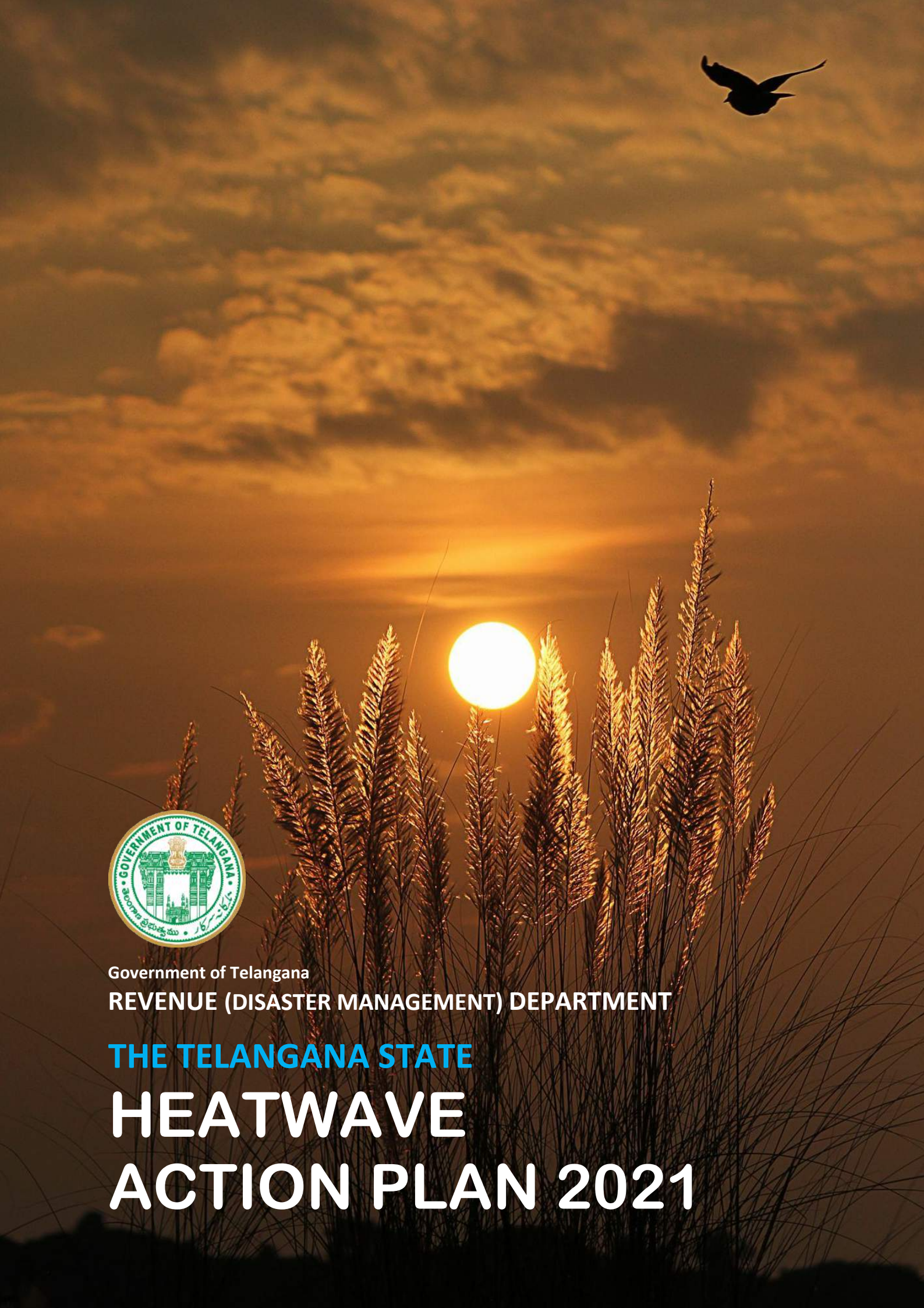
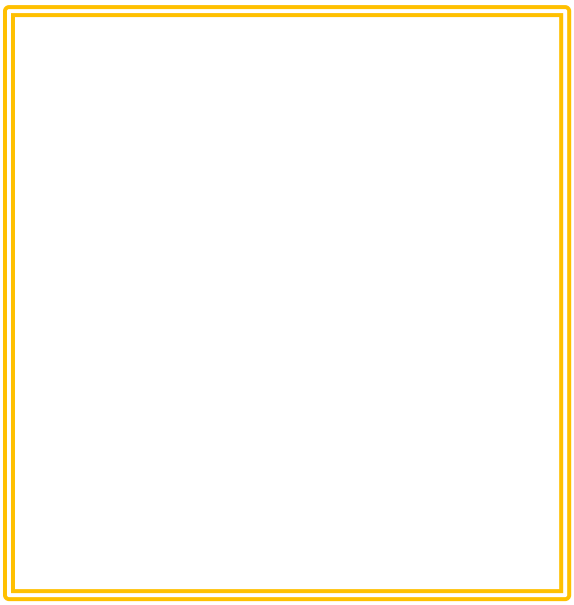


Government of Telangana

REVENUE (DISASTER MANAGEMENT) DEPARTMENT

THE TELANGANA STATE

HEATWAVE ACTION PLAN 2021

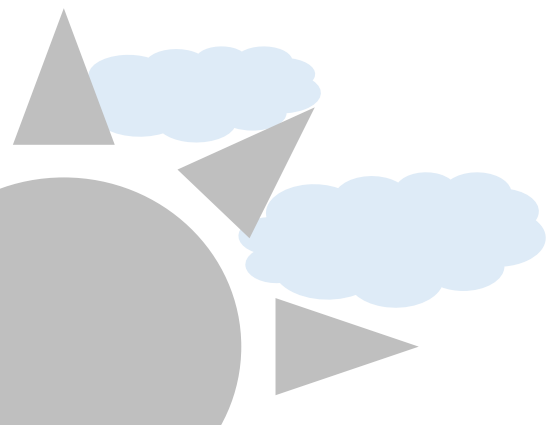


TELANGANA STATE DEVELOPMENT PLANNING SOCIETY

TELANGANA STATE

Heatwave Action Plan -2021

Revenue (Disaster Management) Department
Government of Telangana



PREFACE

The state is highly vulnerable to Heatwaves owing to its geographic and topographical context and is in core heat wave zone of India. As many as 568 mandals out of 589 mandals are vulnerable to heat waves. Occupationally, the poor and marginalized, construction workers, vendors, including women, children and men, besides general public, are exposed to heat stress in urban areas, industrial estates, on roadways, in villages and countryside.

Heatwaves in the recent years have become a challenge, for not only the health, environment or water related agencies but equally or even more for the disaster management authorities and climate change adaptation programmes.

The Government of Telangana is incorporating both traditional and present technologies to mitigate the impact of heat waves. The forecast reports and weather data shared by India Meteorological Department (IMD) and Telangana State Development Planning Society (TSDPS) are analyzed and used for the purpose of Heat Wave Action Plan following the NDMA guidelines.

The proactive measures by the state government and the close association with agencies like Indian Meteorological Departments, Telangana State Development Planning Society, UNICEF, Hyderabad Field Office, Civil Society Organizations and hundreds of voluntary organizations and philanthropists ensured a significant reduction in the fatalities from 541 in 2015 to 9 in 2020.

The present Heatwave Action Plan is intended to mobilize the policy makers, district level administration, field level personnel and other stakeholders to mitigate the impacts and combat the health hazards during heat wave season in Telangana.

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FOREWORD

Heat wave is a “silent disaster” as it develops gradually and results in deaths and injuries to humans and animals. Extreme positive departures from the normal maximum temperature, higher daily peak temperatures of longer duration and more intense heat waves are becoming increasingly frequent globally due to climate change.

This unusual hot weather causes major disruption in community infrastructure such as power supply, public transport and other essential services and adversely affects human and animal health leading to physiological stress, sometimes even death. This is also diversely affecting the economy and food production as it is directly affecting the agriculture sector.

Over the past several years, there has been an increasing trend of heat-wave in Telangana whereby several Mandals are extremely affected. In the last 10 years, the state has endured heat waves almost every year and the duration of heat period has been increasing in every part of the state. Prior information about the possible heat wave conditions will help in taking precautionary action, also the government agencies to be vigilant and allow them to plan outreach activities to save the lives of the humans and animals

As per the IMD and TSDPS Heat wave criteria, a total of 568 mandals are vulnerable to and more than13 million people fall in severe, critical and semi critical zones of heat waves in the state of Telangana.

The government of Telangana has embarked on a positive note to reduce the fatalities and causalities that occur due to Heat Wave conditions. From the year 2016 till date, we have reduced fatalities to 9 in 2020 compared to 364 fatalities in 2016. The Heatwave Action plan has been formulated through joint work of Telangana State Disaster Management Authority and all the state line departments. I extend my sincere gratitude to all the stakeholders especially the Telangana State Development Planning Society (TSDPS), India Metrologic Department (IMD) and UNICEF, Hyderabad Field office for their regular support since 2016 for strengthening the preparedness level of the state to compete with the hazard.

The heat wave action plan is formulated in line with the guidelines from NDMA to enable administrators to take appropriate measures and action for being in a state of preparedness for the heat wave season in a phased manner. The Government of Telangana emphasizes that the actions mentioned in the Heatwave Action Plan - 2021 be implemented and requests all state line departments and other stakeholders to use the plan document for reference and make their own action plans. Also requested to seek guidance from various academic and scientific institutions and civil society organisations to ensure there are no fatalities due to Heatwave in the State. I hope that this document will help all stakeholders across government, humanitarian agencies and private sector to understand their roles in making Telangana become resilient to heatwave hazard.

Rahul Bojja IAS
Secretary to Government
Revenue Disaster Management Department (FAC)
Govt. of Telangana

ABREVIATIONS

AICTE	All India Council of Technical Education
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
ATI	Administrative Training Institute
AWC	Anganwadi Centre
AWS	Automated Weather Stations
CO2	Carbon dioxide
CH4	Methane
N2O	Nitrous Oxide
DDMA	District Disaster Management Authority
DMD	Disaster Management Department
CHC	Community Health Centre
DRR	Disaster Risk Reduction
DST	Department of Science and Technology
GHMC	Greater Hyderabad Municipal Corporation
HAP	Heatwave Action Plan
HI	Heat Index
ICDS	Integrated Child Development Services
IDSP	Integrated Disease Surveillance Programme
IEC	Information, Education and Communication
IIPH	Indian Institute of Public Health
IMA	Indian Medical Association
I&PR	Information and Public Relation
IT	Information Technology
IPCC	Inter-Governmental Panel on Climate Change
IV Fluid	Intravenous Fluid Drip
IMD	Indian Meteorological Department
KVK	Krishi Vigyan Kendra
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act.
MoA&FW	Ministry of Agriculture and Family Welfare
MoAH	Ministry of Animal Husbandry and Dairying
MOEF&CC	Ministry of Environment Forest an Climate Change
MHA	Ministry of Home Affairs
MoPR	Ministry of Panchayati Raj
MoRD	Ministry of Rural Development
MoR	Ministry of Railways
MoRT&H	Ministry of Road Transport and Highways
MoWR.RD&GR	Ministry of Water Resources, River Development and Ganga Rejuvenation
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NGO	Non-Governmental Organization
NRDC	National Resource Defence Council
ORS	Oral Rehydration Salts
PHC	Public Health Centre
PRI	Panchayati Raj Institution
PPE	Personal Protective Equipment
RRT	Rapid Response Team
TSDMA	Telangana State Disaster Management Authority
SMS	Short Message Service
SMI	Soil Moisture Index
SOP	Standard Operating Procedure
TS	Telangana State
TSECBC	Telangana State Energy Conservation Building Code
TSDPS	Telangana State Development and Planning Society
TSRTC	Telangana State Road Transport Corporation
UHC	Urban Health Centre

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- Annexure -2 - Telangana cool roof policy (draft)
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- Annexure - 5 - Format for death reported due to heatwave(state report to NDMA)
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- Annexure - 7 - Daily report of the heat stroke case and deaths (district report to state government)
- Annexure - 8 - Deaths due to heat related illness (to be cumulated at the state level and sent to central government)
- Annexure - 9 - Symptoms and first aid for various heat disorders
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- Annexure - 11 - Ground water status
- Annexure - 12 - Aspects to be considered by concerned line departments while preparing action plans for urban slums
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PART 1

INTRODUCTION AND OVERVIEW
HEATWAVE VULNERABILITY ANALYSIS

CHAPTER 1

INTRODUCTION AND OVERVIEW

Extreme heat is a risk to human health and wellbeing as well as to infrastructure and services. In some parts of the world extreme heat is seasonal. Often, the hottest time of the year is prior to the start of the rainy season; although this is not the case everywhere. Extreme heat can occur over large geographic areas and can combine with other factors such as humidity to increase the risk of negative health impacts and death.

One form of extreme heat is called a 'heatwave' – a period when temperatures, or temperature in combination with other factors, are unusually high and hazardous to human health & well-being impacts to animal life and environment. Heatwaves typically have a noticeable start and end, last for a period of days and have an impact on human activities and health. Heatwave incidences and impacts are increasing around the globe. In India, heatwave has been a major concern for more than two decades now. Heatwave are projected to increase in number, intensity and duration over most of the land area in the 21st century. In India the impact of increased temperatures is already being observed.

Concentrations of the major greenhouse gases, CO_2, CH_4, and N_2O, continued to increase in 2019 and 2020. Despite developing La Niña[1] conditions, global mean temperature in 2020 is on course to be one of the three warmest on record. The past six years, including 2020, are likely to be the six warmest years on record. The global mean temperature for 2020 (January to October) was 1.2 ± 0.1 °C above the 1850–1900 baseline, used as an approximation of pre-industrial levels (Figure 1).

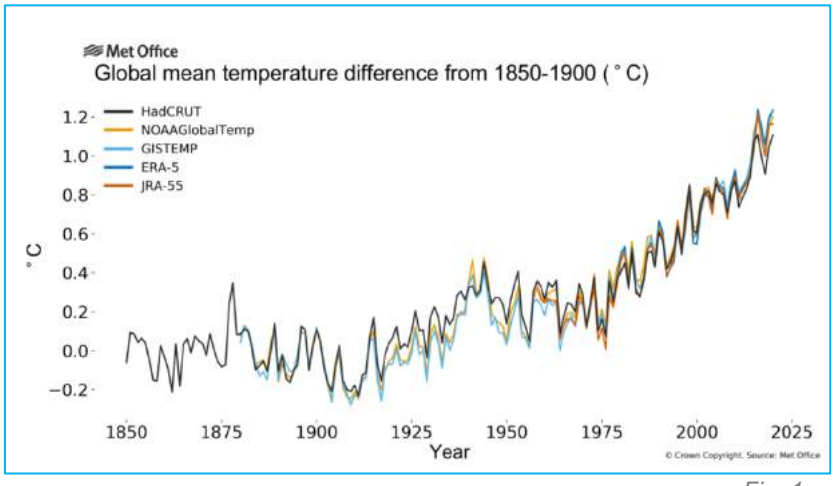


Fig: 1

[1] *La Niña is a climate pattern that describes the cooling of surface ocean waters along the tropical west coast of South America. La Nina is considered to be the counterpart to El Nino, which is characterized by unusually warm ocean temperatures in the equatorial region of the Pacific Ocean.*

According to the India Meteorological Department (IMD), the 2020 annual mean land Surface air temperature for the country was +0.62 °C above the 1981-2010 average.

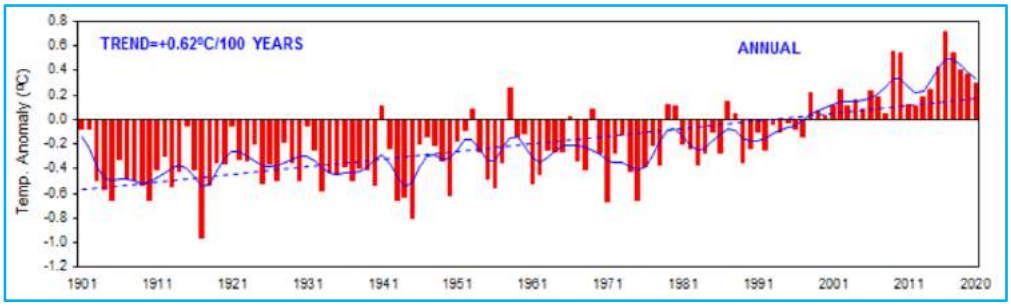


Fig: 2

Annual mean land surface air temperature anomalies averaged over India for the period 1901-2020. The anomalies were computed with respect to base period of 1981-2010. The dotted line indicates the linear trend in the time series. The solid blue curve represents the sub-decadal time scale variation smoothed with a binomial filter. Source: IMD

TELANGANA STATE

Telangana is the 29th state of India, formed on the 2nd of June 2014. The state has an area of 1,12,077 Sq. Km. and has a population of 3,50,03,674. The Telangana region was part of the Hyderabad state from Sept 17th 1948 to Nov 1st 1956, until it was merged with Andhra state to form the Andhra Pradesh state.

After decades of movement for a separate State, Telangana was created by passing the AP State Reorganization Bill in both houses of Parliament. Telangana is surrounded by Maharashtra and Chhattisgarh in the North, Karnataka in the West and Andhra Pradesh in the South and East directions. Major cities of the state include Hyderabad, Warangal, Nizamabad, Nalgonda, Khammam and Karimnagar.

Fig: 2

Capital City	Hyderabad	Inhabited Villages (as per Census, 2011)	9,834
Area	112,077 Sq. Kms.	Un-inhabited Villages (as per Census, 2011)	600
Districts	33	Households	83.04 Lakhs
Revenue Divisions	74	Household size	4
Towns	141	Population	350.04 Lakhs
Municipal Corporations	13	Male	176.12 Lakhs
Municipalities	128	Female	173.92 Lakhs
Zilla Praja Parishads	32	Sex Ratio (Female per 1000 Males)	988 Ratio
Mandal Praja Parishads	539	Density of Population	312 per Sq. Km
Gram Panchayats	12,765	Rural Population	213.95 Lakhs
Revenue Mandals	593	Rural Population Male	107.05 Lakhs
Revenue Villages (as per Census, 2011)	10,434	Rural Population Female	106.90 Lakhs
Inhabited Villages (as per Census, 2011)	9,834	Rural to Total Population	61.12 %
Un-inhabited Villages	600	Urban Population	136.09 Lakhs

(as per Census, 2011)			
Households	83.04 Lakhs	Urban Population Male	69.07 Lakhs
Household size	4	Urban Population Female	67.02 Lakhs
Population	350.04 Lakhs	Urban to Total Population	38.88%
Male	176.12 Lakhs	Child Population (0-6 years) Male	20.18Lakhs
Female	173.92 Lakhs	Child Population (0-6 years) Female	18.81 Lakhs
Sex Ratio (Female per 1000 Males)	988 Ratio	Child to Total Population	11.14 %
Density of Population	312 per Sq. Km	Towns (Statutory)	136

Table 1

RAINFALL

The State as a whole received 1259.7 mm rainfall (till 31st January -2021) against a normal rainfall of 852.2 mm, which is ~ 48 % more than the normal annual rainfall during 2020-21 Water Year (June-20 to May-21) up to January-2021. The southwest monsoon contributes ~79 % of normal rainfall, 14 % is contributed by northeast monsoon and rest by other seasons in the State of Telangana.

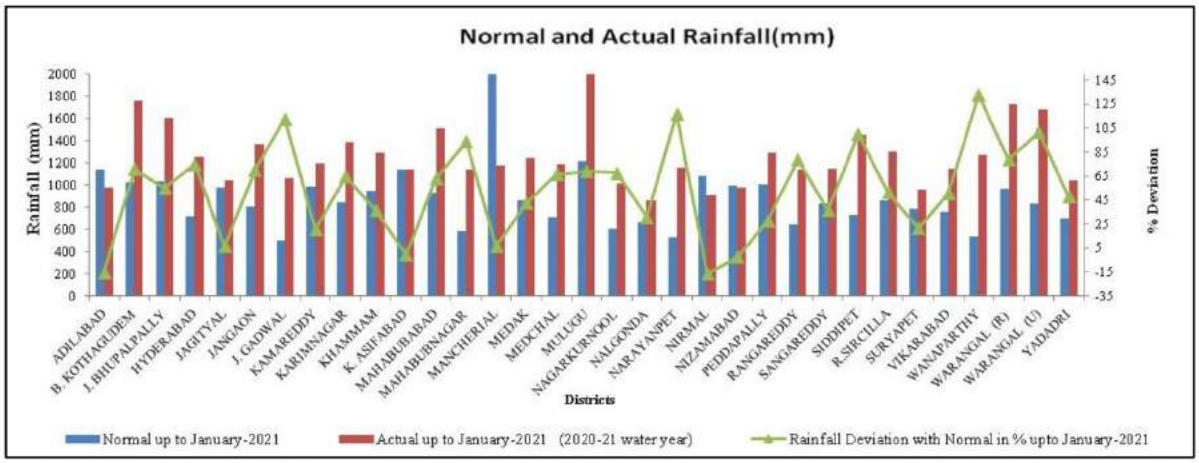
Out of 33 districts, 27 received excess rainfall (+ 20 % & above) and 6 received normal rainfall (-19 % to +19 %) Out of 589 mandals, 431 received excess rainfall (+20 % and above), 136 received normal rainfall (-19 % to +19 %) and 22 received deficit rainfall (-20 % to -59 %) mostly falling in Adilabad, Nirmal, Nizamabad, Asifabad and Mancherial districts.[2]

DISTRICT & MANDAL WISE RAINFALL DEVIATIONS DURING THE WATER YEAR 2020-21
(up to January-2021)

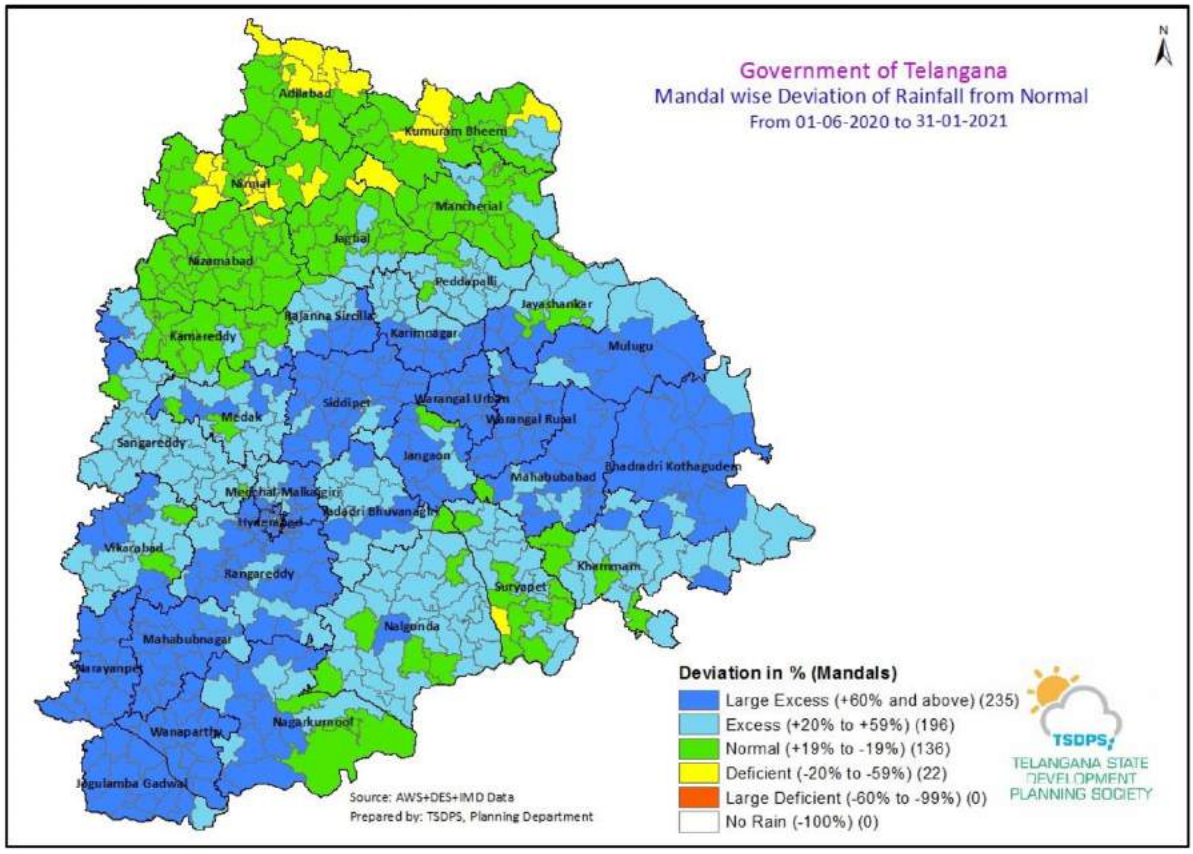
Deviation	Districts	Number of District	Number of Mandal
Excess (20 % & Above)	Wanaparthy (133 %), Narayanpet (117 %), Jogulamba (Gadwal) (113 %), Warangal (U) (102 %), Siddipet (100 %), Mahabubnagar (94 %), Warangal (R) (79 %), Rangareddy (79 %), Hyderabad (75 %), Bhadradri (71 %), Jangaon (70 %), Mulugu (69 %), Nagarkurnool (68 %), Medchal (67 %), Karimnagar (65 %), Mahabubabad (63 %), Bhupalpally (55 %), Sircilla (52 %), Vikarabad (51 %), Yadadri (48 %), Medak (43 %), Sangareddy (37 %), Khammam (37 %), Nalgonda (31 %), Peddapally (28 %), Suryapet (22 %), Kamareddy (21 %),	**27**	**431**
Normal (+19 % to -19%)	Mancherial (7 %), Jagityal (7%), K. Asifabad (-0.2 %), Nizamabad (-2%), Adilabad (-15 %), Nirmal (-16 %)	**6**	**136**
Deficient (-20 % to -59 %)	**Nil**	**Nil**	**22**
Scanty (-60 % to -99 %)	**Nil**	**Nil**	**Nil**
State received actual rainfall of 1259.7 mm against 852.2 mm normal rainfall (up 31st January-2021) (excess of 48%).			

