at people congregation points like market places, labour addas, Bus stations etc. Water may be distributed through pouches to the poor in the identified high-risk areas.
- Actively involve NGOs, Lions Club, Rotary Club and Corporate houses in providing shelter and drinking water facilities.

V. Labour& Employment Department

- Encourage employers to shift outdoor workers schedules away from peak afternoon hours (12 – 4pm) during a heat alert.
- To ensure to provide emergency ice packs and heat-illness prevention materials to construction workers.
- Ensure provision of shelters/ cooling areas, water and supply of emergency medicines like ORS, IV fluids etc. at work sites by employers.

VI. Rural Development Department

- Reschedule of working hours to avoid intense heat timings in all the works sanctioned under MGNREGS.
- Provision of water and shelters / cooling areas wherever necessary.

VII. Animal Husbandry Department

- Display posters and distribute pamphlets on the precautionary measures to be taken to safeguard cattle and poultry birds during heat period in villages and important junctions.
- Ensure adequate stock of medicines in all veterinary hospitals.
- Ensure visit of field staff during heat wave to villages for follow up action in treatment of cattle / poultry birds.

VIII. Transport Department & APSRTC

- Display posters & distribute pamphlets on prevention of heat related illness in bus stands, auto stands etc.

- Ensure availability of shade / shelters, drinking water, ORS packets etc., in bus stands, auto stands etc.
- Establish Health teams at major bus stands / Terminals and other public places Ensure availability of water and ORS packets in long distance buses.
- Do not run buses as per as possible during peak hours (12-4 pm) when Heat wave is declared.

IX. Information and Technology (IT) Department

- Send real time information through Dash board/ interface on all activities related to Heat wave.
- Activate Dash board.
- Activate Heat Wave APP
- Generate reports encompassing all activities undertaken during heat wave alert to use for evaluation of systems and action plan.

X. Education Department

- Ensure supply of water for students and teachers if school is functioning.
- If school is not functioning, permit use of school premises as shelter during day time.

XI. Fire Department

- Ensure presence of staff during heat alert period, if necessary by restricting leaves. Ensure functioning of communication equipment to receive messages / alerts of occurrence of fire.
- Ensure adequate supply of water and foam to fight fires.

XII. Community groups / Self help groups / ward level committees / NGOs

- Take all precautions to avoid Heat related illness.
- Keep cool and hydrated during the heat season by drinking water, staying out of the sun, and wearing light clothing.
- Check on vulnerable neighbors, particularly during a heat alert.
- Limit heavy work in direct sun or indoors, if poorly ventilated, especially during a heat alert.

11.3 Phase-III: – Post -Heat Wave Season (August to December)

I. Incident Controller / Nodal Officer

CDM & EOS - Nodal Officer for State District Collector – Nodal officer for District Commissioner (Municipal) –Nodal Officer for Respective Municipalities

- Review of quantitative and qualitative data for process evaluation and improvements.
- Annual evaluation of Heat Wave Action Plan by organizing a meeting with key Departments /
- Agencies and relevant stakeholders.
- Evaluate the Plan process basing on the reach and impact. Revision of Plan basing on the performance feedback.
- Revision and posting of Revised Action Plan online well ahead of summer season next year for information of all stakeholders.

II. I & PR DEPARTMENT

- Evaluate reach of advertising / public messages and other means of communication like social media (face book, twitter etc.) to target groups.
- Participate in annual evaluation in Heat Wave Action Plan. Review the revised Heat Wave Action Plan.

III. Medical & Health Department and Medical Professionals

- Perform an epidemiological case review of heat-related mortalities during the summer.
- Conduct and gather epidemiological outcomes from the data on heat risk factors, illness and death, based on average daily temperatures.
- Measure mortality and morbidity rates based on data before and after the Plan's interventions.
- Incorporate data and findings into future versions of the Heat Wave Action Plan.
- Participate in annual evaluation of Heat Wave Action Plan review the revised Heat Wave Action Plan.
- Review the revised Heat Wave Action Plan.

To ensure 108 / 104 Emergency Service

(a) Provide data to key Agency / Department.