Table 2

[2] *Source: O/o The Directorate, Economics and Statistics Department, Hyderabad*



District wise Normal & Actual Rainfall (year 2020 -21 -up to January-2021) [3] *Fig: 3*



Mandal wise deviation of rainfall from normal from June 2020 – January 2021 *Fig: 4*

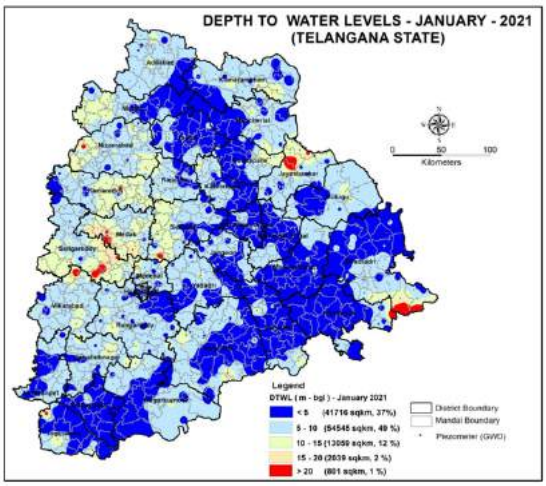
SOIL MOISTURE INDEX

Telangana Soil Moisture Index is categorised into four levels. The mandals with soil moisture index below 50% is considered as affected with moisture index stress. High SMI was recorded throughout the state with 517 mandals above 75% SMI being less exposed to drought like stress. Whereas a total of 6 mandals in Nalgonda, Suryapet recorded 25-50% SMI followed by 2 mandals in Nalgonda recorded less than 25% SMI putting high stress on agriculture.

[3] *Source: gwd.telangan.gov.in*

GROUND WATER STATUS

Ground Water Department monitored water levels during January-2021 through 971 Piezometers (monitoring stations) covering all mandals from 33 districts of Telangana State. Water levels during January-2021 month when compared with Decadal average of January (2011-2020) levels, it is observed that, out of 589 mandals, rise in the range of 0.01-12.11 m is observed in 532 (90%) mandals and fall in the range 0.03- 6.08 m is observed in 57 (10%) mandals. The rise (compared to decadal Average of January (2011-2020) up to 0.5 m is observed in 24 mandals, 0.5-1.0 m in 42 mandals, 1-2 m in 84 mandals and > 2 m in 382 mandals falling in central part of Nizamabad, south western part of Nirmal, Jagitial, Sircilla, Warangal(U), Warangal(R) Karimnagar, Siddipet, Suryapet, Jangoan, parts of Kamareddy, Yadadri, Mahabubnagar, southern part of Bhupalpally, south western part of Bhadradri, Rangareddy, Medchal, western and north eastern parts of Khammam, Jogulamba, Vikarabad, Nagarkurnool, Narayanpet, Nalgonda and Wanaparthy districts etc. The fall (compared to decadal Average of January (2011-2020)) up to 0.5 m is observed in 16 mandals, 0.5-1 m in 15 mandals, 1-2 m in 16 mandals and > 2 m in 10 mandals falling in southern part of Sangareddy, western part of Nizamabad, north western Bhupalapally, northern and eastern Mancherial, south eastern Bhadradi and western part of Jogulamba Gadwal districts. During January -2021 as compared to December -2020 there is an increase in area of deep-water level (>20m) by ~198 km2 of state area. As compared to the decadal average water levels January (2011-2020) deep water level (>20 m) area decreased from 1713 km^2 to 801 km^2



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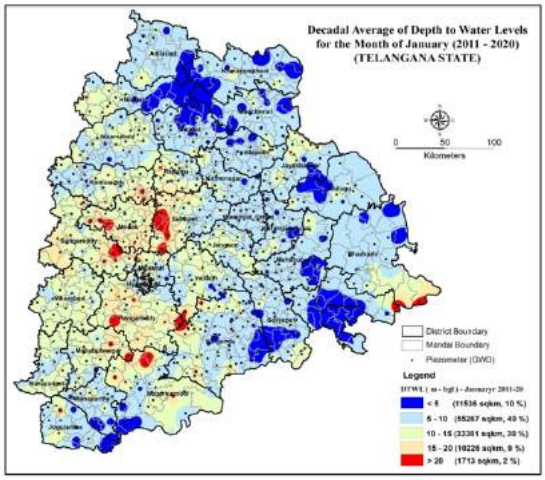


Fig: 6

MAXIMUM TEMPERATURE

Based on the average temperature data of 08 years (2013-2019), the mean maximum temperature of the state is 34.1^0 C. Maximum temperature occurs during summer season (39.0^{0}C) and the lower mean temperature is observed during Northeast Monsoon season (32.9^{0}C). The mean temperature shown a range of 31.5^{0}C to 34.6^{0}C across various locations of the state. Highest temperature of 35.0^{0}C at Khammam followed by 34.9^{0}C Bhadradri Kothagudem district and 34.8^{0}C Suryapet and Bhadradri Kothagudem District.

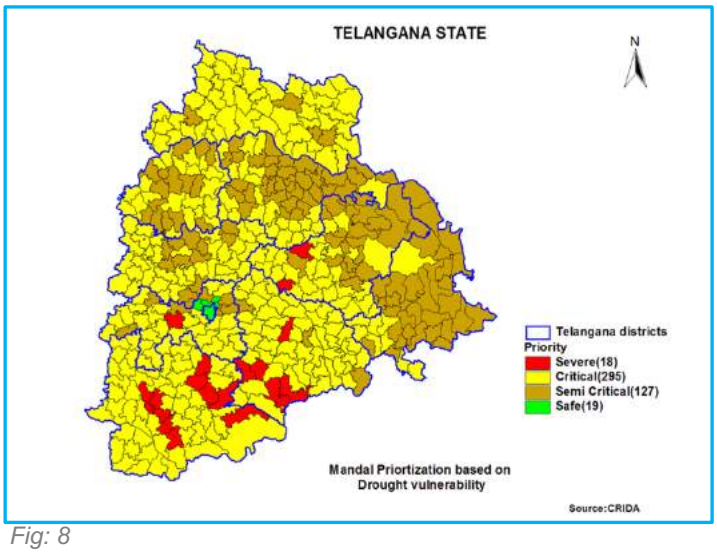
On an annual basis, monthly highest mean maximum temperature (40.9^{0}C) is observed during the month of May and lowest (30.5^{0}C) during the December. April and May are the warmest months of the state. Peddapalli and Mancherial are the warmest districts (42.2^{0}C) followed by Jagatial district (42.2^{0}C). Suryapet district experience a warm climate during Southwest monsoon season (34.6^{0}C) followed by the Khaammam district (34.4^{0}C). The highest temperature during Northeast monsoon is in Khammam district (32.9^{0}C) followed by Bhadradri Kothagudem and Mahbubabad (32.8^{0}C) Highest temperature during summer is in Jayashankar (39.8^{0}C) followed by Manicherial district (39.7^{0}C). Highest temperature

during winter season is in Bhadradri Kothagudem (33.2^{0}C) followed by Khammam and Wanaparthy (33.0^{0}C)[4].

DROUGHT VULNERABILITY

Telangana is located in a semi-arid region with rainfall as major source of water. The rainfall is seasonal in character with a short rainy season of 3 to 4 months. [5]Otherwise the state experiences dry conditions for 8 to 9 months in various parts and more in southern parts of Telangana. The major occupation of two-thirds of the population is agriculture. Acute water scarcity conditions for longer periods will trigger drought. Prolonged water scarcity conditions prevailing over larger areas lead to severe droughts. During most of the years, some parts of the state or the other experience drought which do not have access to water resources other than rainfall. Therefore, there is a need to develop strategies for drought mitigation as a protection from drought. Non-availability of irrigation facilities, erratic distribution of rainfall, limitations of ground water exploration, makes parts of Telangana drought prone. The changes in the monsoon pattern also add to the cause for proneness to droughts in Telangana State.

Fig: 7 *Drought vulnerability status of the Telangana State*



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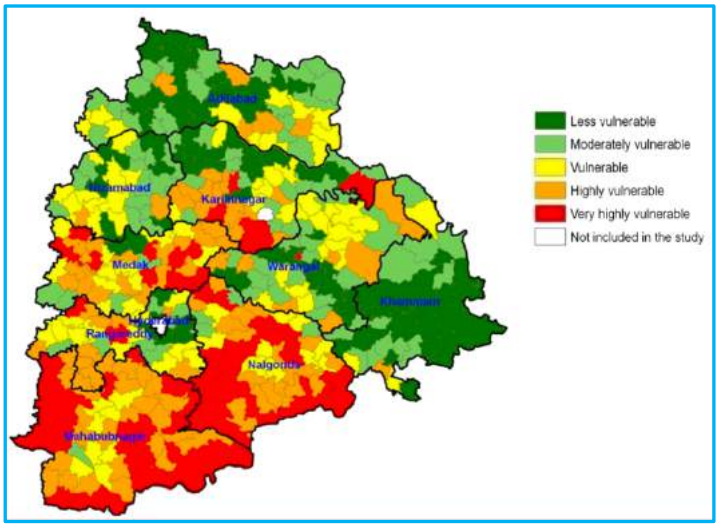


Agricultural drought vulnerability status of different Mandals

The agricultural drought vulnerability index indicates that 87 Mandals are less vulnerable, 90 Mandals are moderately vulnerable, 91 Mandals are vulnerable, 98 Mandals are highly vulnerable and 76 Mandals are very highly vulnerable. Mandals with high and very high vulnerability are concentrated in Nalgonda and Mahaboobnagar districts followed by Ranga Reddy, Medak and Karimnagar districts.

[4] *Source: Telangana State Development Planning Society (TSDPS) and directorate of Economics and statistics*

[5] *Maps are prepared based on the older division of districts.*

BACKGROUND OF THE HEATWAVE ACTION PLAN

Telangana experiences disasters of various scale, its geographic and topographical contexts making the state extremely vulnerable to droughts, floods, hailstorms, fire, lightening and heatwaves and northern districts experience cold waves occasionally. The state is highly vulnerable to Heatwaves, out of 589 Mandals in the state 568 are vulnerable to heatwave in different scale. Telangana State Heat Wave Action Plan was first prepared in 2016 as per High Court orders and the guidelines issued by the National Disaster Management Authority (NDMA), Government of India and the same was submitted to NDMA. Based on regular inputs from NDMA and Scientific Institutions the Heat Wave Action Plan is revised and updated in 2017, 2018, 2019 and 2020.

Revenue (DM) Department Govt. of Telangana initiated heatwave preparedness programmes for the year 2021 in association with its line departments in coordination with Telangana State Development Planning Society (TSDPS) and UNICEF, Hyderabad field office. State Consultation with concerned line departments was organized during the month of February 2021. It is communicated to District Administrations to conduct orientation and plan for the implementation of the Heatwave Action Plan. It was requested to all departments and District Administrators to submit suggestions for the revision of heatwave action plan for the year 2021. Departments and agencies submitted their suggestions to include in the Heatwave Action plan. Since 2018 it was proposed to send weekly reports on actions taken to mitigate heatwave conditions and also during exigencies. In 2018 to 2020, with support from Telangana State Development Planning Society, Indian Meteorological Department, MCR HRD Institute and UNICEF, Hyderabad Field Office conducted workshops/conferences with State and District Officials on extreme weather evets. Capacity building and orientation programmes at different levels of administration and community levels will be organized for the current year 2021.

OBJECTIVES OF THE HEATWAVE ACTION PLAN

The Heatwave Action Plan aims to provide a framework for developing plans for the preparedness, implementation, interagency coordination and impact evaluation of heatwave response activities in all the districts that reduce the negative impact of extreme heat. The primary objective is to alert those at risk of heat-related illness in places where extreme heat conditions either exist or are imminent, and to take appropriate precautions. The plan also calls for preparedness measure to protect livestock/animals as extreme heat causes significant stress to them as well. The heatwave action plan intends to mobilize departments and communities to help protect communities, neighbours, friend, relatives and themselves against avoidable health problems during spells of very hot weather. The Plan also intends to help early warning agencies as well as the media to be proactive on steps taken to negate heat wave impacts. The administrative/preventive actions that need to be taken by multiple agencies/departments in the state of Telangana. All district/cities/town can learn from their/others' experiences and develop a plan to deal with heat wave effectively.

KEY STRATEGIES

Severe and extended heat waves can cause disruption to general, social and economic services. Government agencies will have a critical role to play in preparing and responding to heat waves at the local level, working closely with health and other related departments on a long-term strategic plan.

- Ensure preparedness and convergence between departments and other stakeholders.
- Establish Early Warning System and communication systems
- Developing inter-agency response plan and coordination in field
- Preparedness at the local level for health eventualities
- Health care system capacity building
- Ensuring COVID-19 protocols
- Public awareness and community outreach
- Collaboration with private, non-government and civil society
- Assessing the impact - feedback for reviewing and updating the plan

After a severe heat wave affected the State of Telangana in May 2015, causing several deaths, Government of Telangana has taken the initiative to develop a comprehensive heat wave Management action plan for extreme heat events.

In Telangana State, the period from April to June is summer months. During this period the temperatures rise considerably, to a point of 47º C in the month of May in Districts - Khammam, Nizamabad, Bhadrachalam, Nalgonda, Karimnagar and Warangal. To protect and prepare people of Telangana from extreme heat events, State Government formed a Committee to prepare a comprehensive Heat Wave Action Plan based on guidelines issued by NDMA and plans prepared by other states such as Gujarat, Odisha, etc., to avoid sunstroke fatalities and illness in the future.

COMMITTEE

The following are the members of the Committee:

1	The Secretary, Revenue (DM) Department	Member & Convener
2	The Prl. Secretary, School Education Dept.	Member
3	The Prl. Secretary, PR & Rural Development Dept.	Member
4	The Prl. Secretary, Municipal Admin. & Urban Development Dept.	Member
5	The Prl. Secretary, Animal Husbandry & Fisheries Dept.	Member
6	The Prl. Secretary, IT, Electronics & Communications Dept.	Member
7	The Director, Public Health & Family Welfare Dept.	Member
8	The Director, Institute of Preventive Medicine Dept.	Member
9	The Commissioner, Information & Public Relations Dept.	Member
10	The Director, Indian Meteorological Dept. (IMD)	Member
11	The Director General of Fire Services Dept.,	Member
12	The Prl. Secretary, Health, Medical & Family welfare Dept.	Member

Table: 3

The Telangana Heat Wave Action Plan (HAP) aims to provide guidelines on the steps to be taken by the state & district administration for minimising the impact of Heat Waves. The primary objective is to ensure no fatalities among the population most at-risk during Heatwave and reduce related illness due to the effects of the heatwaves.

Telangana state Revenue (DM) Department is coordinating the heatwave preparedness and mitigation activities for the state. Initial state level consultations are organized with state line departments and district collectors. Telangana state development planning society has initiated accurate and timely weather forecast and hazard warning to state line departments and public. Weather data is being collected from 1044 Automated Weather Stations (AWS) located across the state on hourly basis. It creates and archives data base of weather information and makes real-time analysis, three-day weather forecaste of Heatwave on real time basis. Society has organized capacity building activities and review of action plan in association with Revenue (DM) department and UNICEF, Hyderabad Field Office. TSDPS has prepared Heatwave Atlas -2019 consisting of analysis of heatwave conditions of the state since last 10 years. TSDPS is developing a mobile App (TS-Weather) to know about the village level weather conditions from the nearest AWS for the use of department officials, expert agencies and common public. In addition, the local weather information the App will also give information on top ten hottest locations in the state which will be helpful to the district officials to issue weather bulletins locally to make necessary precautionary measure. For transmission of real-time weather updates and alerts for public and official use, LED display boards were installed in the District Collector Offices and other prominent places in Hyderabad.

Telangana State Development Planning Society (TSDPS) and Revenue (DM) Department is jointly working with UNICEF, Hyderabad field office to review and update heatwave action plans since 2017. During 2017 to 2020 all state line departments were involved in the consultation process to review and update the plans as per the NDMA guidelines and state priorities. Revenue Disaster Management Department in association with UNICEF has initiated District Disaster Management Plans (DDMP) for the entire districts in Telangana considering all the hazards including heatwaves and vulnerabilities pertaining to different sectors in each districts of Telangana State. UNICEF, as the part of its Global platform-GRIP (Guidance for Risk Informed Programming) has prepared Child Risk and Impact Analysis (CRIA) considering the major hazards of the state like floods, droughts, heatwave etc. to identify various risks and impact of natural hazards especially on children and women and various social sectors providing critical services to them.

CHAPTER 2

HEATWAVE VULNERABILITY ANALYSIS

DEFINITION

Heat wave is a condition of atmospheric temperature that leads to physiological stress, which sometimes may cause death. The World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius. Different countries define heat wave differently in context of their local conditions. In India, heat wave conditions are considered if maximum temperature of a station reaches at least 40°C or more for plains, 37°C or more for coastal areas and at least 30°C or more for hilly regions. Following criteria is used to declare heat wave conditions prevailing:

a) 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)

b) Based on Actual Maximum Temperature (for plains only)
   - Heat Wave: When actual maximum temperature > 45°C
   - Severe Heat Wave: When actual maximum temperature >47°C

DECLARING HEATWAVE FOR TELANGANA STATE DURING 2021

To declare a heat wave, the above criteria should be met for 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.

TEMPERATURE HUMIDITY INDEX

The level of heat discomfort is determined by a combination of meteorological (temp, RH,wind, direct sunshine), social/cultural (clothing, occupation, accommodation) and physiological (health, fitness, age, level of acclimatization) factors. There will be no harm to the human body if the environmental temperature remains at 37°C. Whenever the environmental temperature increases above 37° C, the human body starts gaining heat from the atmosphere. If humidity is high, a person can suffer from heat stress disorders even with the temperature at 37°C or 38°C as high humidity does not permit loss of heat from human body through perspiration. To calculate the effect of humidity, Heat Index Values are used in some regions. The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. Heat index chart used by the National Weather Service of the USA given below shows that if the air temperature is 34°C and the relative humidity is 75per cent, the heat index how hot it feels - is 49°C. The same effect is reached at just 31°C when the relative humidity is 100percent.

Temperature/ Humidity Index

Relative Humidity %	Temperature °C																
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
40	27	28	29	30	31	32	34	35	37	39	41	43	46	48	51	54	57
45	27	28	29	30	32	33	35	37	39	41	43	46	49	51	54	57	
50	27	28	30	31	33	35	36	38	41	43	46	49	52	55	58		
55	28	29	30	32	34	36	38	40	43	46	48	52	54	58			
60	28	29	31	33	35	37	40	42	45	48	51	55	59				
65	28	30	32	34	36	39	41	44	48	51	55	59					
70	29	31	33	35	38	40	43	47	50	54	58						
75	29	31	34	36	39	42	46	49	53	58							
80	30	32	35	38	41	44	48	52	57								
85	30	33	36	39	43	47	51	55									
90	31	34	37	41	45	49	54										
95	31	35	38	42	47	51	57										
100	32	36	40	44	49	56											

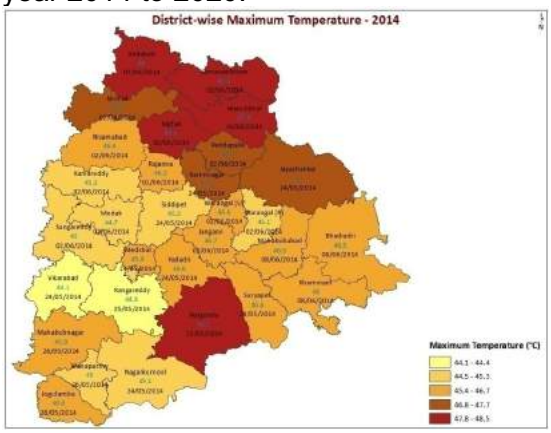
Caution | Extreme Caution | Danger | Extreme Danger

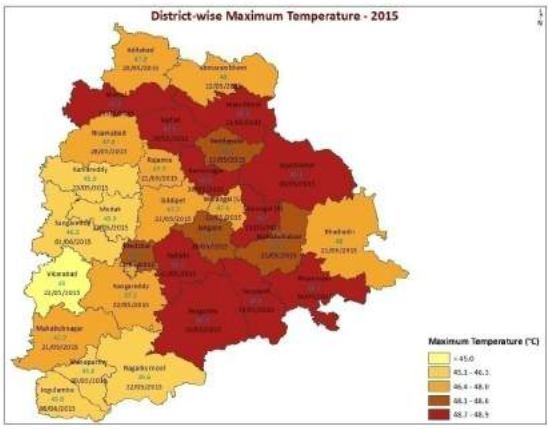
Source: Calculated °F to °C from NOAA's National Weather Service

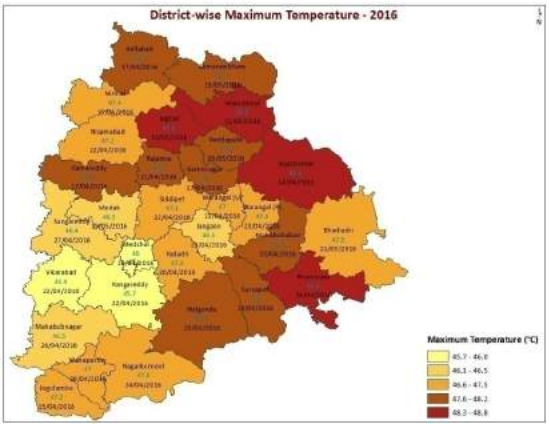
Fig: 9

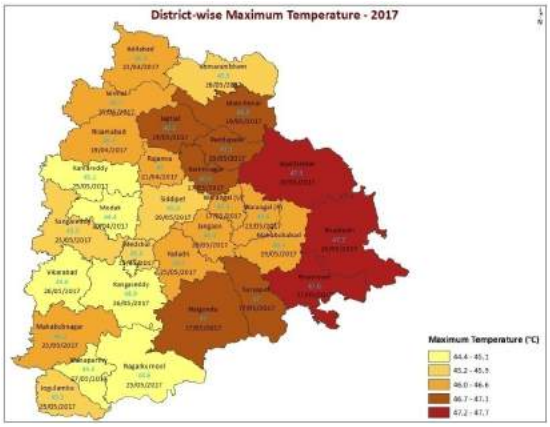
TREND IN TEMPERATURE VARIATION OF THE STATE

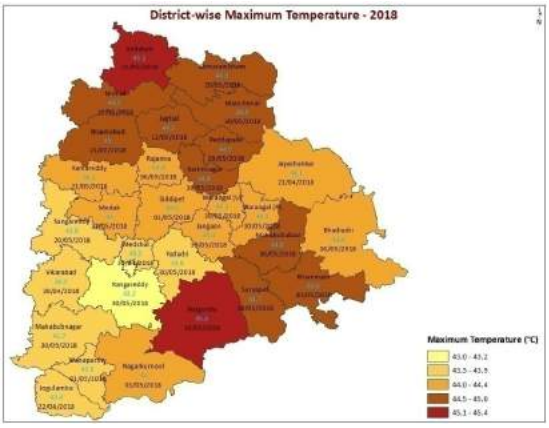
The below maps are showing the mandal wise maximum temperature recorded from the year 2014 to 2020.

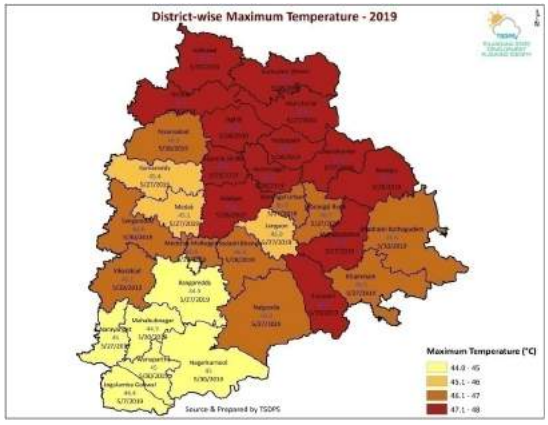












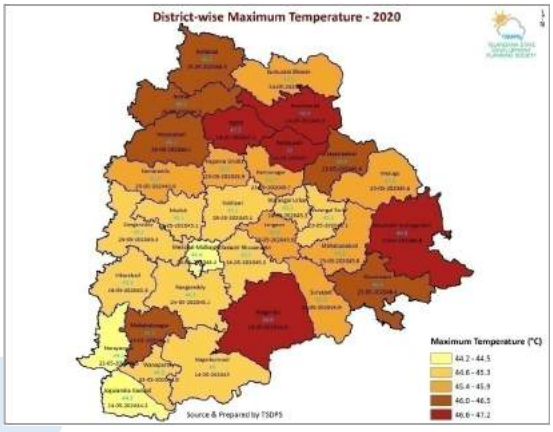


Fig: 10 -16

DISTRICT WISE MAXIMUM TEMPERATURE DURING THE YEAR 2020

S. No	District	Mandal	Location	Date	Temp (°C)
1	Jagtial	Velgatoor	Endapally	24-May-20	47.2
2	Peddapalli	Srirampur	Srirampur	24-May-20	47.0
3	Mancherial	Jannaram	Jannaram	24-May-20	46.9
4	Bhadradri Kothagudem	Annapureddypally	Pentlam	23-May-20	46.8
5	Nalgonda	Anumula_Haliya	Peddavura Road	24-May-20	46.8
6	Nirmal	Kaddam Peddur	Kaddam Peddur	26-May-20	46.5
7	Jayashankar	Mogullapally	Mogullapally	23-May-20	46.4
8	Khammam	Enkuru	Enkuru	23-May-20	46.4
9	Adilabad	Jainad	Bhoraj	25-May-20	46.3
10	Mahabubnagar	Balanagar	Balanagar	24-May-20	46.1
11	Nizamabad	Bodhan	Kaldurki	26-May-20	46.1
12	Kamareddy	Banswada	Kollur	25-May-20	45.9
13	Rajanna Sircilla	Mustabad	Namapur	23-May-20	45.9
14	Suryapet	Mothey	Urlugunda	23-May-20	45.9
15	Mahabubabad	Narsimhulapet	Peddanagaram	23-May-20	45.8
16	Karimnagar	Karimnagar Rural	Durshed	23-May-20	45.7
17	Jangaon	Chilpur	Malkapur	23-May-20	45.6
18	Mulugu	Mulugu	Mulugu	23-May-20	45.6
19	Kumuram Bheem	Dahegaon	Dahegaon	24-May-20	45.5
20	Sangareddy	Kalher	Kalher	24-May-20	45.3
21	Vikarabad	Yalal	Yalal	24-May-20	45.3
22	Warangal Urban	Dharmasagar	Peddapendyal	24-May-20	45.2
23	Yadadri Bhuvanagiri	Yadagirigutta	Yadagirigutta	24-May-20	45.2
24	Medak	Narsapur	Narsapur	28-May-20	45.1
25	Rangareddy	Balapur	Mamidipalle	24-May-20	45.1
26	Siddipet	Koheda	Shanigaram	28-May-20	45.1
27	Warangal Rural	Nekkonda	Nekkonda	23-May-20	45.1
28	Nagarkurnool	Vangoor	Kistampalle	24-May-20	45.0
29	Wanaparthy	Kothakota	Kanaipally	23-May-20	44.8
30	Narayanpet	Maganoor	Maganoor	22-May-20	44.5
31	Hyderabad	Bandlaguda	Kandikal Gate	24-May-20	44.4
32	Medchal-Malkajgiri	Qutballapur	Qutballapur	24-May-20	44.4
33	Jogulamba Gadwal	Rajoli	Rajoli	24-May-20	44.2

Table: 4

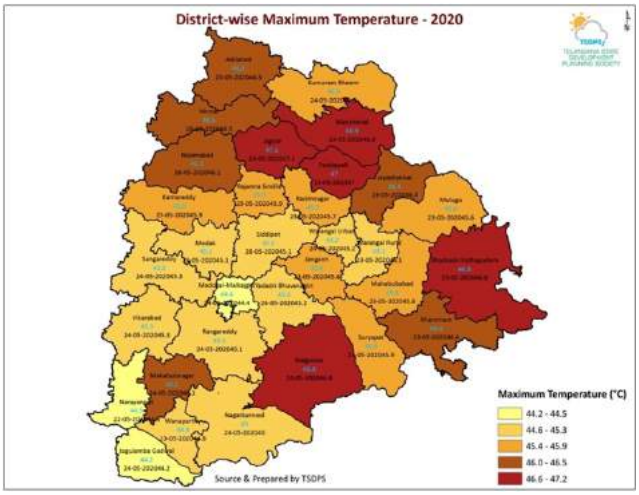
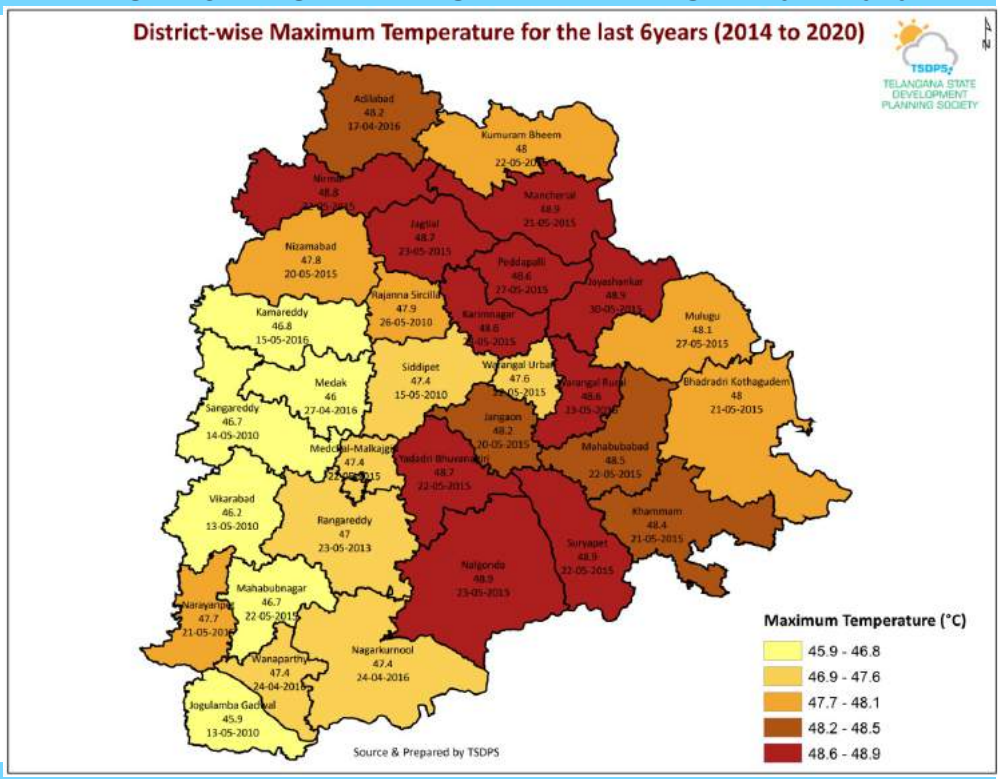


Fig:17

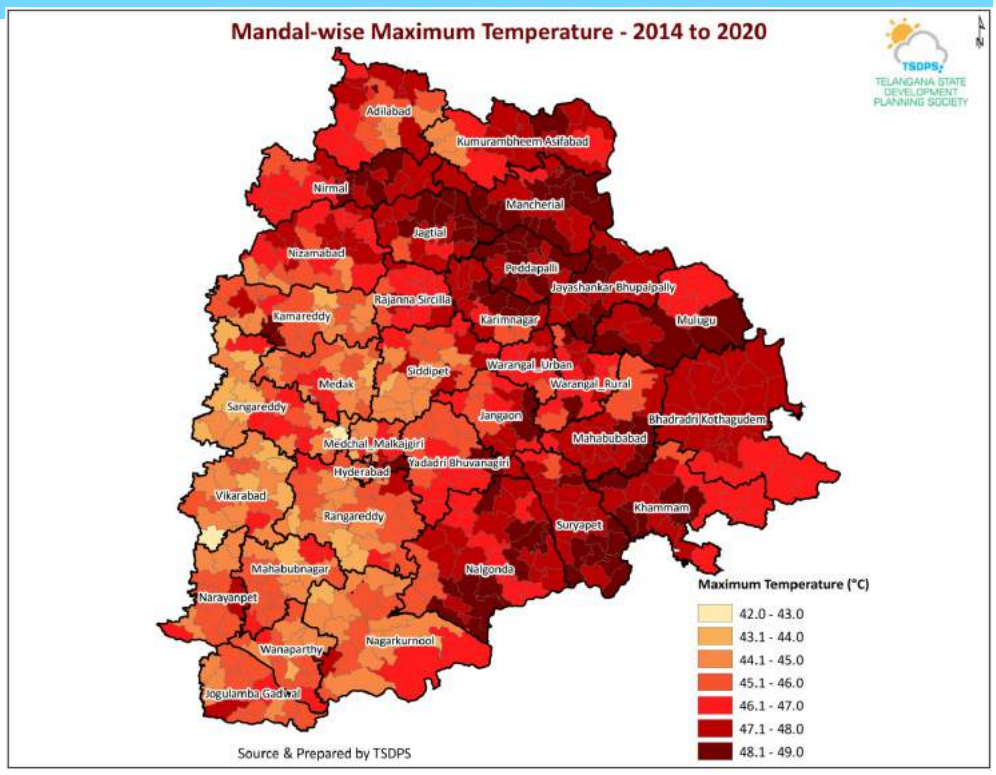
DISTRICT WISE MAXIMUM TEMPERATURE 2014-2020

Fig: 18



MANDAL WISE MAXIMUM TEMPERATURE FROM 2014 TO 2020

Fig: 19



DISTRICT WISE HEAT WAVE / SEVERE HEAT WAVE DAYS

S. No	District	2014	2015	2016	2017	2018	2019	2020	Total
1	Adilabad	3	11	24	4	1	11	5	59
2	Kumuram Bheem	3	18	12	4	1	4	0	42
3	Mancherial	3	23	37	8	0	6	4	81
4	Nirmal	2	17	15	2	0	4	7	47
5	Nizamabad	1	12	24	1	1	6	0	45
6	Jagtial	1	25	35	7	0	16	5	89
7	Peddapalli	4	22	29	7	1	9	2	74
8	Jayashankar	3	19	15	6	0	5	1	49
9	Bhadradri Kothagudem	1	15	19	12	0	1	1	49
10	Mahabubabad	1	17	23	4	0	7	0	52
11	Warangal Rural	0	13	19	2	0	1	0	35
12	Warangal Urban	0	10	15	2	0	1	0	28
13	Karimnagar	3	18	31	4	0	7	1	64
14	Rajanna Sircilla	0	8	10	4	3	5	2	32
15	Kamareddy	0	4	21	0	0	0	0	25
16	Sangareddy	0	4	9	1	0	0	0	14
17	Medak	0	0	9	1	0	0	0	10
18	Siddipet	0	7	7	0	0	5	0	19
19	Jangaon	0	10	3	0	0	1	0	14
20	Yadadri Bhuvanagiri	0	9	10	0	0	3	0	22
21	Medchal-Malkajgiri	2	7	4	0	1	0	0	14
22	Hyderabad	0	3	4	0	0	0	0	7
23	Rangareddy	0	3	5	0	0	0	0	8
24	Vikarabad	0	0	4	0	0	0	0	4
25	Mahabubnagar	0	1	4	0	0	0	1	6
26	Jogulamba Gadwal	0	0	5	0	0	0	0	5
27	Wanaparthy	0	0	5	0	0	0	0	5
28	Nagarkurnool	0	0	8	0	0	0	0	8
29	Nalgonda	5	24	19	3	0	2	1	54
30	Suryapet	1	19	15	6	0	8	1	50
31	Khammam	1	17	22	4	0	7	0	51
32	Mulugu	1	19	15	6	0	3	0	44
33	Narayanpet	0	1	2	0	0	0	0	3

Table: 5

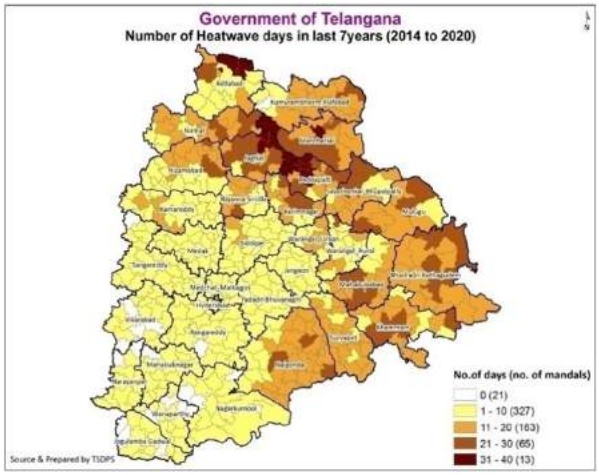


Fig: 20

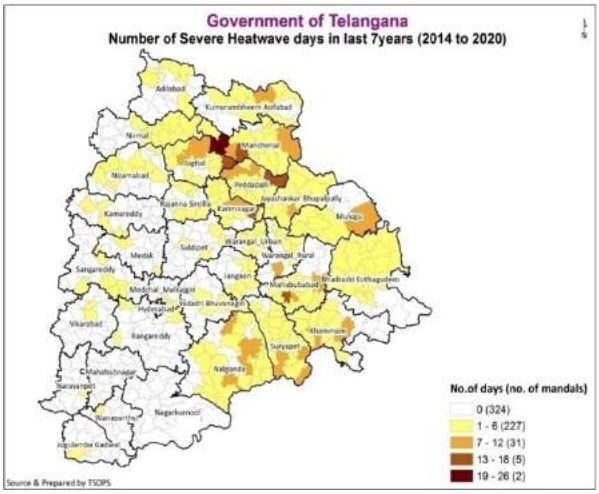


Fig: 21

HAZARD VULNERABILITY CATEGORIZATION

The heatwave vulnerability map of Telangana State is derived for all the mandals in the state, based on the number of years, the mandals have experienced Severe Heatwave and Heatwave days and are categorized into five categories i.e., Severe, Critical Semi Critical, Vigilant and Safe in descending order of vulnerability.

Sl. No.	Severe Heatwave (No. Years)	Heatwave (No. Years)	Categories
1	>=4	>=6	Severe
2	>=2	>=4	Critical
3	>=1	>=2	Semi Critical
4	>=1	>=1	Vigilant
5	0	0	Safe

Table: 6

Hazard vulnerability analysis was carried out based on heatwave and severe heatwave conditions over each mandals in the state for the last seven years. From the analysis, 3 mandals are falling under the category of sever heatwave vulnerable, 62 are critical, 187 are semi critical, 316 are vigilant and 21 are under safe category based on the criteria mentioned below. Over 13.7 million people are in sever, critical and semi critical zones in the state.

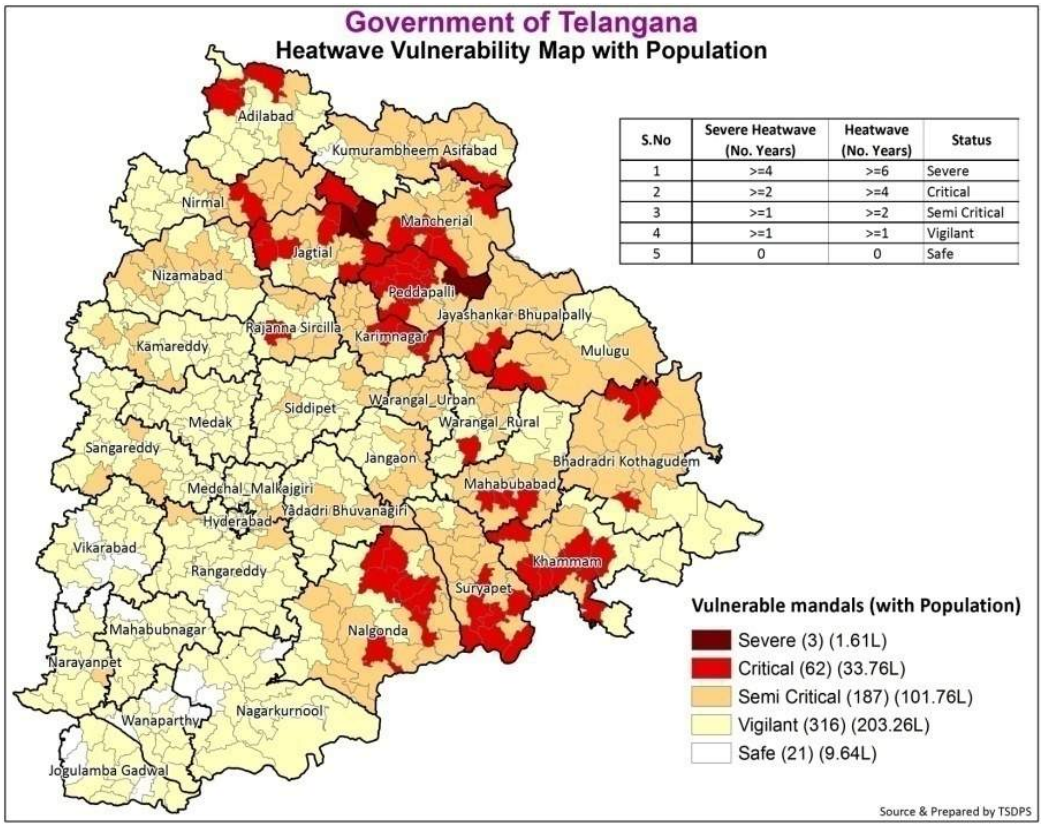


Fig: 22

IMPACTS OF A HEATWAVE

Heatwaves impact different aspects of life including human health, surrounding nature, critical infrastructure, the economy and essential services. While this guide focuses on the impacts of heat on human health in cities, it is important to know that there are other impacts such as those on water availability and agricultural production in rural areas.

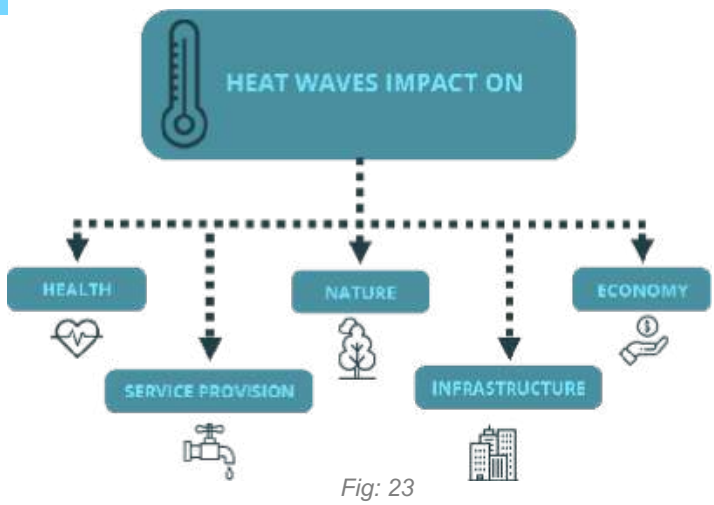


Fig: 23

DIRECT IMPACTS

- Exposure to extreme heat can lead to dehydration, heat exhaustion, heat stroke, loss of consciousness and other medical emergencies.
- Heatwaves can also exacerbate pre-existing conditions such as cardiovascular disease and respiratory illnesses and have deadly consequences.
- Extreme heat can also directly affect infrastructure, for example, by causing road surfaces to melt, making them inaccessible or unsafe.
- In India during a heatwave in 2016 the heat softened the tarmac on the roads making it difficult for people to cross them.

INDIRECT IMPACTS

- In addition to the direct impacts on human health, heatwaves stretch existing health systems by increasing in the number of emergency hospital admissions.
- Heatwaves also impact the city economy as well as the provision of essential services by reducing the number of hours outdoor workers can be employed safely; reducing productivity in offices without adequate cooling; and impacting sectors such as tourism. In addition, physical infrastructure such as energy systems, water storage, delivery and treatment, and transport are affected by extreme heat both directly and indirectly. For example, demands for water and electricity tend to increase during a heatwave, straining existing systems and potentially leading to shortages.

IMPACT OF HEATWAVE IN INDIA

- The rising maximum temperature during the pre-monsoon months continues till June, and in some cases till July, when the onset of southwest monsoon occurs over some parts of the country.
- In recent years, heat wave casualties have increased. Abnormally high temperatures were observed during April-June during 2010 to 2016 across the country.
- In India, heat wave caused 24,223 deaths from 1992 to 2015 across various states Intense and sustained efforts by all stakeholders significance reduction in mortality due to heat wave from 2040 in 2015 to 1111 in 2016.
- Mortality due to heat wave further reduced to 384 in 2017 and 25 in 2018. Heat wave also caused the death of wildlife, birds, poultry, etc. across the country.