(b) Participate in annual evaluation of Heat Action Plan review the revised Heat Wave Action Plan.

(c) Review the revised Heat Wave Action Plan.

IV. MA & UD / Panchayat Raj Department/Local bodies, Labour& Employment Department, RWS, Rural Development Department, IT Department, School Education Department, Animal Husbandry Department, Transport Department & APSRTC

- Collect data related to implementation of Action Plan and provide feedback to key agency / department**.**
- Participate in annual evaluation of Heat Wave Action Plan. Review the revised Heat Wave Action Plan.

V. Community groups / Self-help groups / ward level committees / NGOs

- Reach the unreached and educate the community on a continuous basis, in addition to providing feedback on the outreach and impact of Heat wave Action Plan to the Key Departments / Agencies / Nodal Officers at State and District Levels.

12. CONCLUSION

Increased occurrences of summer heat wave conditions in recent years are fettle to the human life. Prior information about the possible heat wave conditions will help in reducing the risk to human life and also helps in taking precautionary action and also the government agencies to be vigilant and allow them to plan outreach activities to save the lives of the public.

All the departments / agencies shall take necessary timely action to implement the Heat Wave action plan to mitigate the adverse effects of heat wave.

As a result of consequent, collaboration efforts of government of Andhra Pradesh through implementation of heat wave action plan by Andhra Pradesh State Disaster Management Authority, and line departments, efforts on continuous monitoring and early warning has significantly reduced the death of sunstroke in the year 2018, to a single digit of 8 deaths.

ANNEXURE 1 ROLE OF SEOC – APSDMA

During the heat wave season (March - May), The SEOC – APSDMA efficiently activates the Heat wave Monitoring cell and disseminating system.

Pre activity timeline of Heat wave Monitoring Cell (12 hrs in advance)

Step 1(Data receiving @2:00 PM)

ARD at SEOC receives GFS 9X9 Model Output data from India Meteorological Department through file transfer protocol (FTP)Server which is installed at SEOC.

Step 2(Data Processing @3:00 PM)

The data processing and downscaling the India Meteorological Department provided GFS data to Mandal level by ARD team.

Step 3 (Data Verification @ 4:00PM)

Data prepared by ARD is sent to APSDPS & IMD-HYD for quality and verification purpose, if any issues regarding forecasted data then repeat the previous step within 30 minutes.

Step 4(Dissemination @5:00PM)

activates the dissemination system through phone call, Email, Social media, SMS messages at SEOC

Real-time activity of Heat wave Monitoring Cell

- The SEOC operators continuously monitor the AWS station temperature observations between 11:00 AM to 4:00 PM. In case of any exceeded temperatures (> 41°C) recorded from AWS stations then SEOC operators will make phone call to concerned Mandal MROs to get the ground reality.
- ARD team at SEOC will do data validation of forecasted data with AWS observational data for further improvement of forecast.
- SEOC data gathering team take feedback from concerned state level officials regarding heat wave conditions.

The disseminating system at SEOC-APSDMA

1. **Via Phone call:**

   SEOC operators make phone call to Heat wave prone district D-sections and also

Heat wave prone Mandal MROs in order to alert them in advance and request to take precautionary measures to the public in view of available forecast of heat wave.

2. **Via Email:**

   Passing the Heat wave forecast information to all district collectors, DRO's, D-Section and I&PR.

3. **Via Social Media:**

   Information dissemination to Heat wave prone mandal MRO/VRO and Concerned Line departments through various available social media.

4. **Via SMS Messages:**

   Other hand SEOC also send the information through short messages services to concern mandal MRO and VRO/VRA in advance.