HEATWAVE IMPACT IN TELANGANA

- The people who are most vulnerable to hot weather include older people (over age 65); those with pre-existing medical conditions such as heart disease, respiratory illness or diabetes; those taking certain medications; those who are overweight and obese; those who are marginalized and isolated, including those experiencing homelessness; pregnant women, infants and people wearing personal protective equipment (PPE) in places that are not temperature controlled.

- People infected with, or recovering from, COVID-19 are presumed more vulnerable to heat stress, including outdoor workers returning to the workplace.
- Vulnerable populations may be in more precarious social and economic conditions due to COVID-19, including from lost wages, increased isolation, and strains or gaps in social networks. This can increase vulnerability to heat risk by limiting healthcare access, transport options, food security and utility access.

No of Deaths as per DMD			
Year	Deaths	Year	Deaths
2008	17	**2015**	541
2009	9	**2016**	324
2010	11	**2017**	108
2011	0	**2018**	12
2012	144	**2019**	64
2013	516	**2020**	9
2014	31		

Table: 7

- Telangana is highly prone to hot weather conditions and heatwave. Out of 589 Mandals 3 Mandals are in severe, 62 are in critical 187 are in Semi Critical situation as per the vulnerability analysis based on the data from TSDPS.
- Adilabad, Nirmal, Jagtial, Kumurambheem, Asifabad, Maancheril, Peddapalli, Karimnagar, Warangal, Mulugu, Khammam, Suryapet, Mahabubabad, Nalgonda districts are highly vulnerable to the hazard.
- Heatwaves affects the entire population especially infants, children and aged people.
- According to the data analysed for 2014 to 2020 all the above districts had experienced 21-40 heatwaves days in a year.
- 31,897 Main AWCs and 4,076 Mini Anganwadi Centres in Telangana State are vulnerable to heatwaves.
- Alternative measures are essential as nutrition services through AWCs will be affected and reduce accessibility to nutrition services like cooked meal for pregnant women, infant care services etc
- The presence of kitchen outside the home makes women more vulnerable towards the heat exposure and illness
- Impact to outdoor work/ opportunities/agriculture will affect the economy of the population and chances of school dropouts, food and sanitation facilities. Concerned line departments are working on the same to ensure livelihood alternatives and risk transfer schemes to avoid the impacts.
- COVID-19 has amplified the risks of hot weather for those already most vulnerable to the negative effects of extreme heat. In particular, this includes the elderly(>65 years), and those with pre-existing health conditions (e.g. cardiovascular,

pulmonary, kidney disease; diabetes/obesity), essential workers who work outside during the hottest time of the day, and many others.

- Health services and systems will need to prepare for a potential increase in patients during a heatwave, during a time when they are already stretched with COVID-19 patients. In addition, healthcare workers wearing Personal Protective Equipment (PPE) working in inadequately cooled conditions are also at high risk of heat stress.

PART 2

Heatwave preparedness Plan implementation

CHAPTER 3

HEATWAVE PREPAREDNESS

GUIDELINES FOR STATE-DISTRICT AND LINE DEPARTMENT AUTHORITIES

STATE LEVEL

Telangana State Disaster Management authority and state line departments

- Telangana State Disaster Management Authority (TSDMA) shall update Heatwave Action Plan as per the NDMA guidelines 2019.

- The authority must circulate Heatwave Action Plan to all Collectors & HoDs of concerned line departments with instructions for its implementation and appoint a Nodal Officer at State, District and Block levels for communicating early warning and coordinating the implementation of Heatwave Action Plan.
- The authority must instruct departments/ agencies to prepare and submit their action plans to state government.
- TSDMA shall give directions to Stakeholders to take precautionary measures of concurrent disaster of COVID-19. Provisions should be made to ensure physical distancing along with the availability of soap, water and sanitising stations.
- Telangana State Disaster Management Authority must review and monitor the heat wave situation through video conferencing with concerned line departments/districts/ blocks.
- The revenue (DM) department shall put up display boards with colour coding for heat wave alert at different locations. Widely publicise Do's & Don'ts.
- TSDMA in association with I & PR department, Panchayati Raj and MAUD along with TSDPS shall publish IEC print material (print material, video, radio jingles etc) in regional language. Warnings may be disseminated by using SMS, WhatsApp, Facebook, Twitter etc.
- The state Health and Family Welfare departments must ensure stock of ORS packets at health centres, anganwadis, schools and other important locations.
- Education department must re-schedule school timings to avoid hot weather impact. Schools may start early and close before noon or as per the local climatic conditions.
- MAUD and Panchayati Raj institutions must setup large- scale drinking water stations (kiosks) at public places.
- The Panchayati Raj Department shall set up special shelters for MGNREGA/construction workers and rescheduling their working hours. Ensure COVID-19 protocols in all drinking water stations.
- The revenue department shall undertake local thresholds assessment with the partnership of expert institutions
- The SDMA shall allocate funds from SDRF for the plan implementation including preparedness, capacity building mitigation activities (long term and short term).
- The revenue (DM) department shall create a common web based platform (Whats App or other comfortable social network) for inter- department/ agency coordination an knowledge management.
- TSDMA must instruct departments to take preparedness measures based on the warning issued by IMD and TSDPS.

- TSDMA has to ensure proper reporting of heatwave related impacts including deaths by each departments as per the formats issued by NDMA and SDMA shall compile the same and send to NDMA. (Reporting formats- Annexure 5,6 and 7)
- SDMA shall organize state level awareness programme on heatwave impact mitigation and preparedness to all the concerned department heads during the first week of march.

DISTRICT LEVEL

District Disaster Management Authorities- District line departments

- District Disaster Management Authorities (DDMA) must organize review meetings with district line departments before heat season starts and revise heatwave action plans at the district level.
- District Collectors shall hold regular Press conferences on the risks and dangers of heat related illness, activated “cooling centres” at important locations – Religions places, Community and Public buildings, Malls and bus stands.
- District administrations also shall support NGO’s, Community Groups and Individuals to open “Chalivendrams” at public congregation places for providing drinking water and butter milk during Heat Wave conditions.
- Undertake awareness campaign to inform and educate the public on Heat wave Do's & Don'ts.
- DDMAs must ensure all line departments are following guidelines under the heatwave action plan.
- Undertake precautionary measures of concurrent disaster of COVID-19. Provisions should be made to ensure physical distancing along with the availability of soap, water and sanitising stations.
- Undertake necessary steps to prevent heat-related deaths with the support of district line departments.
- Hold regular Press conferences on the risks and dangers of heat-related illnesses, activate "cooling centres" such as temples, public buildings, malls, etc. and urge NGOs, community groups and individuals to open drinking water / butter milk kiosks at public places during Heat Wave conditions.
- Ensure that all concerned line departments/agencies are well connected with the early warning facilities from TSDPS and IMD.
- DDMAs has to ensure heatwave impact reports from all the concerned line departments as per the formats issued by NDMA. (Reporting formats- Annexure 5,6 and 7)
- Organize district level awareness programme on heatwave impact mitigation and preparedness to all the concerned department heads during the first week of march.

DEPARTMENT LEVEL

REVENUE (Disaster Management) DEPARTMENT

- Review and revise heatwave action plan
- Circulate state plan with all the concerned line departments and agencies
- Ensure that all departments are ready with their action plan.
- Instruct all concerned line departments to send daily and monthly impact report as per the format attached in the annexure.
- Monitor capacity building activities and awareness programmes both for the officials and vulnerable community.

- Document heatwave impact data and best practices in heatwave preparedness and mitigation.
- Share consolidated heatwave impact data and best practices to NDMA.

TELANGANA STATE PLANNING DEVELOPMENT SOCIETY (TSDPS) & INDIAN METEOROLOCIAL DEPARTMENT (IMD)

- Ensure timely and accurate temperature forecasts and communicate district wise max. temperature details on daily basis.
- Giving Heatwave alerts/warnings promptly through Mobile application, LED Display boards and TSDPS website.
- TSDPS may be organize a periodic workshop for all stake holders in the month of March in association with Revenue (DM) Department, IMD and UNICEF.
- Review and updating of Heatwave Atlas
- Ensure proper functioning of mobile App (TS-Weather)

I & PR DEPARTMENT

- District officers has to be instructed to identify high risk areas for giving more attention.
- Prepare and circulate IEC Material for adequate publicity through posters, pamphlets, boards & banners, radio jingles across the State and widely publicise them for creating awareness.
- Create public awareness on heat-related illnesses, provided preventive tips and on Do's & Don'ts of Heat wave through electronic (TV, FM Radio, Facebook, Twitter and WhatsApp) and Print Media.

HEALTH, MEDICAL AND FAMILY WELFARE

- Prepare department specific action plan for heatwave season and include the same in department annual plan.
- Health Department shall alert public about the impacts of ill-health that will occur during heatwave.
- The department is suggested to deploy additional staff to take care of affected persons due to Sunstroke.
- Activate 108 / 104 Emergency services and also kept adequate stocks of medical supplies such as ORS and IV fluids in all hospitals / PHC's / UHC's by positioning ORS packets and IV fluids in each district.
- The Department has to ensure COVID 19 protocols while implementing precautionary measures.
- Adopt Heat focused examination procedures at local hospitals.
- Develop monitoring mechanism for implementation of heat health hospital preparedness plan.
- Follow a standard protocol for investigating and arriving at the cause of a death.
- Ensure proper reporting to DDMA/SDMA about the heatwave deaths/ other illness on daily and monthly basis as per the format attached in the annexure.
- Adopt a uniform process for registration of casualties/ deaths due to heat wave.

LABOUR AND EMPLOYMENT DEPARTMENT

- The department must prepare action plan for the heatwave season.
- Ensure guidelines under COVID 19 protocols for shelter planning and worksite management.

- Organize awareness camps and publish health advisories on Heat related illnesses for industrial and other labour.
- Direct employers to reschedule working hours for outdoor workers to avoid peak hours (12 Noon to 3 PM).
- Coordinate with health department and ensure regular health check-up of workers.
- Ensure the availability of drinking water and undertake other necessary measures for construction workers.
- Ensure proper reporting about the impact of heatwave and causalities if any to DDMA.

RURAL WATER SUPPLY AND SANITATION

- Prepare action plan for the hot weather season and guidelines can be issued for the stakeholders/ agencies involving in water supply to ensure safe and easy accessibility of quality water in all vulnerable locations.
- Enhance capacity of the drinking water distribution agencies.
- Ensure quality standards in water collection and distribution.
- Ensure safe drinking water for all especially farmers working at the field, slum dwellers, people living in poor living facilities and other vulnerable communities in the society.

PR & RD DEPARTMENT

- The department must prepare action plan for the heatwave season, share the same with DDMA.
- PR & RD Department shall restrict the working hours during peak hours, for the labours working under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
- Implementation of instruction for mainstreaming heat health precautionary measures, including re-scheduling of working hours and reduce piece rate, in all schemes and programmes.
- Ensure shelter facility for resting and drinking water facilities for workers at all work place and major locations.
- Follow COVID-19 instructions issued by the state.

CONSUMER AFFAIRES FOOD CIVIL SUPPLIES DEPARTMENT

- Prepare department level action plan for storage and supply of materials under the departments.
- Take precautionary measures as per the contingency plan.

AGRICULTURE AND COOPERATION DEPARTMENT

- Based on the heatwave vulnerability of the districts/mandals, the department shall ensure contingency plans to reduce/prevent heatwave impact to agriculture sector.
- The department must prepare action plan for the heatwave season and same must be shared with DDMA.
- The Department must ensure suggested contingency measures based on the farming situation including; change in crop/cropping system/variety, agronomic measures, Seed/input supply, institutional policy etc.
- Ensure predominant seed verities which can survive the extreme weather situations has to be included in seed subsidy programmes under Normal State Plan (NSP) and Rashtriya Krishi Vikas Yojana (RKVY)

- Support research and development in heat resistant verity seeds development and adaptable farming methods.
- Enhance the capacity and awareness of the farmers.
- Ensure focus on extreme weather preparedness and mitigation measures while conducting awareness campaigns with Agricultural extension staff, KVK scientists in coordination with ATMA and capacity building programmes for farmers on latest technology updates in coordination with PJTSAU as per the state action plan.
- Ensure proper risk transfer mechanisms are available and vulnerable people are covered under the same.
- Ensure alternative irrigation measures during drought situation.
- Make sure that all the agriculture farmers and related industries are connected with weather related updates/warnings (in local language).
- Department shall ensure suitable monitoring and grievance redressal mechanism established at Mandal, District and state levels.
- The department shall ensure heatwave related measures to be included in the state and district Agro-advisories issued by the department.
- Include Heatwaves and its mitigation and preparedness measures as a component to be considered while preparing annual action plans and all mobile applications under the department.

ANIMAL HUSBANDRY AND FISHERIES DEPARTMENT

- The department must prepare action plan for the heatwave season and share the same with DDMA.
- Animal Husbandry Department shall activate field staff to create awareness among the Livestock farmers on the Animal Management during Heat waves and printed posters and exhibited in the public places of the villages.
- Cattle troughs were also provided with transportation of Drinking water.
- Preparation, implementation and review of Heat wave action plan to safeguard the cattle.
- Activate field staff and Gaupalaks at village level to create awareness among those with Livestock on Animal Management during Heat wave conditions.
- Create shelters for livestock and animal husbandry and maintain it.
- Ensure pre-positioning of adequate veterinary medicines and supplies.
- Provide and maintain cattle troughs with safe drinking water.
- Fisheries department shall ensure contingency plans to mitigate/prevent impact on aquaculture industry and fish farming.
- Enhance capacity of the farmers/industries on essential preparedness during all phases of hot weather situation.

TRANSPORT DEPARTMENT AND TSRTC

- The department must prepare action plan for the heatwave season and share the same with DDMA.
- Transport Department and TSRTC shall establish health teams at major bus stands / terminals and other public places for safe transportation by changing the timings of buses during peak hours (12 to 4 PM).
- Ensure social distancing and COVID19 protocols in all bus stands / terminals, other public places and inside buses.

- Ensure shelter/shades at Bus terminals/stops.
- Ensure drinking water facilities at major bus stops.
- Ensure facilities for First Aid at major bus stands / terminals. Consider changing bus timings to avoid peak heat hours, in consultation with the district administration.
- Ensure shade and cool jacket for on-duty traffic police as they are more exposed to heat wave.

EDUCATION DEPARTMENT

- The department must prepare action plan for the heatwave season and same must be shared with concerned DDMA.
- Education Department shall issue directions to schools to alter school timings to ensure children are not affected. Reschedule school timings (restrict school timings to avoid hot weather impact to children, start mid-day schools) and vacations as per the heat wave situation.
- Awareness and capacity development programmes will be conducted for Parents, Teachers, students and Non-teaching staffs. Dos and Don'ts will be exhibited at the schools.
- Follow protocols under COVID19 during class hours, midday meal service and transportation.
- Ensure cool places for all educational institutions, and availability of drinking water facilities.
- Ensure that students avoid outdoor physical activities during the summer. Don't allow open air classes.
  (The department must follow the special guidelines for the schools)

IT DEPARTMENT

- The department shall prepare of dashboard/interface for monitoring Heat wave conditions in the district/state.
- Bulk SMS alerts to be sent through this dashboard/ portal.
- The department shall develop a mobile application for spreading heat-related issues, alerts and information about shelters and drinking water.

(IT Department developed 'The Telangana State Disaster Management Control Portal' and upload data such as maximum, minimum and average temperatures, humidity and wind speed recorded by 1044 AWS sensors deployed across the state by TSDPS.)

ELECTRICITY AND POWER SUPPLY DEPARTMENT

- The department must prepare action plan for the heatwave season and share the same with DDMA.
- Ensure repair & maintenance work on time for uninterrupted power supply.
- Re-schedule load shedding of power to avoid peak heat hour.
- Ensure continuity of power supply for essential service institutions like PHCs, AWCs, Nutrition centres etc.

WOMEN AND CHILD DEVELOPMENT DEPARTMENT

- The department must prepare action plan for the heatwave season and share the same with DDMA.

- Women, children and infants are most vulnerable to heatwave seasons. WCD has to take essential precautionary measures to ensure that essential nutritional services will not get effected during the time of heatwaves.
- The department has to ensure staff sensitisation before heat wave season. Capacity building programmes for AWC workers on DOs and DONTs.
- Ensure the accessibility to services through alternative schemes and service distribution patterns.
- All AWCs has to complete delivery of services by 11.00 noon instead of 4.00 pm every day.
- Ensure social distancing and special hygiene practices in line with COVID19 guidelines at AWCs, nutrition centres and other service facilities under the department.

ENVIRONMENT, FORESTS, SCIENCE AND TECHNOLOGY

- The department must prepare action plan for the heatwave season and share the same to Telangana SDMA.
- Identify the spots of fire accidents in the forest using the historical data and ensure prevention of the possible fire related accidents in these spots through creation and maintenance of fire lines, control burning of the forest litter in the fire lines, clearance of dry wastes, awareness to the villagers adjoining the forest etc.
- Ensure proper afforestation (greenery) at public places.
- Continuous watch in the forest area to avoid forest fires.
- All Field Officers shall directed to divide the Forest areas into grids of 3 x 3 km (2 x 2 km in case of PAs) to assess availability of water source in each grid and to take measures to ensure water supply in grids without water source. 6102 grids have been identified out of which 2763 grids have at least one water source. Steps are on to provide water in another 970 grids which are accessible. With this nearly 76% of the Forest areas will have water sources for Wild animals.
- Ensure measures for transportation and supply of water in saucer pits at The Nehru Zoological Park, Hyd. and Kakatiya Zoological Park, Warangal.
- Ensure essential measures including installation of Sprinklers, Foggers, Air Coolers, Shade Nets, Water Pools, Wallow pits etc. in animal enclosures including Bird and Reptile enclosures.
- Special diet consisting of fruits and vegetables like water melon, cucumber, tomatoes, tender coconut, sugarcane etc., with plenty of water should be made available.
- The roof of the enclosures can be covered with thick layer of grass / gunny bags and is watered frequently to retain moisture and cool down the enclosure.
- Ensure optimum number of check dams and percolation tanks in Forest areas to harvest and impound rain water for benefit of Wild animals.
- Ensure proper usage of Rain water harvesting structures in Forest areas which were developed as part of soil and moisture conservation program. (Percolation tanks, check dams, peripheral trenches, staggered trenches etc., have been constructed in Forest areas to conserve soil and moisture.)
- Ensure fire prevention & preparedness by taking below steps
    - Identify the spots of fire accidents in the forest using the historical data and ensure prevention of the possible fire related accidents in these spots through creation and maintenance of fire lines, control burning of the forest litter in the fire lines, clearance of dry wastes, awareness to the villagers adjoining the forest etc.

TOURISM & ENDOWMENT DEPARTMENT

- Ensure· proper registration of tourists who are visiting the State
- Publicise advisories for tourists on Heat wave conditions in the State.
- Build temporary shaded areas and ensure availability of safe drinking water for pilgrims at religious places.
- Enhance capacity of officials, help desks, tour operators in managing services during hot weather condition.

POLICE DEPARTMENT AND FIRE DEPARTMENT

- Ensure monitoring of accurate and timely weather forecast and hourly temperature data and escalate the same to officials, district headquarters and local stations.
- Ensure access to early warnings to all key officials and field staff.
- Ensure safety of officials working outdoor like highways and traffic
- Facilitate capacity building activities and review of action plan.

HOSPITAL PREPAREDNESS MEASURES FOR MANAGING HEAT RELATED ILLNESS

Director/In-charge of Hospitals CHCS and PHCS in all the Districts should ensure that the following measures are in place:

- A detailed action plan to tackle heat-related illnesses well in advance of hotter months.
- Operational framework - preparing specific health adaptation plan, development of guidelines and response plan for climate sensitive diseases (CSD).
- Need for updating heat health action plan, and issuing advisories for hospital preparedness surveillance and weekly monitoring, including capacity building.
- Promoting strategic media coverage of climate and health linkages at the State level in regional languages to increase support for climate mitigation and adaptation responses.
- Long-term measures such as adopting cool roofs, improving green/forest coverage and analysing health impacts in urban planning.
- Standard Operating procedures to tackle all levels of heat-related illnesses. Capacity building measures for doctors, nurses and others staff should be undertaken.
- Cases with suspected heat stroke should be rapidly assessed using standard Treatment Protocols.
- Identify surge capacities and mark the beds dedicated to treat heat stroke victims and enhance emergency department preparedness to handle more patients.
- Identify RRT (Rapid Response Teams) to respond to any exigency call outside the hospitals.
- Ensure adequate arrangements of Staff, Beds, IV fluids, ORS, essential medicines and equipment to cater to management of volume depletion and electrolyte imbalance.
- May try to establish outreach clinics at various locations easily accessible to the vulnerable population to reduce the number of cases affected. Health Centres must undertake awareness campaigns for ne1ghbourh0od communities using different means of information dissemination.
- Primary health centres must refer the patients to the higher facility only after ensuring adequate stabilization and basic definitive care (cooling and hydration)

- Hospitals must ensure proper networking with nearby facilities and medical centres to share the patient 1load which exceeds their surge capacities.
- All cases of heat-related illnesses (suspected or confirmed) should be reported to IDSP (Integrated Disease Surveillance Programme) unit of the district.

PREPAREDNESS AT SCHOOLS

(Department of Education)

Heat management planning

- Create infrastructure that reduces exposure to heat e.g. room ventilation, access to additional fans, shade provision (plant trees or build structures), source alternative venues for outdoor activities.
- Consider the provision of at least one priority area of the school with artificial cooling.
- Build staff and student awareness about the prevention, monitoring and identification of heat stress symptoms.
- Consider suitable uniform options that incorporate UV protection and cooling fabrics.