Annexure 2 Total Summary of Consolidated Report **on** Heat Waves Season - 2018

Consolidated Report on Heat Waves Season - 2018		
Drinking Water Camps (Chalivendrams) - Total (a+b+c)		**96269**
a	Established by Government Departments	37842
b	Established by Local bodies	49030
c	Established by NGOs & others	9397
Shelters Provided		**720276**
a	No. of shelters provided by local panchayats / Municipalities	2498
b	No. of shelters provided by departments / organizations (at work places)	69348
c	No. of shelters provided by NGOs / Voluntary organizations etc.,	180
Campaign of Precautionary Measures (do's & don'ts)		
a	No of advertisements given	457
b	No. of scrollings made	1062
c	No. of Hordings/ Posters displayed	24929
d	No. of Pamphlets distributed	2486975
Medical & Health-Heat illness cases		
a	No. of sunstroke cases	242
b	No. of Death Cases reported by Medical & Health Dept. due to Sunstroke	8
c	No. of awareness camps	166399
d	No.of People Attended at camps	2105867
e	No. of ORS packets distributed	1580859
Total Expenditure incurred on any mitigation measures related to Heat Waves. (Rs.in lakhs)		**--**

ANNEXURE 3 DISTRICT WISE HEAT WAVE CONSOLIDATED SHEET

Consolidated Daily situation Report on Heat Waves - Andhra Pradesh															
Sl.No	Item	Srikakulam	Vizianagaram	Visakhapatnam	East Godavari	West Godavari	Krishna	Guntur	Prakasam	Nellore	Chittoor	Kadapa	Ananthapuram	Kurnool	Total
1	**Temperature** (in ° Celsious)														
a	Today Temperature in Dist. Head quarters														
b	Season Highest Temperature in Dist. HQ - 2018														
c	Previous Highest Temperature recorded in Dist. HQ														
d	Season Highest Temperature With Location														
	in Celsius														
2	**No. of Deaths reported by Collectors due to Sunstroke**														
a	Male														
b	Female														
c	Children														
3	**Drinking Water Camps (Chalivendrams) - Total (a+b+c)**														
a	Established by Government Deparatments														
b	Established by Local bodies														
c	Established by NGOs & others														
4	**Shelters Provided**														
a	No. of shelters provided by local panchayats / Municipalities														
b	No. of shelters provided by departments / organizations (at work places)														
c	No. of shelters provided by NGOs / Voluntary organizations etc.,														
5	**Campaign of Precautionary Measures (do's & don'ts)**														
a	No of advertisements given														
b	No. of scrollings made														
c	No. of Hordings/ Posters displayed														
d	No. of Pamphlets distributed														
6	**Medical & Health-Heat illness cases**														
a	No. of sunstroke cases														
b	No. of Death Cases reported by Medical & Health Dept. due to Sunstroke														
c	No. of awareness camps														
d	No.of People Attended at camps														
e	No. of ORS packets distributed														
7	**Total Expenditure incurred on any mitigation measures related to Heat Waves. (Rs.in lakhs)**														

ANNEXURE 4. HEALTH IMPACT OF HEAT WAVES

Clinical Entity	Age Range	Setting	Cardinal Symptoms	Cardinal Signs	Pertinent Negatives	Prognosis
Heat rash	All, but frequently children	Hot environment; +/- insulating clothing or swaddling	Itchy rash with small red bumps at pores in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	Diffuse maculopapular rash, occasionally pustular, at hair follicles; pruritic	Not focally distributed like a contact dermatitis; not confluent patchy; not petechial	Full recovery with elimination of exposure and supportive care
Heat cramps	All	Hot environment, typically with exertion, +/- insulating clothing	Painful spasms of large and frequently used muscle groups	Uncomfortable appearance, may have difficulty fully extending affected limbs/joints	No contaminated wounds/tetanus exposure; no seizure activity	Full recovery with elimination of exposure and supportive care
Heat exhaustion	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling overheated, lightheaded, exhausted and weak, unsteady, nauseated, sweaty and thirsty, inability to continue activities	Sweaty/diaphoretic; flushed skin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria; no overdose history	Full recovery with elimination of exposure and supportive care; progression if continued exposure
Heat syncope	Typically, adults	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling hot and weak; lightheadedness followed by brief loss of consciousness	Brief, generalized loss of consciousness in hot setting, short period of disorientation if any	No seizure activity, no loss of bowel or bladder continence, no focal weakness, no aphasia/dysarthria	Full recovery with elimination of exposure and supportive care; progression if continued exposure
Heat stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Severe overheating; profound weakness; disorientation, obtundation, seizures, or other altered mental status	Flushed, dry skin (not always), core temp ≥40°C; altered mental status with disorientation, possibly delirium, coma, seizures; tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria; no overdose history	25-50% mortality even with aggressive care; significant morbidity if survive