Managing schools during excessive heat or heatwave conditions

- Modify or suspend normal school activities during excessive heat.
- Postpone any outdoor or sporting activities where appropriate
- Increase access to the coolest areas of the school grounds or facilities for lessons or other activities.
- Ensure students with additional support needs are appropriately supervised, including the monitoring of their hydration.
- Ensure school lunch boxes are stored in cool areas.
- Facilitate and encourage students to drink plenty of water and to stay out of the sun.
- Department of Health recommends that during hot weather, water (room temperature or slightly cool rather than very cold) is the best fluid to drink.
- Every school must have first aid kits with sufficient quantities of ORS packets and other essential items.
- Undertake normal first aid procedures in the event of a student or staff member becoming heat stressed.
- Schools must prepare separate action plan for hot weather preparedness considering the situation of COVID -19 pandemic
- Communicate the action plan details to teachers, supporting staff, transport agencies, children and parents
- While preparing guidelines in the action plan, ensure that the following areas are to be covered - Class rooms, labs, play grounds, cafeteria, school buses
- Ensure physical distancing and personal hygiene measures at the special shelter facilities, drinking water facilities

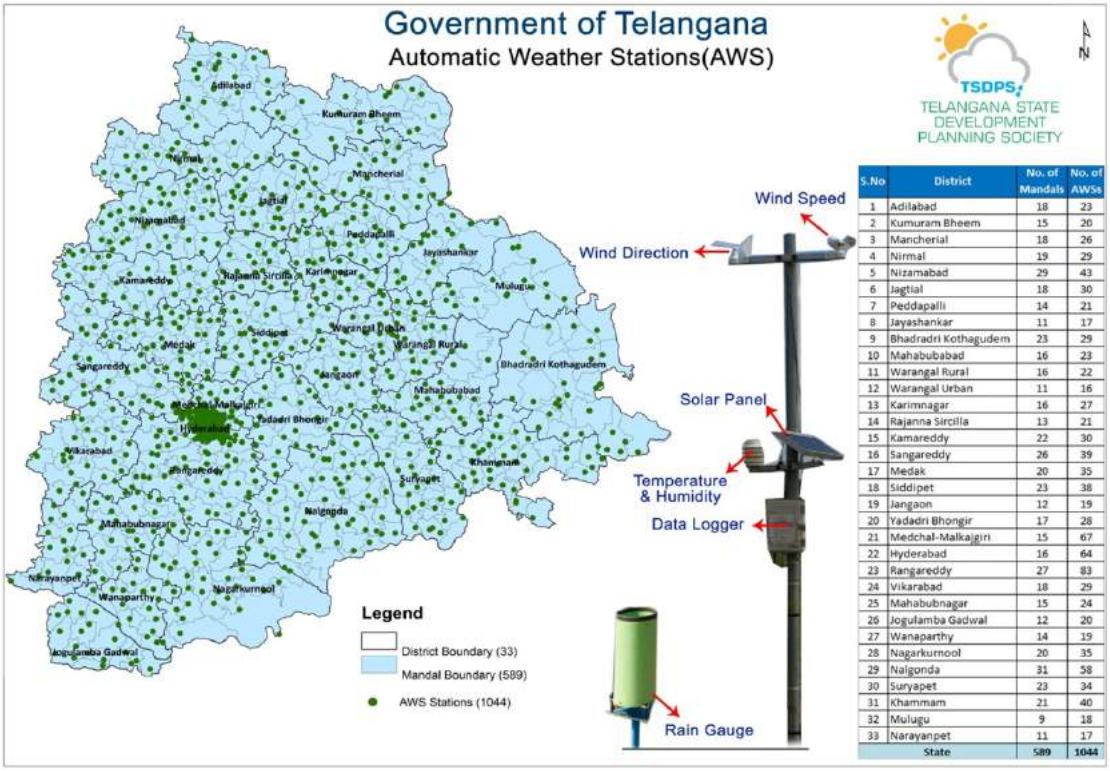
Playing and exercising safely in hot weather

Factors to consider when **cancelling or postponing a sporting event** include, but are not limited to:

- The temperature - both ambient and relative humidity (local weather conditions can be checked on the TSDPS and IMD website)
- The duration and intensity of the event (for example, an endurance or distance event has more potential for problems than a stop-start team event)
- Rest and drink breaks
- Time of day
- Local environment
- Acclimatisation of the participants
- Fitness levels of participants
- Age and gender of participants.

EARLY WARNING AND DISSEMINATION

Presently TSDPS having 1044 Automatic Weather Stations (AWSs) in the state covering at 10x10 km resolution with at least one AWS in each of 589 mandals including 149 at GHMC area at 2x2 km resolution. The AWS provides hourly rainfall (mm), Temperature (^{0}C), Humidity (%), wind direction and speed from all these stations which transmits the data to main server located at TSDPS office, Hyderabad through GSM technology. After quality control the real-time data and products are disseminated to various users.



S.No	District	No. of Mandals	No. of AWSs
1	Adilabad	18	23
2	Kumuram Bheem	15	20
3	Mancherial	18	26
4	Nirmal	19	29
5	Nizamabad	29	43
6	Jagtial	18	30
7	Peddapalli	14	21
8	Jayashankar	11	17
9	Bhadradri Kothagudem	23	29
10	Mahabubabad	16	23
11	Warangal Rural	16	22
12	Warangal Urban	11	16
13	Karimnagar	16	27
14	Rajanna Sircilla	13	21
15	Kamareddy	22	30
16	Sangareddy	26	39
17	Medak	20	35
18	Siddipet	23	38
19	Jangaon	12	19
20	Yadadri Bhongir	17	28
21	Medchal-Malkajgiri	15	67
22	Hyderabad	16	64
23	Rangareddy	27	83
24	Vikarabad	18	29
25	Mahabubnagar	15	24
26	Jogulamba Gadwal	12	20
27	Wanaparthy	14	19
28	Nagarkurnool	20	35
29	Nalgonda	31	58
30	Suryapet	23	34
31	Khammam	21	40
32	Mulugu	9	18
33	Narayanpet	11	17
	State	589	1044

Fig: 24

Real time data products in heatwave management

- Hourly updating data on TSDPS web page and email, WhatsApp, SMS to state/district officials on Maximum temperature information and 3 days Temperature forecast.
- District specific data on Temperature along with colour code were displayed on TSDPS LED display boards available at district Hqs. and GHMC area and on heat wave precautionary measures required during the heat wave situations.
- Top 10 highest Maximum temperatures recorded locations in state and each district.
- District wise Maximum temperature forecast for next 3 days.
- Location specific hourly real-time data and 3 hourly forecast up to 3 days through TS-Weather App.[6]
- District wise Maximum temperature spatial maps highlighting Maximum Temperature observed mandals for last 5 years.
- Based on last 6 years AWS maximum temperature data, climatologically heat prone mandals were prepared as per the IMD norms.

[6] TS- Weather APP Link - https://play.google.com/store/apps/details?id=nic.ts.com.t_weather&hl=en_IN&gl=US

TEMPERATURE FORECAST FOR TELANGANA STATE 24HR, 48HR AND 72HR

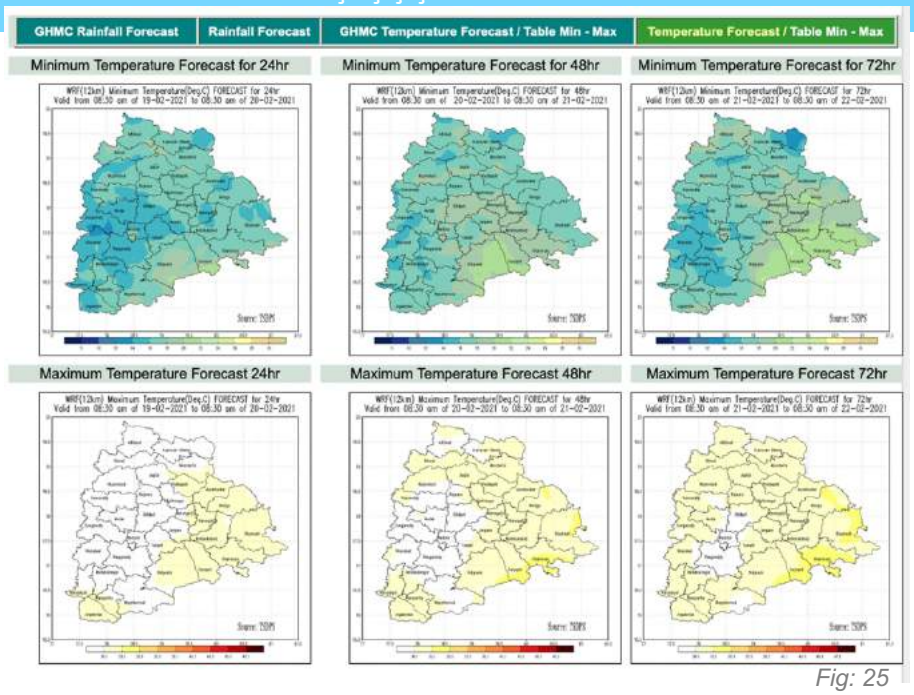


Fig: 25

DISTRICT WISE HEATWAVE ALERT IN TELANGANA

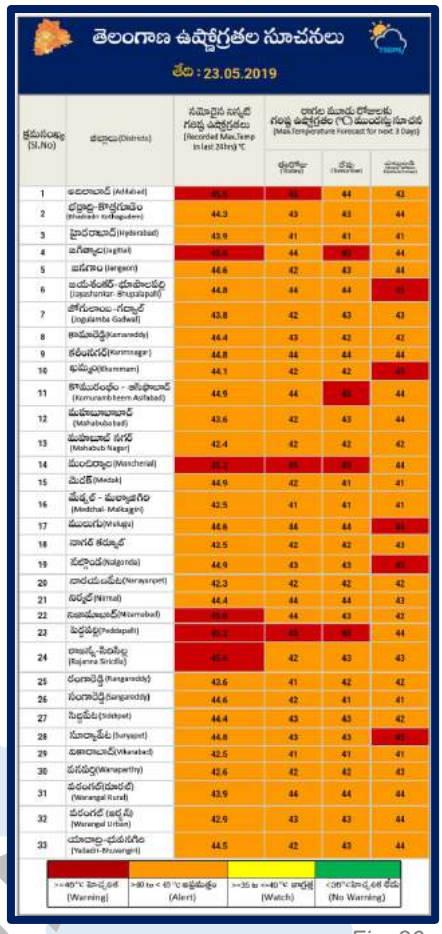
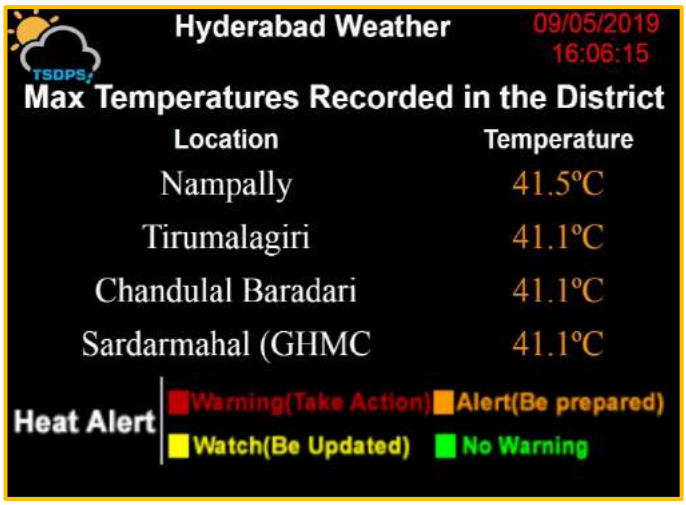


Fig: 26

LED BOARDS DISPLAYED AT MAJOR LOCATIONS

Fig: 27



Weather information LED Display boards installed across the city and District Headquarters, Managed by TSPDS

COLOUR CODE SIGNALS FOR HEATWAVE ALERT AND SUGGESTED ACTIONS

Colour Code	Alert	Warning	Impact	Suggested Actions
Green (No Action)	Normal Day	Maximum temperatures are near normal	Comfortable No cautionary action required temperature	Normal Activity
Yellow Alert (Be updated)	Heat Alert	Heatwave conditions at isolated pockets persists for 2 days	Moderate temperature. Heat is tolerable for general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases	(a) Avoid heat exposure. (b) Wear lightweight, light-coloured, 1loose, cotton clothes. (c) Cover your head
Orange Alert (Be prepared)	Severe Heat Alert for the day	1) Severe heat wave condition persists for 2 days (ii) Through nom severe, but heat wave persists for 4 days or more	High temperature. Increased likelihood of heat illness symptoms in people who are either exposed to sun for a prolonged period or doing heavy work. High health concern for vulnerable people e.g. infants, elderly, people with chronic diseases.	(a) Avoid heat exposure- keep cool. Avoid dehydration (b) Wear lightweight, light-coloured, loose, cotton clothes (c) Cover your head (d) Drink sufficient water- even if not thirsty (e) Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated (f) Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body (g) Take bath in cold water frequently. In case of SUNSTROKE Lay the person in a cool place, under a shade. Wipe her/him with a wet cloth/wash the body frequently. Pour normal temperature water on the head.| The main thing is to bring down the body temperature. Consult a Doctor immediately.
Red Alert (Take Action)	Extreme Heat Alert for the day	i) Severe heat wave persists for more than 2 days. (ii) Total number of heat/severe heat wave days exceeding 6 days.	Very high likelihood of developing heat illness and heat stroke in all ages	Along with suggested action for orange alert, extreme care needed for vulnerable people.

Table: 8

MAJOR ROLES AND RESPONSIBILITIES OF DIFFERENT STAKEHOLDERS

(All stakeholders are advised to consider necessary precautions to maintain social distancing, physical hygiene and other instructions as per COVID-19 protocols issued by the state while preparing action plans and implementation of activities)

State Agency	Responsibility
Understanding Risk	
State Govt./SDMA/DDMA/ULBs/PRIs	Preparation/revision of Heatwave Action Plan based on NDMA revised Guidelines and local experiences.
Inter-Agency Coordination	
State Govt./SDMA/Dist. Admin./DDMAs	- Real-time monitoring surveillance and evaluation of weather station. - To disseminate the information received from IMD to the public at large. - Disseminate the heat-health warning, determine the threshold for action and communicate risks.
State Govt./SDMA/ Dist. Admin./DDMAs	- Prepare SoP for heat wave response based on Extended range of forecast and Numerical Weather Prediction.
SDMA/DDMAs/ULBs/PRIs	- Coordination among all stakeholder with clearly defined roles and responsibilities - Flexible timing of market and offices - Take necessary measures, wherever applicable - Collaboration with non-government and civil Society - Provide occupational support and advisories - Special care for vulnerable groups children, disabled, women and old aged.
State Govt./SDMA/ Dist. Admin./DDMAs/Health Department	- Develop monitoring mechanism for implementation of heat action plan - Provision of funds for heat action mitigation plans. - Deployment of rapid medical response teams

PREVENTION AND MITIGATION MEASURES

Investing in Disaster Risk Reduction

NON-STRUCTURAL MEASURES

PREPAREDNESS MEASURES	
State Govt./SDMA/ Dist. Admin./DDMAs/ULBs/PRIs	- Appointment of Nodal officer at each level (state, districts, tehsil and block, department

	etc) - Implementation of Heat Action Plan - Issue necessary directions for preparedness
State Govt./Dept. of home	- Ensure shade for on duty traffic police, as hey are more exposed to heat wave and distribution of Cool jacket for traffic police personnel
State Govt./SDMA/ Dist. Admin./DDMAs/ULBs/PRIs/Line departments	- Heat wave should be included in annual disaster event calendar. - Interstate collaboration for sharing experiences and data - Reviewing preparedness &mitigation Measures
SHORT TERM MITIGATION MEASURES	
State Govt./Health Department	- Prepare hospital preparedness plans - Preparedness of the heat health and social care system - Ensuring 24X7 heat health facilities with adequate provision of basic medicine like ORS. Glucose etc. - Dissemination of heat health plan by organizing awareness campaigns.
Dept. of forest in coordination with other departments	- Identify heat hot-spots" using framework for tracking and modelling based on IMD data. - Maintain water bodies in the forest area for wild animals & birds. - Afforestation and plantation - Prevention of forest fire
Dep. of Rural development and Panchayati Raj	- Implementation of instruction for mainstreaming heat health precautionary measures, including re-scheduling of working hours and reduce piece rate, in all Schemes and programmes. - Ensure shed for resting and drinking water facilities for workers at all work place,
Department of Drinking water	- Ensure drinking water facilities. - Identify vulnerable place and ensure drinking water facilities. - Repair/maintenance of mechanical electrical fault of tube wells, ponds at priority basis to ensure water storage. - Suitable arrangement for drinking water supply and promptly respond to water scarcity. - Ensure drinking water facilities all common place and nearby habitation.
Education Department	- Rescheduling of school timing and vacation as per heatwave situation. Ensuring cool places for all educational institutions , and availability of water facilities.

	- Ensure that students avoid outdoor physical activities during the summer in schools. - Research on heatwave related issues through universities.
Dept. of Labour/Dept. of Social Welfare	- Consider guidelines for heatwave season while preparing activity plans. - Re-scheduling of working hours for employees in different sectors. - Ensure drinking water facilities at work places. - Coordinate with Health department and ensure regular health check-up of the workers and provide emergency materials to constriction workers.
State Govt./Dept. of Agriculture/Horticulture and Animal Husbandry	- Follow the advisory on heatwave Shelter for livestock and animal husbandry should be maintained - Pre-positioning of adequate veterinary medicines and supplies. - Update contingency plan regarding provision of drinking water for animal.
State Government/ District Admin./DDMAs/ULBs/MAUD	- Open parks/open areas during daytime for providing spaces with shade. - Sprinkling of water on roads. - Construct shelters, sheds at public place, provide access to public parks during heatwave season. - Promote cool roofs initiative such as paint roof white, create green roofs and walls and plan trees in neighbourhood to keep them cool.
State Government/ Dept. of Transport	- To ensure 1) Shelter/ sheds at bus stops, 2) Frequency of transportation, 3) drinking water facilities at bus stop. - Enable better emergency transport system for affected people to health care facilities with adequate equipment.
Department of Power	Ensure repair & maintenance work for uninterrupted power supply before and during the summer. - Re-scheduling load shedding
All General Manager of Zone and Divisional Railways Manager/ Metro Rail Corporations in states.	- Repair/ maintenance of mechanical/electrical system on priority basis including fan and cooling system. - Ensure drinking water facilities in trains and railway stations.
State Govt./ Dept. of Science and Technology	- To develop application/ APP related to awareness generation, quick information sharing on the Heatwave Risk Reduction. - R&D activities to promote utilization of S&T in the field of Heatwave risk reduction - Promote research on heatwave related issues.

STRUCTURAL MEASURES

LONG TERM MITIGATION MEASURES	
State Govt./ SDMA/ Concerned line Departments	- Long term planning for heat resilience infrastructure - Promote cool roofs technology and use other similar heat reduction technology. - Ensure implementation of mixed use planning adopted in heatwave affected cities. - Heat appropriate planning for new building (consideration e.g.: in architecture, width/height ratio, street development, orientation and site) in urban and rural areas. -Ensure capacity building of structural engineers, civil engineers and architects for construction for green building, maintenance and fire safety of structure. - Ensure construction of green building, environment and building code related to heatwave risk mitigation. - Implement cool roof policy for the state of Telangana. *(Draft cool roof policy is annexed)*
Sate Govt./ MAUD/ULBs/PRIs	- Ensure implementation of latest National Building Code of India 2016 Part- IV “Fire & Lafe Safety” in their building bye-laws
State Govt./Relief Commissioner/SDMA/Dept. of Forest / Dept. of R&B	- Ensure construction of green building . Energy conservation building code (ECBC) related to heatwave risk mitigation. - Increase forest coverage and green area. - Afforestation and mass plantation - Coordination with Transport Department and Roads and Bridges for plantation of trees at road side , barren land and other areas. -Prevention of forest fire and control measures.
State Govt./Dept. of Agriculture	Promote short duration and heat resisting, stress tolerant variety crops.

CAPACITY DEVELOPMENT

State Govt./ SDMA/State ATI with Department of Health and Education/State line departments	- Develop training module and conduct proper training programme for different stakeholders. - Heatwave management should be added in school curriculum to sensitize school children and local people. - Conduct capacity building and training programme as per domain and expertise of department.

State Govt./PWD, MAUD	- Capacity building of structural engineers, civil engineers and architects for construction of green building, maintenance and fire safety of the structures. - Long term mitigation measures construction of green building, environment and building code related to heatwave risk mitigation.
Agriculture and fisheries department/Animal Husbandry/ Panchayati Raj and Rural Development/ Police/Women and Child Development/Municipal Administration and Urban Development/ Labour employment training and factories	- Enhance capacity of farmers on mitigation and preparedness measures. - Ensure awareness creation activities while working outside. - Implement awareness programmes for the officials and field staff

PUBLIC AWARENESS AND COMMUNITY OUTREACH

MEDIA CAMPAIGN AND IEC ACTIVITY	
SDMA/ District Admin./ DDMA/Information and Public relations Dept. and other concerned departments	- IEC campaign to create awareness through print media, electronic media, social media etc. - Display board with colour coding for heatwave alert. - Display DO's and Don'ts in the Public areas, Hospitals, Parks etc. - Develop of mobile application for faster spread of heat related issue, alertness, space for shelters and drinking water.
DATA COLLECTION AND DOCUMENTATION	
SDMA/DDMA/Health Department though Nodal officer/All state line departments	- Establish a data monitoring cell and collect data from district and maintain state level data base. - A standardized collection of granular data - Standard protocol for death investigation. - Adopt uniform process for registration of causalities/ deaths due to heatwave based on the post mortem report, death count, type of disease, time and duration.

CHAPTER 4

PLAN IMPLEMENTATION

Principle Secretary Revenue (DM) Department as Nodal Officer to head the Heat Wave Action Plan at State Level, District Collector is the Nodal Officer at District Level and Commissioner Greater Hyderabad Municipal Corporation (GHMC) is the Nodal Officer for GHMC area Municipal Corporation and Commissioner, Municipal Corporations/Municipalities in their respective Municipalities.

The Nodal Officer is responsible for coordinating and communicating ahead of, and during, extreme heat events. The Nodal Officer should adopt the steps given in three Phases.

As per plan and directions, training programmes were conducted with officials from Medical and Public Health, Community Health Staff, Health Care Professionals, Administrators, and also VROs, VRAs, paramedical & field staff and link workers (ASHAs, ANMs etc.) for effective implementation of “Heat Wave Action Plan”.

The State Government constituted a ‘Three-member Committee’ at Mandal level with Tahsildar, Sub Inspector of Police and Assistant Civil Surgeon to enquire in to and certify the deaths due to Sun strokes / Heat Waves, in order to ensure the deceased families, receive the relief at the earliest under “Apathbandhu Scheme” amounting to 50,000/

The plan is to be implemented in three phases:

Phase - I

Pre-Heat Season

Jan-Mar

PHASE 1: PRE-HEAT SEASON
JANUARY TO MARCH

Prl. CDM & E.O. Prl. Secretary to Govt	**- Nodal Officer for State**
District Collector	**- Nodal Officer for District**
Commissioner, GHMC	**- Nodal Officer for GHMC**
Commissioner	**- Nodal Officers for Municipal**

* Convene Meeting with Departments/Organisations/ NGOs involved in rehab /Agencies to review mechanism to respond to extreme heat events.
* Interact regularly with concerned Departments for review and feedback.
* Identify high-risk areas of the State/District vulnerable to heat waves and focus on such areas and initiate focused activities on prevention of heat related illness.
* Organize training for health workers, link workers, teachers, school children, and the local community with the Health Department in preventive measures and treatment protocol.
* Distribute pamphlets and posters in local language with tips to prevent heat stress to hospitals, schools, and professional associations.
* Display the information provided by TSDS/IMD in the web portal and for displaying the same in display boards across the City and District HQs.
* Request all telecom service providers to send Heat wave messages to subscribers at no cost.

ROLES AND RESPONSIBILITIES OF THE DEPARTMENTS/ AGENCIES

(Line departments are suggested to consider COVID-19 protocols during the implementation of all the activities under the Heatwave action plan)

REVENUE (DM) DEPT
1. Promote research on heat related management and mitigation practices in collaboration with knowledge partners in the state.
2. Conduct periodic coordination meetings with all relevant departments towards implementation of the heat wave action plan.
3. Coordinate heat wave awareness campaigns, Dos and Don'ts and capacity building activities in the state
4. Circulate State Heatwave action plan and advocate departments to prepare their own action plan and SOP.

INDIA METEOROLOGICAL DEPARTMENT (IMD)
1. Issue Prior Warnings with details of temperature and districts.
2. Conduct awareness workshops for media and Departments.

INFORMATION & PUBLIC RELATIONS (I & PR) DEPARTMENT
1. Identify high-risk areas through survey by Dist. Officers of I & PR Dept as to be made focus of attention
2. Develop and design information materials in local languages on heat stress prevention and tips for health protection during extreme heat events:
   - Posters/hoardings

- Pamphlets
- Booklets
- CM Open letters to the public to be read in the Gram Sabhas

3. Develop cinema slides to be shown in cinema theatres, besides TV scrolls and Radio Jingles.
4. Develop themes for widespread communications through social and print media. Use of folk artists to spread message in rural and tribal artists.
5. Create awareness among public through Telangana "Samskruthika Saaradhi" Artists.