Heat Illness - Case Definitions

Clinical Entity	Case Definition
Heat rash	Diffuse, pruritic, maculopapular or vesicular rash in the setting of heat exposure, often with insulatingClothing or swaddling.
Heat cramps	Painful contractions of frequently used muscle groups in the setting of heat exposure, often with exertion
Heat exhaustion	Syndrome of generalized weakness and or exhaustion, often with lightheadedness, limiting functioning in a hot environment, without history of recent infection. May or may not be exertional.
Heat syncope	Brief loss of consciousness in the setting of heat exposure without evidence of seizure activity, stroke, ormedication overdose.
Heat stroke	Altered mental status (including disorientation, delirium, seizure, obtundation) with elevated core bodytemperature ≥ 40°C in the setting of heat exposure, without signs of stroke, history of infection, or signs of medication overdose. May or may not be exertional.

ANNEXURE 5. HEAT ILLNESS – TREATMENT PROTOCOL

General Treatment protocol applicable to all patients in any setting, where there is a potential concern for heat illness with slight variations according to the setting (EMS, health center, clinic, hospital emergency department, etc.).

1. Initial patient assessment – primary survey (airway, breathing, circulation, disability, and exposure), vital signs, including temperature.
2. Consider heat illness in differential diagnosis if:

a. Presenting with suggestive symptoms[26] and signs
(See table in Health Impacts of Heat Waves).

b. Patient has one or more of the following risk factors:

i. Extremes of age (infants, elderly)

ii. Debilitation/physical de-conditioning, overweight or obese

iii. Lack of acclimatization to environmental heat (recent arrival, early in summer season)

iv. Any significant underlying chronic disease, including psychiatric, cardiovascular, neurologic, hematologic, obesity, pulmonary, renal, and respiratory disease

v. Taking one or more of the following:

1. Sympathomimetic drugs
2. Anticholinergic drugs
3. Barbiturates
4. Diuretics
5. Alcohol
6. Beta blockers

3. Remove from environmental heat exposure and stop physical activity.

4. Initiate passive cooling procedures:

a. Cool wet towels or ice packs to axillae, groin, and around neck; if patient is stable, may take a cool shower, but evaluate risk of such activity against gain and availability of other cooling measures.

b. Spray cool water or blot cool water on to skin.

c. Use fan to blow cool air on to moist skin.

5.If temperature lower than 40°C, repeat assessment every 5 minutes; if improving, attempt to orally hydrate (clear liquids, ORS can be used but not necessary; cool liquids better than cold)and observe.

6.If temperature is 40°C or above, initiate IV rehydration and immediately transport to emergency department for stabilization.

ANNEXURE 6. VULNERABLE GROUPS OF POPULATION

S. No	Vulnerable Groups
1	Young Children
2	Pregnant Women & Nursing mothers
3	Older people mainly above the age of 60
4	Below Poverty Line (BPL) families with no or poor housing conditions
5	Infirm, isolated, and destitute
6	People with preexisting medical conditions (e.g., cardiovascular and respiratory illness, diabetes), people on certain medication
7	People with limited mobility, impairment of thermoregulatory capacity and reduced ability to perceive
8	People engaged in outdoor occupations

Reasons for inadequate coping

1. Not knowing the issue of heat alerts.
2. Lack of awareness of precautionary measures (Dos & Don'ts).
3. Not knowing Symptoms of Heat related illness and immediate treatment.
4. Lack of proper connectivity to Primary Health Centres (PHCs).
5. Lack of access to urgent medical attention at local levels (in villages).
6. No access to shaded areas and cooling places.
7. Non availability of adequate water.
8. No knowledge of Services available etc.

Special care for vulnerable population groups

Once people at risk have been identified special care and interventions need to be implemented through the local health care and social services.

It is important that those who are susceptible can be easily identified for outreach services. Possible methods of identification include local community groups and social services and active registration of individuals with a general practitioner or social services

DO & DONT'S POSTER

CHALLIVENDRAM CAMPS ORGANISED IN 13 DISTRICTS OF THE STATE OF AP IN 2018


చలివేంద్రం


చలివేంద్ర


చలివేంద్రం

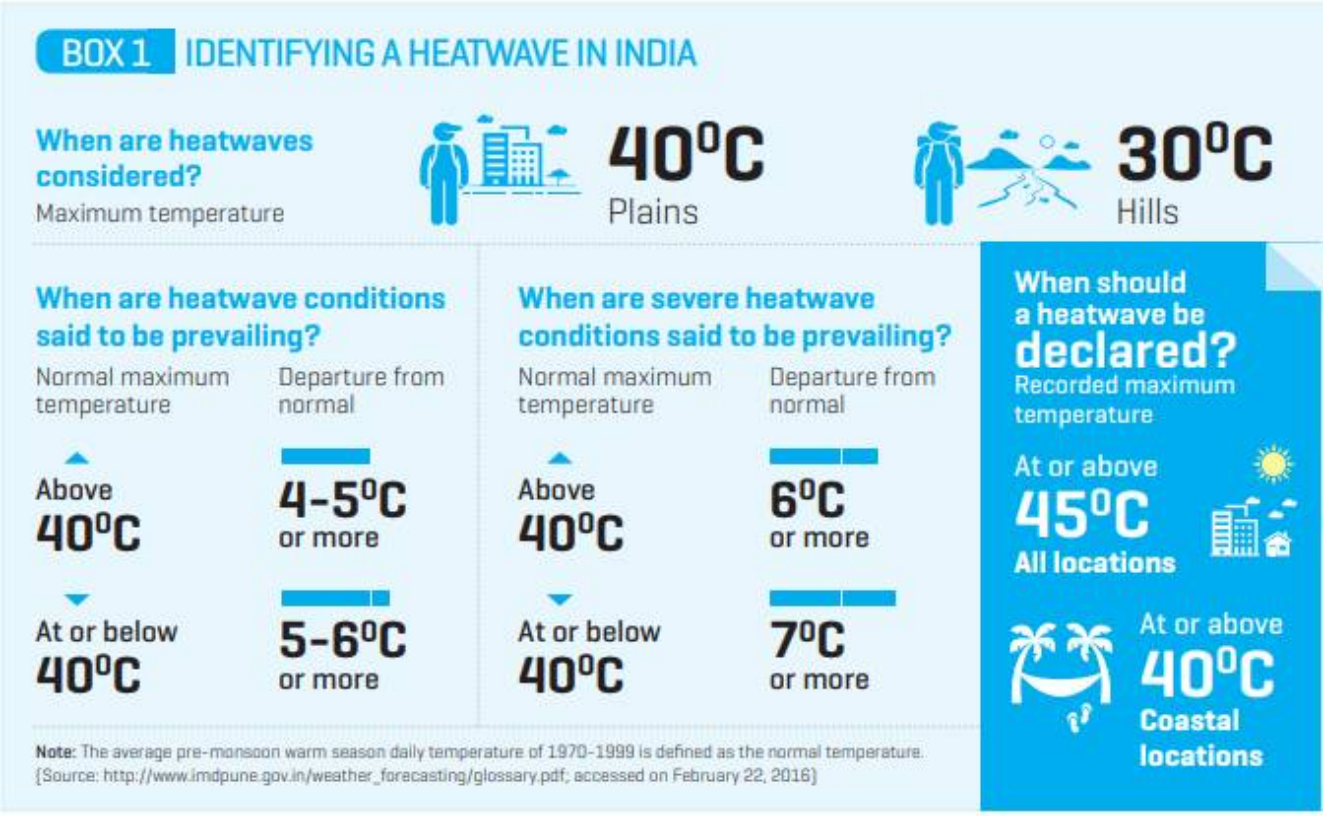

ధర్మముతో
చలివేంద్రం


చలివేంద్రం


చలివేంద్రం


చలివేంద్రం

PICTORICAL REPRESENTATION OF IDENTIFYING HEAT WAVE



(Source: Road Map for planning heat wave management in India)