HEALTH MEDICAL AND FAMILY WELFARE DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Initiate targeted training programs, capacity building efforts and communication on heat illness for medical staff at local PHCs/hospitals and Urban Health Centres (UHCs), nursing staff and also VROs, VRAs, paramedics, field staff and link workers, (ASHA Workers ANMS etc.). Identify the susceptibility of particular wards for special attention.
3. Ensure COVID-19 guidelines.
4. Ensure hospitals update their admissions and emergency case records to track heat-related cases. Train hospital staff to improve experience of recording the cause of death certificates. The training could also include recording Information Education & Communication (IEC) efforts.
5. Adopt heat-focused examination procedures at local hospitals and urban health centers.
6. Promote use of reusable soft plastic ice packs for the state wide UHCs, 108 emergency centres, ambulances and hospitals.
7. Explore creation of ice pack dispensaries to increase access to vulnerable communities.
8. One day workshops in hospitals with the medical students may be organized before commencement of summer – Director Medical Education (DME).
9. Separate beds for the Sunstroke victims may be provided – Director Medical Education (DME) and Telangana State Vaidya Vidhana Parishad(TSVVP).
10. Help desk with Toll free 104 may be established for further information on Heatwave – S.O-104.
11. Ensure the availability of separate room for Heat Stroke patients in hospitals in a well ventilated and cool space.
12. In PHCs and CHCs, wherever AC and Coolers are available, to be utilized in the heat stroke room.
13. Provision of power backup, ambulances & other PHC vehicles should be kept ready
14. Proper sensitization of health workers and medical staff is to be done in all categories such as preparedness measures, awareness on dangers of heatwave etc.

108/104 EMERGENCY SERVICE

1. Create displays on ambulances during local events to build public awareness
2. Identify at-risk areas of vulnerable populations, in part by utilizing the list of high-risk areas.

LABOUR EMPLOYMENT TRAINING AND FACTORIES DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.

2. Organize awareness camps for employers, factory manager's outdoor labourers and workers regarding health impacts of extreme heat and recommendations to protect themselves during high temperatures.
3. Utilize maps of construction sites and outdoor work spots to identify more high-risk outdoor workers. Potentially overlay with irradiation map from IMD or heat island map. Conduct publicity campaigns during high-risk days to these specific areas.
4. To regulate construction/work site contactors to provide drinking water, ORS and shelter to worker's labourers.
5. To Instruct Factory/industry managements to provide cool drinking water, ORS and shelter to worker's labourers.

PANCHAYATI RAJ AND RURAL DEVELOPMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Appoint one nodal officer for managing heatwave preparedness and mitigation activities with other departments and SDMA/DDMA
3. Organize capacity enhancement programmes for both officials and community.
4. Ensure "challivedram" at all essential locations and ensure social distancing and personal hygiene measures.

RURAL WATER SUPPLY AND SANITATION

1. Review and escalate the plan to all the concerned officials.
2. Prepare separate action plan and SOP for the drinking water supply during summer season.
3. Ensure all stakeholders under the departments is connected with early warning facilities and with enhanced capacity to act as per the weather warnings.

AGRICULTURE AND COOPERATION DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Ensure heatwave action plan is revised and all the officials are trained in implementing preparedness measures under the department.
3. Organize stakeholder meeting and capacity building programmes for the farmers on implementation of contingency plans.
4. Organize convergence meetings and prepare policy needs for plan implementation.

ANIMAL HUSBANDRY AND FISHERIES DEPARTMENT

1. Review and discuss implementation of Heatwave Action Plan for safeguarding cattle and poultry district heads and also Farmers Training Centres.
2. Prepare material like Posters & pamphlets separately for tips to take care of cattle and poultry during heatwaves
3. Review availability of necessary medicines for treatment of cattle / poultry affected by heatwave
4. Prepare plan for drinking water for cattle with RWS Dept.

TRANSPORT DEPARTMENT

1. Review plan with cab operator / auto / transport associations and also Highway patrol .

2. Explain importance of proper shade, availability of drinking water and other facilities for, transport office visitors and applicants.
3. Discuss and involve cab operator / auto / transport associations .
4. Distribute pamphlets / posters on heat related illness prevention; Do's and don'ts for display & further distribution to passengers at Bus stations, bus shelters, cab and auto stands etc
5. Plan and Ensure availability of proper shade, drinking water and Butter Milk for applicants and visitors.
6. Ensure availability with of ORS, Ice pack, and Cool drinking water.

TELANGANA STATE ROAD TRANSPORT CORPORATION

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Review plan with Depot Managers/ Zonal Managers
3. To create awareness among the Staff and Passengers through gate meetings, Pamphlets, Posters and Banners on the ill effects of Heat Wave and Sunstroke during summer.
4. Organize heat wave risk awareness programmes for Bus crew, staff at bus stands
5. Explain importance of proper shade, availability of drinking water and other facilities for passengers in bus stations
6. Distribute pamphlets/posters on heat related illness prevention; Do's and Don'ts for display & further distribution to passengers at Bus Stations, Bus Shelters.
7. Ensure supply of safe drinking water to its Staff and Passengers in the depots and bus stations through RO plants, Municipal Water Supply, through chalivendram organized by social organizations during summer season.
8. Procure Hot whether equipment such as Earthen pots, Ranjans., Water glasses etc at all work places like offices, workshops, Depots, bus stations for the use of employees and passengers.
9. Contact District Medical Administration to procure ORS and sodium lactate packets which have to be supplied to the passengers who are found with symptoms of Sunstroke.
10. Ensure availability of proper shade, drinking water for passengers at bus stands.
11. Ensure availability of ORS, Ice pack, and Cool drinking water, in long distance buses.

EDUCATION DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders (School/Colleges, etc).
2. Organize awareness camps classes on heat wave related illness/sunstrokes for teachers and also students.
3. Prepare SOP for hot weather impact reduction to education system and safe environment for students.
4. Explain importance of proper shade, availability of drinking water and other facilities for Students
5. Distribute pamphlets/posters on heat related illness prevention; Do's and Don'ts for display & further distribution to students in Schools & Colleges.
6. Ensure availability of ceiling fans in class room's proper shade, drinking water for students.
7. Ensure availability with of ORS, Ice pack, and Cool drinking water.

INFORMATION TECHNOLOGY (IT) ELECTRONICS AND COMMUNICATION DEPARTMENT

1. Coordinate with Planning Department to collect real time information through sensors in Automatic Weather Stations (AWS) for monitoring the temperatures and also for disseminating the same.
2. Ensure all major line departments and 33 district headquarters and well connected and informed about the weather warnings.
3. Prepare Dash board with a login to monitor heat wave scenario and its impact constantly.
4. Prepare map on web interface with colour coding system

ENVIRONMENT, FORESTS, SCIENCE AND TECHNOLOGY

1. All Field Officers should be directed to divide the Forest areas into grids of 3 x 3 km (2 x 2 km in case of PAs) to assess availability of water source in each grid and to take measures to ensure water supply in grids without water source.
2. Ensure measures including transportation and supply of water in saucer pits.
3. Special diet is consisting of fruits and vegetables like water melon, cucumber, tomatoes, tender coconut, sugarcane etc., with plenty of water to be made available. The roof of the enclosures is covered with thick layer of grass / gunny bags should be watered frequently to retain moisture and cool down the enclosure.
4. Construction of check dams and percolation tanks in the Forest areas to harvest and impound rain water for benefit of Wild animals.
5. The solar bore wells and other water storage structures for Wild animals also to benefit the inhabitants of human settlements inside the Forests.
6. Rain water harvesting structures. Percolation tanks, check dams, peripheral trenches, staggered trenches etc., to be constructed in Forest areas to conserve soil and moisture.
7. Directions for making water available for animals in reserved/ protected forests and make necessary provisions, where necessary.
8. Issue directions to the Zoo Authorities for special arrangements for the animals in zoo to protect them from the effect of Heat Wave.
9. Provision of drinking water like ponds/water bodies for wild life
10. Direction for provision of water to human habitations facing water scarcity inside reserved forests
11. Promote rain water harvesting
12. Provision of funds for Heat Wave management.
13. Identify spots for possible fire accidents in the forest and ensure to defuse any possible fire related accidents. Clearance of dry wastes to be priority.

WOMEN DEVELOPMENT AND CHILD DEVELOPMENT DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Setting up of nutritional resource centres at anganwadi centres to supplement nutritional deficiency in children.
3. Pre heatwave necessary precautionary methods such as provision of proper stock of ORS, buttermilk and other rehydration methods may be arranged well in advance as the heatwave extends for about 17- 45 days in Telangana.
4. Create surveillance mechanism on tracking children, lactating mothers and women through ICDS and Anganwadi centres in the state.
5. Capacity building of Anganwadi sevikas, Asha workers, ANM nurses and ICDS workers to identify symptoms in women and children and to report it when necessary.

6. Identify the districts or villages where high child mortality rates are present to take necessary precautionary methods.

FIRE DEPARTMENT

1. Check the readiness of vehicles and firefighting equipment to face any emergency situations.
2. Ensure capacity building activities of staff and officials.
3. The department shall coordinate community and school children capacity building activities on heatwave preparedness.
4. Prepare SOP for managing heat related health causalities. (Handling of the patient, transpiration etc)

MUNICIPAL ADMINISTRATION AND URBAN DEVELOPMENT

1. Review and discuss the heatwave action plan
2. Prepare an action plan for the extreme hot weather situation preparedness and mitigation.
3. Ensure availability of shelter and quality drinking water facilities.
4. Ensure accessibility to safe water and heat protection measures at the slum areas, ensure children, pregnant women and aged people are aware of the preparedness measures.

POLICE DEPARTMENT

1. Review the circulate heatwave action plan department action plan with concerned officials and others stakeholders.
2. Conduct joint capacity building and awareness building activities to the police staff posted in vulnerable mandals on topics such as importance of periodic hydration, working in shade and effects of pollution combined with heatwave.
3. Shifting of work hours of Traffic personnel in the early morning and late evening along with convenient shifts throughout the day with enough rest.
4. Prepare SOP for managing heatwave related health causalities.
5. Address the thick material of police uniforms that trap heat addition to the body heat.
6. Update the guidelines for police personnel on duty and creating awareness at all levels.

NGOs, COMMUNITY GROUPS AND INDIVIDUALS

1. Initiate educational preventative trainings aimed at children and distribute heat protection materials at local schools.
2. A workshop could be organised for teachers to equip them with knowledge of heat protection tips and materials that they can teach in classrooms. Students can be assigned activities and projects on health dangers of extreme heat.
3. Conduct Training workshops and outreach sessions with community groups and mobilizers such as ASHA workers, Anganwadies, Self Help Groups and municipal councils to help inform and also actively involve vulnerable communities. Other sectors such as higher education, NGOs and community leaders may also be involved to increase reach to communities.
4. Encourage individuals' discussion of the early signs of heat exhaustion with their local doctor or Urban Health Centre.
5. Inform fellow community members about measures and tips to keep cool and protect oneself from heat.
6. Distribute pamphlets & paste, posters in vulnerable areas.

YOUTH ADVANCEMENTS, TOURISM AND CULTURE

1. Revise and escalate the Heatwave action plan and ensure facilities for the safety of tourists during heatwave season.
2. Capacity building of the stakeholders/ tour operators to prevent/mitigate the impacts due to hot weather at the tourist locations and during travel.
3. Ensure proper measures are in place for providing shelter, drinking water and medical support.
4. Monitor weather early warnings.

PHASE 2: DURING THE HEAT SEASON

APRIL TO JUNE

Prl. CDM & E.O. Prl. Secretary to Govt	**- Nodal Officer for State**
District Collector	**- Nodal Officer for District**
Commissioner, GHMC	**- Nodal Officer for GHMC**
Commissioner	**- Nodal Officers for Municipal**

* Issue a State and District wide **heat alert** when extreme heat events are forecasted. The key agency leaders, IMD, SDMA in accordance with the Communication Plan.
* When necessary, monitor and increase the heat alert level to match the severity of the forecast and threshold established. Special meetings with key agency leaders may be convened.
* Activate "cooling centres," such as temples, public buildings, malls, during a heat alert and/or State Government - run temporary night shelters for those without access to water and/or electricity.
* Provide access to shaded areas for outdoor workers, slum communities, and other vulnerable populations on a large scale. For example, confirm that night shelters stay open all day for migratory populations during a heat alert.
* Hold regular (daily, if necessary) conference to discuss reports and fresh breaking developments during a heat alert and ensure that communication channels are functional and operating.
* Monitor temperature data and forecasts.
* All non-essential uses of water (other than drinking, keeping cool) may be suspended.
* Increase efforts to distribute fresh drinking water to the public by opening 'Chalivendrams' at people congregation points. For example, expand potable water access during a heat alert at religious spaces including temples and mosques, Bus stations, pouch handouts to the poor and high-risk areas (identified by the mapping of high-risk areas).
* Inform power supply Companies to prioritize maintaining power to critical facilities (such as hospitals and UHCs).
* Notify when the heat alert is over.

ROLES AND RESPONSIBILITIES OF THE DEPARTMENTS/ AGENCIES

(Line departments are suggested to consider COVID-19 protocols during the implementation of all the activities under the Heatwave action plan)

INDIA METEOROLOCIAL DEPARTMENT (IMD) and TELANGANA STATE DEVELOPMENT SOCIETY (TSDPS)

1. Provide daily and weekly forecasts
2. Communicate Heatwave alerts/warnings promptly.
3. Communicate Max temperatures district-wise periodically.
4. Update heatwave details regularly.

INFORMATION & PUBLIC RELATIONS (I & PR) DEPARTMENT

1. Create awareness among public through advertisements in regional languages
2. Display hoardings at important places
3. Create awareness through TV and Radio spots and jingles
4. Conduct regular press conferences at the State level and District level through concerned Ministers, Secretaries and Collectors on the risks and dangers of heat related illness.
5. Circulate heat wave warnings i.e. text alerts or Whats App messages in collaboration with private sector telecom companies in addition to traditional media.
6. Send warnings in bulk to the public via centralized email databases during heat waves.
7. Develop SMS alert system from time to time on treatment systems to send messages to private doctors and medical professionals at Government hospitals including PHCs and UHCs.
8. Utilize local radio FM broadcast through special programmes and during popular programmes to alert the public.
9. Explore other means of communication like Facebook, Twitter and Whats App.
10. Collect all news items/reports on Heatwaves daily and report to Government. Conducting regular press conferences at the state level and District level on the risks and dangers of heat related illness.
11. Circulate heat wave warnings i.e. text alerts or whats App messages in collaboration with private sector telecom companies in addition to traditional media.
12. Send warnings in bulk to the field level government missionaries including Doctors and medical professionals at Government hospitals at PHCs and UHCs. via centralized email databases during heat waves.
13. Utilize local radio FM broadcast through special programmes and during popular programmes to alert the public. Exploring other means of communication like Facebook, Twitter and whats App for wide publicity.

MEDICAL & HEALTH DEPARTMENT AND MEDICAL PROFESSIONALS:

1. Display heat-related illness prevention tips and how to stay cool around hospitals PHCs and UHCs
2. Keep adequate stocks and Ensure availability of medical supplies like ORS in all hospitals/ PHCS/ UHCs, hospitals.
3. Generate reports of the public health impact for Nodal Officer, every week/ month during a heat alert
4. Deploy additional staff at hospitals and PHCs/UHCs to attend to the influx of patients during a heat alert, if feasible
5. Increase link worker and community health worker outreach in at-risk neighbour hoods during a heat alert, if feasible
6. Have Regional Health Officers visit UHCs to confirm proper preparation has been made for heat related illness case audits during heat season may be conducted
7. Update heatwave related illness information to Revenue (Disaster Management) Department to monitor the impact of heat wave.

108/104 EMERGENCY SERVICE:

1. Ensure adequate supply of ice packs and IV fluids
2. Disseminate SMS text messages to warn local residents during a heat alert
3. Ensure ambulance vehicles are available for emergency purposes.

LABOUR & EMPLOYMENT TRAINING AND FACTORIES DEPARTMENT

1. Encourage employers to shift outdoor workers' schedules away from peak afternoon hours (11pm – 3pm) during a heat alert
2. Provide emergency ice packs and heat-illness prevention materials to construction workers as pilot project.

ANIMAL HUSBANDRY AND FISHERIES DEPARTMENT

1. Conduct training for Dept., field workers as well as for cattle and poultry farmers on heat wave management plan in Animal Husbandry sector, can use giant coolers in Cattle sheds and poultry farms
2. Display posters / distribute pamphlets in villages, and important government offices
3. Ensure availability of adequate field staff during heat wave and ensure that they visit villages for follow up action.

AGRICULTURE AND COOPERATION DEPARTMENT

1. Monitor the implementation of the action plan.
2. Ensure support to farmers for documenting and prepare for availing risk transfer facilities for reducing impacts to agriculture/fisheries due to heatwaves.
3. Ensure early warnings, dissemination and its last mile connectivity.

TRANSPORT DEPARTMENT /METRO RAIL/TRAIN

1. Display posters & distribute pamphlets on prevention of heat related illness
2. Ensure availability of shade, drinking water, ORS etc
3. Permit use of school premises as shelter during day time
4. Establish Health teams at major bus stands / Terminals and other public places.
5. Involve Auto/Transport associations wherever possible in distribution of drinking water and Butter milk at all RTA offices and other centres.

TELANGANA STRATE ROAD TRANSPORT CORPORATION

1. Display posters & distribute pamphlets on prevention of heat related illness
2. Ensure availability of shade, drinking water, ORS for passengers & crew at Bus stands, Depots
3. Establish Health stations at major bus stands / Terminals and other public places
4. Ensure that buses do not run during peak hours (12-4 pm) when Heatwave is declared.
5. Provide emergency ice packs and heat-illness prevention materials to TSRTC staff (Drivers, Conductors) etc
6. Operate more AC buses during peak hours (12 noon -4.00 p.m.) when Heat wave is declared. Keep the AC buses in operational conditions.
7. Contact District Medical Administration to procure ORS and sodium lactate packets which have to be supplied to the passengers who are found with symptoms of Sunstroke.
8. Provide immediate Medical Aid to be given to the staff & passengers who are found to be affected by Sunstroke and to be shifted to nearest Hospital for further treatment.
9. Play the IEC materials made on the ill effects of HEAT WAVE and the precautions to be taken during the summer season in all the buses and bus stations where the TVs are functioning.

10. Utilize public addressing system in all bus stations for announcing ill effects of HEAT WAVE.
11. Provide Buttermilk at places like Adilabad, Nizamabad, Kothagudem and Badrachalam etc., where the temperatures often go very high, through sponsors.
12. Display the list of steps to be taken for prevention of sun stroke as prepared by Tarnaka hospital Authorities at all conspicuous places in the Depots/garages/bus stations and other premises through pamphlets/ flexi banners etc. to educate the staff and passengers

EDUCATION DEPARTMENT

1. Display posters & distribute pamphlets on prevention of heat related illness in Schools and Colleges
2. Identify shelter space, of shade, drinking water, ORS facilities with signs
3. Restrict working hours as per the weather conditions and monitor early warning when Heat wave is declared
4. No open-air classes to be conducted
5. Ensure school buses are parked in sheds, sprinkle water on the roof of the buses, before commuting.
6. Distribute heat protection materials at local schools and orient school teachers to equip them with knowledge of heat protection tips and activities which they can disseminate in classrooms.
7. Scheduling of examinations before starting of Heat period normally.
8. Hostels operated by Social Welfare, Minority, and by Private Institutions to ensure proper measures are adopted to provide sufficient water and arrangements to keep the environment in the hostels cool. Ensure sufficient power supply is available, health facility is available, fans/cooler's installed.

INFORMATION TECHNOLOGY (IT) DEPARTMENT

1. Prepare Dynamic Heat wave Plan with links of Departments for real-time / implementation.
2. Send real time information to all Departments through Dash board/ interface.
3. Activities to be displayed on Dash board/ Interface/Online Monitoring Tool
4. Activate Heat Wave management APP

PANCHAYATI RAJ AND RURAL DEVELOPMENT

1. Ensure all challivendrams are working properly
2. Enhance community awareness and exhibit DO's and Don'ts at major locations like offices, institutions and public places.

RURAL WATER SUPPLY

1. Ensure availability of safe drinking water
2. Monitor the water quality at collection and distribution points

MA & UD DEPARTMENT / CORPORATIONS / MUNICIPALITIES

1. Display temperature data in the electronic display boards in its jurisdiction (Junctions and public places)
2. Parks to be open for rest – no charges to collect. Keep open the parks for a longer duration during evenings.
3. Malls/shops to keep cold water at their locations

4. Department of Water Supply to provide drinking water to “Chalivendrams”
5. Activate “cooling centres,” 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.
6. Expand access to shaded areas for outdoor workers, slum communities, and other vulnerable sections of population.
7. All non-essential uses of water (other than drinking, keeping cool) may be suspended, if necessary.
8. Distribution of fresh drinking water to the public by opening water centres (Chalivendrams) at people congregation points like market places, construction and infrastructure work locations, Bus stations etc.
9. Water may be distributed through pouches to the poor in the identified high-risk areas.
10. Actively involve NGOs, Lions Club, Rotary Club and Corporate houses in providing shelter and drinking water facilities in places like 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.
11. Expand access to shaded areas for outdoor workers, slum communities, and other vulnerable sections of population.

WOMEN AND CHILD DEVELOPMENT DEPARTMENT

1. Use opportunities, such as nutrition day, SHG meetings for creating awareness and educate young girls and mothers regarding the dangers of Heat Waves, its related health impacts and the precautionary measures to be taken.
2. Display IEC materials at Anganwadis and encourage integrated child development scheme (ICDS) workers to disseminate Heat Wave related information with special focus on infants, children below five years, pregnant and lactating mothers, and geriatric population to protect them from dehydration.
3. Provision of drinking water and first aid at all the Anganwadi Centres, old age homes, orphanages.
4. Ensure that visits to homes by AWWs are done early mornings, so as not to be exposed to high temperatures.
5. Provision of funds for Heat Wave management.
6. ORS, buttermilk and other dehydration methods should be provided to all the school going children under anganwadi centres and mid-day meal scheme
7. Monitoring and evaluation of heatwave impacted infants, women and lactating mothers during the heatwave period.
8. Child and Women specific Hot Line numbers should be active 24/7
9. The government’s nutritional Aarogya lakshmi programme for spot feeding should be provided at home instead of making the women travel to centres, ensure COVID-19 guidelines.

FIRE DEPARTMENT

1. Obtain feedback on Fire calls, plan, and measures taken.
2. Monitor the weather situation and early warnings.

POLICE DEPARTMENT

1. Provision of drinking water, preferably in earthen pots to keep the police personnel hydrated.

2. Proper usage of caps and sun glasses for traffic police in prolonged shifts from morning to afternoon.
3. Management of traffic through traffic lights instead of police personnel standing out in the sun.
4. Ensure the usage of covered police vehicles (4 wheelers) for personnel travel and resting.

NGOs, COMMUNITY GROUPS AND INDIVIDUAL

1. Keep cool and hydrated during the heat season by drinking water, staying out of the sun, and wearing light clothing
2. Office and field visit timings to be re-worked
3. Check on vulnerable neighbours, particularly during a heat alert
4. Limit heavy work in direct sun or indoors if poorly ventilated, especially during a heat alert.

PHASE 3: POST-HEAT SEASON

JULY TO SEPTEMBER

(Awareness, capacity building activities and long term mitigation measures (afforestation, ground water recharging, cool roofing etc.) shall planned and implemented during this phase, in practical this phase will extend up to December)

Prl. CDM & E.O. Prl. Secretary to Govt	**- Nodal Officer for State**
District Collector	**- Nodal Officer for District**
Commissioner, GHMC	**- Nodal Officer for GHMC**
Commissioner	**- Nodal Officers for Municipal**

* Organize a meeting with key agency leaders and relevant stakeholders to review the implementation of Heat Wave Action Plan.
* Evaluate the reach and impact of the Plan and update/revise it based on review and evaluation.
* Evaluate the Plan process based on performance and revise accordingly.
* Evaluate the reach and impact of the Plan and revise accordingly.
* Display the revised Plan in the Disaster Management/District website ahead of the next heat season for stakeholders.

ROLES AND RESPONSIBILITIES OF THE DEPARTMENTS/ AGENCIES

(Line departments are suggested to consider COVID-19 protocols during the implementation of all the activities under the Heatwave action plan)

INDIA METEOROLOGICAL DEPARTMENT (IMD)

1. Provide seasonal report containing duration of Heatwave, maximum temperatures location-wise.
2. Obtain feedback on cases, plan, and measures taken
3. Revise plan accordingly
4. Report to Government

MA & UD DEPARTMENT / CORPORATIONS / MUNICIPALITIES

1. Conduct review of the plan implementation with officials and other stakeholders
2. Revise the department action plan as per the review.
3. Conduct capacity enhancement programmes at schools and integrate heatwave awareness as a separate content in community trainings/village meetings etc.

INFORMATION & PUBLIC RELATIONS (I & PR) DEPARTMENT

1. Collect feedback on publicity, reach and implementation of plan from media and other sources.
2. Collect all news/reports on Heatwave plan published/telecasted
3. Collect all new IEC/reports on Heatwaves.

MEDICAL & HEALTH DEPARTMENT AND MEDICAL PROFESSIONALS

1. Review with hospitals and PHCs/UHCs

2. Revise heatwave action plan based on the performance
3. Perform an epidemiological case review of heat-related mortalities during the summer.
4. Conduct and gather epidemiological outcomes from the data on heat risk factors, illness and death, based on average daily temperatures.
5. Incorporate data and findings into future versions of the Heat Action Plan.
6. Measure mortality and morbidity rates based on data before and after the Plan's interventions.

108/104 EMERGENCY SERVICE

1. Review implementation of Heatwave Action Plan.
2. Obtain feedback on cases, plan, and measures taken.
3. Revise plan accordingly.
4. Report to Government.

LABOUR & EMPLOYMENT DEPARTMENT

1. Review implementation of Heatwave Action Plan.
2. Obtain feedback on cases, plan, and measures taken.
3. Revise plan accordingly.
4. Report to Government.

PANCHAYATI RAJ AND RURAL DEVELOPMENT

1. Conduct review of the plan implementation with officials and other stakeholders
2. Revise the department action plan as per the review.
3. Conduct capacity enhancement programmes at schools and integrate heatwave awareness as a separate content in community trainings/village meetings etc.
4. Mass awareness campaigns shall be organized at heat prone villages.

TRANSPORT DEPARTMENT

1. Review implementation and effectiveness of Plan.
2. Obtain and give feedback for further improvement of Plan.

TSRTC

1. Review implementation and effectiveness of Plan.
2. Obtain and give feedback for further improvement of Plan.

EDUCATION DEPARTMENTS

1. Review implementation and effectiveness of Plan.
2. Obtain and give feedback for further improvement of Plan.

ANIMAL HUSBANDRY AND FISHERIES DEPARTMENT

1. Review implementation of Heat wave Action Plan.
2. Obtain feedback on cases, plan, and measures taken.
3. Revise plan accordingly.
4. Report to Government

AGRICULTURE AND COOPERATION DEPARTMENT

1. Assess the impact to agriculture/aquaculture sector
2. Support farmers to avail compensation/ support
3. Enhance research and development for heat resistant verities of seeds and alternative farming methods.

FIRE DEPARTMENT

1. Collect Fire call data and find reasons and plan for future
2. Community/school level awareness and capacity building

ENVIRONMENT, FORESTS, SCIENCE AND TECHNOLOGY

3. Identify heat prone locations and take precautionary actions
4. Conduct activities to enhance social forestry and improving the green environment in urban and rural areas

INFORMATION TECHNOLOGY (IT) DEPARTMENT

1. Collect data of temperatures mandal wise.
2. Collect data on number of downloads of APP & map accordingly

WOMEN DEVELOPMENT AND CHILD WELFARE DEPARTMENT

1. Evaluate the reach of Asha workers and ICDS programme in reducing the child mortality in all heatwave affected districts.
2. Revision of Heat wave Action Plan

POLICE DEPARTMENT

1. Evaluation of the past heat wave season and issues faced by the police staff.
2. Compilation of works done, milestones achieved and lives saved. New learnings by the department shall also be compiled and shared among the departments.
3. Acknowledgment and token of appreciation in monetary forms may be granted for the service of the police personnel.

NGOs, COMMUNITY GROUPS/SHGs/ WARD LEVEL COMMITTEES / INDIVIDUALS

1. Reach the unreached and educate the community on a continuous basis.
2. Conduct training programmes, workshops and outreach sessions with community / Self-help groups and mobilizers 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
3. Identification of NGOs, Voluntary Organizations in reaching out to the Public, especially vulnerable groups
4. Encourage discussions for finding early signs of heat exhaustion with local doctor or Health Centre
5. Inform fellow community members about how to keep cool and protect oneself from heat

All Departments are requested to (create awareness) circulate this plan to their District/Division/ Mandals /Village offices for the benefit of field staff.

CHECKLIST FOR MAJOR STAKEHOLDERS & LINE DEPARTMENTS

(All departments are requested to ensure the activities mentioned are completed and the checklist shall be submitted to DDMA/SDMA. All departments are requested to ensure measures for personal hygiene and protection, like masks, sanitizers, handwashing facilities etc.)

Activity/Task	Status (Completed/ Not completed	Remarks
DISTRICT DISASTR MANAGEMENT AUTHORITY		
PRE HEAT SEASON * Organize district level line department review and planning meeting * Prioritise updation and review of department SOPs * Designate point of contact for each department in heatwave management * Organize monthly review of activities and situation analysis * Establish heat illness and mortality tracking system and update datasets * Give priorities to departments dealing with vulnerable populations * Ensure proper impact mitigation strategies at Education and WCD for uninterrupted education and critical health and nutrition services to women, children and infants. * Create list of high-risk areas of city heat- wise **Pre-heat season** * Organize district level line department review and planning meeting * Prioritise updation and review of department SOPs * Designate point of contact for each department in heatwave management * Organize monthly review of activities and situation analysis * Establish heat illness and mortality tracking system and update datasets		

* Give priorities to departments dealing with vulnerable populations * Ensure proper impact mitigation strategies at Education and WCD for uninterrupted education and critical health and nutrition services to women, children and infants. * Create list of high-risk areas of city heat- wise **During Heat Event** * Ensure updates and communication from each line department nodal officers. * Announcement of heat wave warning at least 48 hrs in advance. * Maintain contact with department points of contact for updates on conditions * Ensure staff presence and availability of supplies with each department – including distributing fresh drinking water * Communicate locations of emergency facilities and cooling shelters/shaded areas, 'chalivendrams' with each department * Monitor heat alert and increase level when severe forecast **Post-heat season** * Review quantitative and qualitative data for process evaluation and improvements * Organize annual evaluation of heat plan with key line departments, civil organization and agencies. * Review and revise heatwave action plan		
WOMEN AND CHILD DEVELOPMENT DEPARTMENT		
Pre-heat season * Ensure capacity building programmes to parents, teaching and non-teaching staffs at AWCs under ICDS, staffs at nutrition centres. * Prepare alternative plans for ensuring uninterrupted nutrition services during heat season especially for pregnant women and infants. * Ensure availability of IEC materials and headlines prevention materials at centres. * Staff capacity building on DO's and DON'Ts **During Heat Event**		

* Proper monitoring with the support of factories and boilers department, department of labour, different civil engineer's consortium etc. to ensure no child labour and abuse. * Ensure working hours changes and AWS working hours accruing to the situation. * Monitoring of shelter, cooling and heat illness management facilities at AWCs and nutrition centres. * Depute officer at state and district level for monitoring and evaluation of the strategies and situations **Post heat season** * Participate in annual evaluation of heat action plan * Review revised heat action plan		
HEALTH AND FAMILY WELFARE DEPARTMENT		
Pre-heat season * Identify areas that are vulnerable * Check inventories of medical supplies in health centres * Identify cooling centres and barriers to access cooling centres * Community involvement in mitigation and preparedness measures **During Heat Event** * Prepare rapid response team * Distribute Do's and Don'ts to community * Effectively send a "Don't Panic!" message to community * Ensure access to Medical Mobile Van in the Red Zone * Ensure additional medical vans available **Post-heat season** * Participate in annual evaluation of heat action plan * Review and revise heatwave action plan **CHECKLIST FOR MEDICAL COLLEGES AND HOSPITALS** **Pre-heat season**		

* Ensure ORS and first aid kits available * Special capacity building programme for the staffs at causalities. * Adopt heat-focused examination materials * Get additional hospitals and ambulances ready * Update surveillance protocols and programs, including to track daily heat- related data **During Heat Event** * Adopt heat-illness related treatment and prevention protocols * Equip hospitals with additional materials * Deploy all medical staff to be on duty * Keep emergency ward ready * Monitor water borne diseases, malaria and dengue * Keep stock of small reusable ice packs to apply to PULSE areas * Report heat stroke's patients to District/ DRO on daily basis * Expedite recording of cause of death certificates **Post-heat season** * Participate in annual evaluation of heat action plan * Review revised heat action plan **CHECKLIST FOR PHCS/UHCS** **Pre-heat season** * Distribute pamphlet and other materials to community * Sensitize health workers and community leaders * Develop and execute school health program * Dissemination of materials in slum communities * Coordinate outreach efforts with other community groups, non-profits, and higher education * Training to AWC workers, ASHAs and other community health workers. **During Heat Event** * Modify working hours to avoid impact of heat hours * Recheck medical stock * Visit at-risk populations for monitoring and prevention		

* Communicate information on tertiary care and emergency services and DDMA **Post-heat season** * Participate in annual evaluation of heat action plan * Review and revise heatwave action plan **CHECKLIST FOR EMERGENCY MEDICAL SERVICE (HEALTH DEPARTMENT)** **Pre-heat season** * Identify most vulnerable locations based on the warnings provided in IMD and TSDPS websites and LED displays. * Prepare handouts for paramedics about heat illness * Create displays on ambulances to build public awareness during major Spring events * Identify media point of contact * Establish Dynamic Strategic Deployment Plan for ambulances * Ensure adequate supply of IV fluids * Prepare SMS/other mode of communication messages to disseminate during emergencies **During the Heat Season** * Send messages to all employees alerting them of heat action plan * Activate Dynamic Strategic Deployment Plan * Ready medicine stocks * Keep accurate records of pre-hospital care **Post-heat season** * Provide data to DDMA/Revenue (DM)Department * Participate in annual evaluation of heatwave action plan * Review and revise heatwave action plan		

CHECKLIST FOR DISTRICT INFORMATION & PUBLIC RELATION DEPARTMENT		
Pre-heat season * Secure commercial airtime slots for public service announcements * Identify areas to post warnings and information during heat season * Organize training for health workers and medical Professionals * Activate telephone hotline * Begin placing temperature forecasts in newspapers * Increase installed LED screens with scrolling temperature data **During Heat Event** * Issue heat warnings in heat and electronic media * Ensure proper communication with TSDPS/IMD for getting warnings and alerts. * Contact local FM radio and TV stations for announcements * Use SMS, text and WhatsApp mobile messaging and centralized mobile databases to send warnings * Contact transport department to place warnings on buses **Post-heat season** * Evaluate reach of advertising to target groups and other means of communication such as social media * Participate in annual evaluation of heat action plan Revise heat action plan as per the changes required		
* **LABOUR EMPLOYMENT TRAINING AND FACTORIES DEPARTMENT**		
Pre-heat season * Communicate directly about heat season with non-factory workers * Capacity building programmes * Ensure availability of masks and sanitizers * Ensure change in working hours according to the situation * Heat illness orientation for factory medical officers and general practitioners		

* Generate list of factory medical officers and contractors to include in heat action communications from Nodal Officer * Utilize maps of construction sites to identify more high-risk outdoor workers. * Conduct publicity campaigns during high- risk days in identified high-risk areas **During the Heat Season** * Provide water and heat resistant measures at work sites * Ensure proper cooling facilities where ever required * Extended hours at Occupational Health Centres * Consider extended afternoon break or alternate working hours for workers **Post-heat season** * Participate in annual evaluation of heat action plan Review and revise heatwave action plan		
CHECKLIST FOR AGRICULTURE AND COOPERATION DEPARTMENT		
Pre-heat season * Organize district level review and planning meetings * Prioritise updation and review of agriculture department SOPs * Designate point of contact for each districts and mandal in heatwave management * Organize monthly review of activities and situation analysis * Establish heat illness and mortality tracking system and update datasets * Give priorities to departments to areas which are falling under vulnerable categories. * Ensure proper impact mitigation strategies are at place for protecting farmers from economic loss. **During Heat Event** * Ensure updates and communication from each nodal officers. * Announcement of heat wave warning at least 48 hrs in advance to all agriculture officers. * Maintain contact with department points of contact for updates on conditions		

* Ensure staff presence and availability of supplies * Communicate locations of emergency facilities and cooling shelters/shaded areas, 'chalivendrams'. * Ensure local agriculture officers are issuing guidance to farmers bases on the early warnings issued by IMD and TSDPS. * Monitor heat alert and increase level when severe forecast **Post-heat season** * Organize annual evaluation of heat plan and same can be reported to SDMA. * Review and revise department heatwave action plan.		
CHECKLIST FOR ANIMAL HUSBANDRY AND FISHERIES		
Pre-heat season * Ensure additional mobile hospital ready at vulnerable villages * Update surveillance programme and protocol including track daily heat is related to livestock * Update facilities according to the data available from TSDPS Website. * Establish more clinical education to villagers who have animals * Continue to train medical and paramedical staff in this period * Identify the areas that are vulnerable for animals * Check inventory of medicine supply in animal health centres * Prepare handouts for animal paramedical to heat illness * Establish dynamic strategic development plan for mobile ambulance for animals * Ensure medical supply of medicines & fluids * Capacity building programmes at veterinary hospitals/centres especially for farmers **During the Heat Season** * Prepare Do's and Don'ts and distribute to community		

* Adopt heat related illness and prevention protocol * Equip mobile van with additional materials * Deploy all animal husbandry staff on duty during heat wave * Monitor water borne diseases * Prepare quick reaction team * Ensure additional annual husbandry van available * Ready medicine stocks **Post-heat season** * Provide data to key agency leaders * Participate in annual evaluation of heat action plan * Review and revise heatwave action plan		
CHECKLIST FOR MUNICIPAL ADMINISTRATION AND URBAN DEVELOPMENT		
Pre-heat season * Arrangements for drinking water specially "Challivendram" at all strategic and vulnerable points * Capacity building programmes to disaster management units under GHMC. * Display heat alerts and precautionary measures at strategy points * Arrangement for shelters and sheds in open and consisted places * Instruction to open parks/zoos during peak hours * Arrangements for water supply to slums * Fire advisory to be given to fire departments * Water conservation for fire tankers **During the Heat Season** * Distribute Do's and Don'ts to community * Develop control room with sufficient staff * Arrangement for emergency water supply * Maintain contact with Hospital Water Supply department, PWD, HUDA * Ensure staff presence * Monitor heat alerts and increase level for severe forecast		

* Prepare quick reaction team * Ensure GHMC control room in emergency communication loop. **Post-heat season** * Participate in annual evaluation of heat action plan * Review and revise heatwave action plan		
Checklist for Police Department and Fire Department		
Pre-heat season * Organize district level review and planning meetings * Prioritise updation and review of police department SOPs * Designate point of contact for each districts and mandal in heatwave management * Organize monthly review of activities and situation analysis * Establish heat illness and mortality tracking system and update datasets * Give priorities to departments to areas which are falling under vulnerable categories. * Ensure proper impact mitigation strategies are at place for protecting officials working outdoors. Especially at traffic, highways etc. **During Heat Event** * Ensure updates and communication from each nodal officers. * Announcement of heat wave warning at least 48 hrs in advance to all agriculture officers. * Maintain contact with department points of contact for updates on conditions * Ensure staff presence and availability of supplies * Communicate locations of emergency facilities and cooling shelters/shaded areas, 'chalivendrams'. * Ensure local agriculture officers are issuing guidance to farmers bases on the early warnings issued by IMD and TSDPS. * Monitor heat alert and increase level when severe forecast		

Post-heat season * Organize annual evaluation of heat plan and same can be reported to SDMA. * Review and revise department heatwave action plan.		
CHECKLIST FOR MANAGING HEAT RISK DURING THE COVID - 19 PANDEMIC (Applicable to all the concerned line departments)		
* Integrate heat risk planning into ongoing Telangana state COVID-19 coordination discussions. Coordinate with health services and utility providers. * Identify high risk communities at each district/mandal in the state by reviewing where local heat islands occur and where this may overlap with high incidence or risk of COVID-19 * Increase the use of telephone/online outreach programmes for regular check-ins by health department/ WCD with the most vulnerable during hot weather to reduce the need for face-to-face interactions due to COVID-19. * Review and expand social safety programmes to support at-home cooling strategies for the most vulnerable people. * DDMAs shall coordinate with relevant departments and implementing partners in advance of a heatwave to review COVID-19 restrictions, how these impact local heatwave risks and management plans. * Coordinate with IMD/TSDPS to align hot weather advisory messages and make any adjustments to advisory thresholds considering additional vulnerabilities due to COVID-19 * Keep early warning and advisory messaging from TSDPS/IMD clear and short, use plain language and avoid unnecessary jargon. Appropriate language versions may be necessary to reach high risk communities (Telugu/Hindi/English). * Mention that COVID-19 transmission does not decrease during hot weather. Exposure to sun and hot temperatures will increase heat stress and does not prevent or cure COVID-19. * Identify and address local risk perceptions, myths, and concerns about heatwaves and COVID-19. * Education department shall prepare separate action plan for hot weather preparedness during COVID -19 pandemic		

* Collect contact information according to local protocols for all visitors to cooling centres in case of the need for contact tracing. * health authorities shall provide cooling facilities for COVID-19 patients with mild symptoms. Raise awareness of the difference between signs of heat stress and fever. * Proper orientation is required from all coordinators of MGNREGA, people working under the scheme should be well aware of the guidelines on Heatwave and COVID-19. * For construction, gardening, delivery, civil protection, and other outdoor workers, consider changing working hours to cooler parts of the day (morning and early evening), introducing shifts and cooling breaks, encouraging hydration by drinking water before service and before feeling thirsty, as well as onsite physical distancing measures to reduce the risk of spreading COVID-19 * Follow local guidance on the use of swimming pools and recreational waters, while following COVID-19 control measures. * Handwashing sinks in public toilet facilities and drinking water fountains should remain open and be disinfected frequently (at least once a day.) Hands free technologies are optimal where available. * Prepare health facilities for a surge in admissions in the event of a heatwave, which may be on top of a surge due to COVID-19. Ensure that triage staff can distinguish between hyperthermia[7] and fever. * Deploy mobile cooling units in hospitals and clinics In hospitals and clinics without air-conditioning to reduce heat stress on patients with the respiratory symptoms of COVID-19, and on staff wearing PPE. * Ensure that critical care facilities – such as hospitals, care homes and retirement villages – have back-up power supplies for critical functions including cooling, refrigeration, as well as water security; test these systems. As there may be delays in the supply chain due to COVID-19, consider ordering critical spare parts to have on standby. * Ensure that frontline COVID-19 responders who are in contact with the public are well informed about heatwave risks and convey approved messages to the most vulnerable.		

[7] ***Hyperthermia*** *refers to a group of heat-related conditions characterized by an abnormally high body temperature*

ANNEXURES

Annexure 1 - NDMA, PREPARATORY ACTION FOR HEATWAVE SEASON 2021
Annexure 2 - TELANGANA COOL ROOF POLICY (Draft)
Annexure 3 - CASE DEFINITIONS
Annexure 4 - HEAT ILLNESS TREATMENT PROTOCOL
Annexure 5 - FORMAT FOR DEATH REPORTED DUE TO HEATWAVE
(State report to NDMA)
Annexure 6 - Format for DETAILS OF THE DEATH REPORTED DUE TO HEATWAVE
(Record kept with state Government)
Annexure 7. - DAILY REPORT OF THE HEAT STROKE CASE AND DEATHS
(District report to state Government)
Annexure 8. - DEATHS DUE TO HEAT RELATED ILLNESS
(To be cumulated at the State Level and sent to Central Government)
Annexure 9 - SYMPTOMS AND FIRST AID FOR VARIOUS HEAT DISORDERS
Annexure 10- DOS AND DON'T S
Annexure 11- GROUND WATER STATUS
Annexure 12- ASPECTS TO BE CONSIDERED BY CONCERNED LINE DEPARTMENTS WHILE PREPARING ACTION PLANS FOR URBAN SLUMS
Annexure 13- IEC

PREPARATORY ACTION FOR HEATWAVE SEASON -2021

संजीव कुमार, भा.प्र.से.
सदस्य सचिव
SANJEEVA KUMAR, IAS
Member Secretary

सत्यमेव जयते

भारत सरकार
गृह मंत्रालय
राष्ट्रीय आपदा प्रबंधन प्राधिकरण
Government of India
Ministry of Home Affairs
National Disaster Management Authority

D.O. No.1-56/2018-PP(Pt.II) Dated, the 11th Feb., 2021.

Subject: Preparatory action for Heat Wave season-2021

Dear Colleague,

As you are aware, heat wave is amongst the most critical extreme weather events in many countries. In the recent years, India has witnessed increasing trend of severe heat wave conditions during March- June period. IMD and other scientists have indicated rising trends of temperature, with increased chances of stronger or more severe heat waves. Many places may record hot and warm weather conditions and reach moderate to severe heat wave condition for several days.

2. National Disaster Management Authority had issued 'National Guidelines for Preparation of Action Plan – Prevention and Management of Heat-Wave'. The latest revised guidelines were issued in 2019 to enable states/local authorities to undertake heat wave risk reduction and management activities.

3. In the recent years, many state governments have taken several steps including Heat Action Plan, appointment of Nodal Officers, managing of situation at the District and Block level. Intense and sustained efforts by all the stakeholders, including regular follow-up through Video conferences by NDMA,wide publicity of early warning through electronic and print media, awareness generation among people through a range of IEC activities mentioning Do's & Don'ts, instructions to all District Magistrates to take necessary mitigation measures, resulted in significant reduction in mortality due to heat wave. In the light of the recent progress made and to continue this momentum, the state governments should start their preparation early to manage heat waves concurrent with COVID-19.

4. It is thus important that all the stakeholders undertake preparedness activities for mitigating and managing heat wave in 2021 and take all necessary actions well in time. Hence the State Governments are urged to undertake the activities as per NDMA National Guidelines for preparation of Action Plan - Prevention and Management of Heat wave 2019. In order to enable the states to prepare for effective mitigation and management of Heat wave conditions in 2021, NDMA has prepared an advisory and Do's and Don'ts to help the state governments. The same is annexed.

5. It is also requested to share the actions taken by State Governments as per NDMA guidelines such as updating the heat action plan, designing program/activities / plans for long term measures to be taken for heat wave risk reduction.

Regards,

Yours sincerely,

(Sanjeeva Kumar)

Chief Secretaries of the States/
Advisors to Administrators of UTs
(As per List)

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TELANGANA COOL ROOF POLICY (DRAFT)

Introduction

In India, nearly half a billion people live in rapidly urbanizing cities, with skyrocketing development, that converts open space into paved, heat-trapping roofs and roads. These hot surfaces worsen the urban heat island effect, drive temperatures higher, and lead to poor air quality, with greater energy needed to keep cool with fans and air-conditioning. Cool roofs offer a simple and cost-effective solution to these urbanization challenges. Cool roofs reflect sunlight and absorb less heat. Depending on the setting, cool roofs can help keep indoor temperatures lower by 2 to 4°C (3.6 - 9°F) as compared to traditional roofs.[8]

Cities can lead the way in cool roof implementation. In 2017 and 2018, the cities of Ahmedabad and Hyderabad initiated pilot cool roof programs.[9]These initial programs included citizen awareness campaigns, pilot initiatives targeting many roofs (3000 roofs in Ahmedabad and 30 roofs in Hyderabad), cooperation with businesses, and applying cool roof techniques to government buildings and schools.

Building on the success of these pilots, the Telangana Cool Roofs Policy is a target-based program to increase the percentage of cool roofs in the state, leading to around 300 sq.kms of cool roofs by the year 2031. Using three main strategies for different building types, the Cool Roofs Policy focuses on yearly targets and implementation plans to increase installation of cool roofs across the city. The Telangana Cool Roofs Policy is a unique initiative building on the pioneering Telangana Energy Conservation Building Code (ECBC) to increase energy savings in buildings and contribute to reduction of the urban heat island effect.

II. Context

Cool roofs save energy, increase thermal comfort and reduce cooling demand in the long run. The roof is an important component of the building envelope, having a direct impact on building's energy needs and ensuring thermal comfort to its occupants. Cool roofs function primarily by reflecting more sunlight incident on the roof back to the atmosphere than a regular roof surface. Cool roofs are accepted internationally as an effective energy- and money-saving strategy that keeps cities cooler and reduces the urban heat island effect. Leading cities across the world (e.g. New York City) have adopted cool roof programs. [10]Research studies have shown that city-wide installations of highly reflective roofs and pavements, along with planting shade trees will, on average, reduce a city's ambient air temperature by 2 to 4 degrees Celsius in summer months. [11]

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[8] Santamouris, M. 2013. "Using Cool Pavements as a Mitigation Strategy to Fight Urban Heat Island—A Review of the Actual Developments." Renewable and Sustainable Energy Reviews 26 (October): 224–40. https://doi.org/10.1016/j.rser.2013.05.047; Santamouris, M. 2014. "Cooling the Cities – A Review of Reflective and Green Roof Mitigation Technologies to Fight Heat Island and Improve Comfort in Urban Environments." Solar Energy 103 (May): 682–703. https://doi.org/10.1016/j.solener.2012.07.003.

[9] NRDC, Cool Roofs, Protecting Local Communities and Saving Energy, Issue Brief, May 2018. Available at https://assets.nrdc.org/sites/default/files/ib_-_cool_roofs_-_hyd_workshop.pdf?_ga=2.221618525.410483421.1580108439-1194886606.1559643759

[10] Global Cool Cities Alliance and R20 Regions of Climate Action, 'A Practical Guide to Cool Roofs and Cool Pavements'. January

[11] Global Cool Cities Alliance and R20 Regions of Climate Action, 'A Practical Guide to Cool Roofs and Cool Pavements'. January 2012

Cool roofs work in the Indian context. [12]Leading studies have shown that cool roofs work to guard against increasingly warmer temperatures in Indian cities. [13]Cool roofs need limited maintenance, and a cool protective coating can be reapplied every 7-10 years and increase the longevity of the roof beneath it. This combined with the nearly 20% savings on air conditioning costs of the building make cool roofing very cost effective over the long run.[14]

In a country where less than 10% of households have air conditioning, [15]access to affordable cooling can be a matter of survival for millions of people and not just comfort. Light-coloured roofs have been used as traditional heat management techniques in India. Studies in Hyderabad and Ahmedabad have established that often the initial material costs are comparable with traditional roofing materials and can also be applied on existing buildings. [16]Slum communities are one of the groups that are the most susceptible to extreme heat because of the lack of access to cooling and that slum housing is often made of heat-trapping materials such as tin sheets, cement sheets, plastic and tarpaulin without sufficient ventilation. [17]As living standards rise, the demand for cooling and air conditioning will rise dramatically, threatening to strain the country's electric grid, worsen air pollution, increase fuel imports, and magnify the impacts of global warming. [18]Reduced air conditioning use is critical to saving energy, consumer costs, reducing air pollution and greenhouse gas emissions and reducing hydrofluorocarbons – the super-pollutant used as a refrigerant in many air conditioners.[19]

The Municipal Administration and Urban Development (MAUD) department of the Government of Telangana and the Greater Hyderabad Municipal Corporation (GHMC) piloted cool roof programs in 2016 and 2017, respectively. The evidence base of results achieved for these cool roof programs is documented in Cool Roofs, Protecting Local Communities and Saving Energy (2018) [20]and Keeping It Cool: How Cool Roof Programs Protect People, Save Energy and Fight Climate Change.[21]

2. Objectives of the Cool Roofs Policy

The state of Telangana, situated on the centre-south stretch of the Indian peninsula on the high Deccan Plateau, is the 12th largest state, with a geographical area of 112,077 km^2 and

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12 Hashem Akbari, Tengfang Xu, Haider Taha, Craig Wray, Jayant Sathaye, Vishal Garg, Surekha Tetali, M. Hari Babu, and K. Niranjan Reddy, "Using Cool Roofs to Reduce Energy Use, Greenhouse Gas Emissions, and Urban Heat Island Effects: Findings from an India Experiment", Ernest Orlando Lawrence Berkeley National Laboratory, 2011 (accessed on 02 May 2017)

13 Ibid

14 Cool roofs for cool Delhi: a design manual, Bureau of Energy Efficiency, 2012.

15 [8] Ozone Cell, Ministry of Environment, Forests, and Climate Change. 2019. "India Cooling Action Plan." http://ozonecell.in/wp-content/uploads/2019/03/INDIA-COOLING-ACTION-PLAN-e-circulation-version080319.pdf.

16 May 2011, Akbari H., Xu T., Taha H., Wray C., and Sathaye J., Garg V., Tetali S., Babu M., and Reddy K.N, 'Using Cool Roofs to Reduce Energy Use, Greenhouse Gas Emissions, and Urban Heat island Effects: Findings from an India Experiment', Environmental Energy Technologies Division Lawrence Berkeley National Laboratory (LBNL) and International Institute for Information Technology (IIIT) Hyderabad, India

17 Tran, Kathy, Gulrez Azhar, Rajesh Nair, K. Knowlton, Anjali Jaiswal, Perry Sheffield, Dileep Mavalankar, and Jeremy Hess. 2013. "A Cross- Sectional, Randomized Cluster Sample Survey of Household Vulnerability to Extreme Heat among Slum Dwellers in Ahmedabad, India." International Journal of Environmental Research and Public Health 10 (6): 2515–43. https://doi.org/10.3390/ijerph10062515.

18 Ibid.

19 Lalit, Radhika, and Ankit Kalanki. 2019. "How India Is Solving Its Cooling Challenge." World Economic Forum. May 15, 2019. https://www.weforum.org/agenda/2019/05/india-heat-cooling-challenge-temperature-air-conditioning/.

20 RDC, Cool Roofs, Protecting Local Communities and Saving Energy, Issue Brief, May 2018. Available at https://assets.nrdc.org/sites/default/files/ib_-_cool_roofs_-_hyd_workshop.pdf?_ga=2.221618525.410483421.1580108439-1194886606.1559643759

21 NRDC, KEEPING IT COOL: How Cool Roofs Programs Protect People, Save Energy and Fight Climate Change, Models to develop city cool roof programs in India, Fact Sheet, July 2018. Available at https://assets.nrdc.org/sites/default/files/keeping-it-cool-roofs-india-fs.pdf?_ga=2.264675658.410483421.1580108439-1194886606.1559643759

the 12th most populated state with nearly 35 million residents, as per the Census 2011[22]. It is also the 8th largest economy in the country and is rapidly growing with an evolving hub for robust IT software, industry and services sectors.

Within Telangana, Hyderabad, the state capital, is the one the fastest growing cities of India. With a population of about 9.1 million [23]it is the sixth most populous urban agglomeration in India. . The city is growing as a business destination and increasingly being identified as the next technology capital of the country.

Hyderabad's 1,468 notified low-income communities house a population of over 1.9 million people. A majority of the houses in low-income neighbourhoods are constructed with concrete slab or asbestos roofs. As the state works to improve living and housing conditions in these neighbourhoods, the use of cool roofs provides great opportunity to impact human health and comfort in the state and the city of Hyderabad. Particularly for low-income communities, cool roofs provide increased thermal comfort that can also lead to improved productivity, as these homes are also places of work for a large proportion of the slum community.

The Telangana Cool Roofs Policy aims to meet the following specific objectives:

1. Drive rapid state-wide adoption of cool roofs to save energy, strengthen heat resilience and increase thermal comfort.
2. Support inter-agency coordination to implement the city-wide cool roof policy.
3. Identify financing frameworks and outreach and awareness of building tools for implementing cool roofs.
4. Support workforce development and training programs for cool roof installation.

Three main sub-program areas that will help achieve these objectives:

- Mandatory Program (government and commercial): Mandatory cool roofing for all municipal, government-owned (take effect from 2020), and commercial buildings (take effect from 2024) covered under the state building efficiency codes, for new and major upgrades.
- Voluntary Program (residential): Voluntary cool roofing for residential and smaller buildings for new and major upgrades (take effect from 2028).
- Vulnerable Communities Program: Cool roofing for all government low-income housing and slum housing identified in the state's Heat Action Plan (take effect from 2020).

3. Mandatory Program: All municipal/government and large commercial buildings

A. Municipal/government buildings (office, educational and healthcare) (2020-2023)

With government spearheading the Telangana Cool City Policy, it is important for all municipal and government office buildings and structures, new or existing, to adopt cool roofs. The key driver for municipal/government buildings is to spur adoption of cool roofs with the benefits of thermal comfort, energy savings and reduction of urban heat island affect.

22 Government of Telangana. 2019. "Telangana State Portal State-Profile." 2019. https://www.telangana.gov.in/about/state-profile.

23 Ibid.

Types of buildings: municipal buildings, government owned schools, hospitals and health care facilities.

Regulatory/policy tool: As an initial step, MAUD formally adopts the “Cool State Program” as a policy measure for the State of Telangana. In the long run, to ensure adoption of cool roofs by municipal buildings, MAUD to announce mandatory adoption of cool roofs in all new construction and retrofits of existing government buildings and incorporate cool roofs when buildings are undergoing roof maintenance. If a building is not due for maintenance within the next 3 years, MAUD could consider implementing cool roofs sooner as part of larger effort. Government of Telangana is also retrofitting 100 government buildings and shall include mandatory application of cool roofs in these retrofits within the next year.

Funding mechanism: Installation costs of cool roofs for municipal buildings will be part of existing government budgets for building construction, repair and maintenance, as well as part of retrofit measures.

Outreach and awareness measures to be undertaken as part of the policy implementation:

- Internal government outreach programs highlighting the program and benefits including thermal comfort and energy savings from cool roofs
- Government meetings highlighting the new cool roofs program
- Media articles on the new cool roofs program
- Dissemination of knowledge material on cool roofs technology, applications and materials and suppliers

B. Commercial (including offices, retail complexes/shops, hotels, industrial, private education and healthcare) (2024-2027)

Commercial buildings include those mentioned in government order 30 governing the Telangana State Energy Conservation Building Code (TSECBC). This building type includes offices, such as IT companies, retail complexes/shops, malls, hotel, industrial buildings and private educational and healthcare. The key driver for adoption of cool roofs for commercial buildings is reducing cooling load and energy savings.

Regulatory/policy tool: The Government of Telangana notified the mandatory compliance to the TSECBC in 2014. The Telangana ECBC [24]applies to any commercial building or building complex that has a plot area of 1,000 square meters or more, or a built-up area of 2,000 square meters or more. The state also has an online platform for building applications, the Development Permission Management System (DPMS). The online DPMS integrates the TSECBC requirements into the online process for building permits, making the ECBC mandatory for commercial building. In order to ensure adoption of cool roofs by the commercial building, the draft TSECBC 2020 includes mandatory adoption of cool roofs in new construction and any major upgrades as part of a formal government order, making it mandatory for any air-conditioned commercial building with a connected load of 100 Kw or more to install cool roofs. Currently, the TSECBC 2017 includes cool roofs under the

[24] Telangana Energy Conservation Building Code Guidelines, December 2017. Available at http://tsredco.telangana.gov.in/PDFs/ECBC/4_TS_ECBCGuidelines.pdf

prescriptive requirements where in roofs with slopes less than 20 degrees shall have initial solar reflectance of not less than 0.70 and an initial emittance no less than 0.75.

Funding mechanism: Installation costs of cool roofs for these building segments is included in the budget for building construction by the real estate developer or individual owner. For un-airconditioned private small hospitals and educational institutes a potential subsidy or full support can be provided by the government.

Outreach and awareness measures: Similar to the residential sector, for the commercial sector as well the nodal agency of the cool state policy (MAUD) along with city municipal corporations such as Greater Hyderabad Municipal Corporation (GHMC) and Hyderabad Metropolitan Development Authority (HDMA) will undertake outreach and awareness building programs (listed below). These programs can be designed by technical partners of the cool state policy. Such programs will be undertaken along with real estate associations such as CREDAI-Telangana Chapter, Association of Architects, Resident Welfare Associations.

- Awareness program with local resident welfare associations
- Presenting the program at trade shows and conferences
- Website and social media to support the program
- Distributing flyers and posters to spread the work
- Ad through bill boards across the city
- Awareness generation through focused events on low cost installation of cool roofs for building owners
- Preparation of a how-to manual on installing cool roofs and other knowledge materials Engage volunteers from companies to coat rooftops

Voluntary Program (residential): cool roofing for all residential buildings

The residential and smaller commercial building segment includes multi-level apartment complexes individual houses and any other building not covered by the government and commercial building mandatory program. The key driver for this segment of the population staying in these buildings in addition to the thermal comfort would be the cooling load reduction and resulting energy savings.

Regulatory/policy tool: for this segment of building type, the adoption of cool roofs would be voluntary but facilitated by periodic outreach and awareness measures on cool roofs, led by city municipal corporations such as GHMC and HMDA.

Funding mechanism: Installation costs of cool roofs for these building segments is part of the total building development costs or upgrade by property developer or individual house owner. To encourage the homeowner for installation of cool roofs, city municipal corporations will have focused educational programs on benefits of cool roofs.

Outreach and awareness measures: The nodal agency of the cool state policy (MAUD) along with city municipal corporations such as GHMC and HMDA will undertake outreach and awareness building programs. These programs will be designed by technical partners of the cool state policy. Such programs can be undertaken along with real estate associations such as CREDAI-Telangana Chapter, Association of Architects, Resident Welfare Associations.

- Awareness program with local resident welfare associations
- Presenting the program at trade shows and conferences
- Website and social media to support the program
- Distributing flyers and posters to spread the work and other knowledge material

- Ad through bill boards across the city
- Awareness generation through focused events on low cost installation of cool roofs for building owners

5. Vulnerable Communities Program: Cool roofing for all government low-income housing and slum housing identified in the state's Heat Action Plan

In low-income communities, cool roofs keep temperatures lower and increase thermal comfort. In the long run, cool roofs for vulnerable communities, would help in locking energy savings and reducing the demand for cooling, thus improving indoor thermal conditions. The driver for this segment of the population for cool roofs is increased thermal comfort and lower indoor temperatures. Additionally, since for a large proportion of these households, their homes are also their place of work, increased thermal comfort due to cool roofs, would also lead to enhanced productivity. Regulatory/policy tool: in order to implement the cool roofs in low income households two mechanisms will be deployed.

- For government financed low income housing projects, government order by MAUD and executed by the Telangana State Housing Corporation Limited (TSHCL), mandating cool roofs in all new and existing government low cost housing. Government of Telangana is already in the process of constructing 20,000 low cost housing in which cool roofs can be incorporated to be implemented within the next 5 years, through a government order.
- For cool roofs implementation in low income households in slums, a program of implementation led by city municipal corporations such as Greater Hyderabad Municipal Corporation (GHMC) and Hyderabad Metropolitan Development Authority (HMDA), for the city of Hyderabad, through the Heat Action Plan.

Funding mechanism: Implementation of cool roofs in government low cost housing for the poor (existing and major upgrades), can be funded by the government budget (TSHCL) and inclusion of cool roofs in their procurement criteria.

Implementation of cool roofs in houses in slums can be funded jointly through government budgets and corporate social responsibility (CSR) funds. Hyderabad's Slum Free City Plan seeks to prioritize slums for development and provide them additional infrastructure and resources. The funds under the program could be used for installation of cool roofs in slums as well as through the Heat Action Plan budgets.

Outreach and awareness measures: To ensure implementation of program in low income/slum area, the nodal agency, will be required to undertake awareness campaign on benefits of cool roofs, also highlighting the maintenance needs. This needs to be coupled with spreading the word on the program through advertisements through bill boards across the city.

6. Policy Design by Building Type

Cool State Policy by Type of Building

Building Type	Regulatory/Policy tool	Recommended cool roof techniques for implementation	Options of Funding Mechanisms	Outreach and Awareness measures
1. Low income/slum areas (effective from 2020)	TSHCL GO on mandating cool roofs in government low income housing projects. Inclusion of cool roofs in construction of 20,000 low cost housing by the government Implementation under the heat action plan by GHMC	• Existing buildings-Recycled advertisement flex sheets/membranes/ cool coatings. • New construction-ceramic tiles and pre- coated corrugated metal and non- metal sheets.	• Government budgets (heat action plan and slum free city plan) and inclusion of cool roofs material in their procurement criteria • CSR	Local slum level awareness campaign on benefits of cool roofs Awareness program with local resident welfare associations Presenting the program at trade shows and conferences Website and social media to support the program Distributing flyers and posters to spread the work. Ad through bill boards across the city Awareness generation through focused events on low cost installation of cool roofs by building owners Prepare how to manual on installing cool roofs on their own
2. Residential (effective from 2028)	Voluntary Awareness on benefits of cool roofs and encourage them to apply	• Existing buildings-Cool coatings/ tiles for new or major retrofit/ membranes • New construction-ceramic tiles	Building construction budgets	
3.Government (offices, educational and healthcare) (effective from 2020)	GO on mandating all government buildings to retrofit roofs with cool roofs and mandatory installation in new construction 100 government building retrofit to include cool roofs	• Existing buildings-Coatings • New construction-Cool tiles	Government budgets	
4.Commercial (offices, retail complexes, hotels, industrial, private educational and healthcare) (effective from 2024)	Modified ECBC to include mandatory cool roofs in new construction and mandatory in existing buildings or a GO mandating any air-conditioned commercial building with a connected load of 100 Kw or more to install cool roofs.	• Existing buildings-High performance Coatings • New buildings-Cool tiles/ Sandwich tiles/ membranes/ insulation	Self-funded For un-airconditioned private small hospitals and educational institutes a potential subsidy or full support can be provided by the government.	

Table: 1

7. Telangana Cool Roof Policy Targets

The total area of Hyderabad is 650 sq. kms. Assuming the eligible roof area for cool roofing to be 15%, the targeted cool roofing area with the current size of the city would approximately be 100.3 sq.kms.

For the state of Telangana, taking a simplified assumption that the eligible roof area would be three times the city of Hyderabad, would imply a cool roof area of 300.3 sq.kms.

Table 2 below mentions the yearly target of cool roofs the current policy aims to add till 2031.

Table 2: Draft Annual Targets of Cool Roofs for Hyderabad and Telangana under the Telangana Cool Roof State Policy

Year	Hyderabad Cool roof area (sq. kms) targets	Telangana Cool roof area (Sq. kms) targets
2020-21	0.1	0.1
2021-22	0.2	0.2
2022-23	0.3	1
2023-24	0.7	2
2024-25	1.7	5
2025-26	3.3	10
2026-27	6.7	20
2027-28	12.3	37
2028-29	25	75
2029-30	50	150
2030-31	100.3	300.3

Source: market survey by IIIT- Hyderabad (2019)

Table: 2

Hyderabad Year 1 Goal: 100,000 sq.m of cool roofs citywide (equivalent to 1,000 roofs)[25]

Hyderabad Year 5 Goal: 30,00,000 sq.m of cool roofs citywide (equivalent to 11,000 homes) and 100 government buildings in the state retrofitted including cool roofs

Hyderabad Year 10 Goal: 100,30,000,000 sq.m of cool roofs citywide (equivalent to 11,000 homes), 20,000 low cost housing units across the city have cool roofs and 1000 commercial

Detailed targets by building types for 2020: the policy covers government office buildings, commercial buildings (such as IT buildings), educational institutions, government hospital buildings, residential housing societies/individual house and low-income housing.

For the start year of the city-wide policy, the policy aims to cover the following buildings to be cool roofed before the start of the summer season in 2020.

[25] These numbers are calculated based on the target announced by Principal Secretary Arvind Kumar in September 2018.

Table 3- Cool city Program targets [26]for the summer of 2020- Hyderabad

Building Type	Number of buildings	Total area (sq.mts)	Possible technologies	Rate/Sq.m	Cost (Rs.)	Funding
Government offices	5	10000	Coating	200-400	20,00,000- 40,00,000	Government
Government schools	10	3000	Coating	200-400	6,00,000- 12,00,000	Government
Government hospitals	5	15000	Coating	200-300	30,00,000- 60,00,000	Government
IT companies	5	15000	High performance	350	52,50,000	IT Companies
Low income/EWS housing	150	7500	Coating -cool roof sheets	200	15,00,000	Government

Table: 3

around Gujarat and Delhi and can serve as an alternative to RCC roofs. The 2020 targets have been set with a focus of exemplifying the comfort provided by the cool roofs by targeting buildings such as in low income house, government schools and hospitals where the comfort provided by a cooler roof is more important. A realistic number of buildings have been proposed across the types. Commercial buildings in form of IT companies have been included to propel the commercial segment to implement the technology to be able to showcase the benefits, in form of better comfort and also energy savings.

8. Cool Roofing Material

The choice of an appropriate cool roof material in a particular context would be dependent on a range of factors, from existing roof material, life and maintenance, availability, cost, time needed for installation and availability of skilled labour. To help cater to a range of contexts, cool roofs techniques can be broadly divided into five categories and building owners can choose from these techniques as appropriate for implementing cool roofs.

- Coated cool roofs: these roofs involve the coating of a material or paint with high reflectivity on top of a conventional roof material to increase the roof surface's SRI. These are liquid applied coatings made of simple materials such as lime wash, or an acrylic polymer or plastic technology and are usually white in colour.
- •Membrane cool roofs: these roofs involve using pre-fabricated materials such as membranes or sheeting to cover an existing roof in order to increase the roof surface's SRI. These types of roofs can be polyvinyl chloride (PVC) or bitumen-based.
- Tiled cool roofs: these roofs involve the application of high albedo, china mosaic tiles or shingles on top of an existing roof or to a new roof.
- Special cool roof materials such as ModRoof: these roofs, made of coconut husk and paper waste, have been installed in households

[26] The numbers are calculated based on market survey of building area in Hyderabad by IIIT-H.

- Green roofs: green roofs make use of vegetation to help the roof absorb less solar energy by providing a thermal mass layer to reduce flow of heat into a building. Vegetation is especially useful in reflecting infrared radiation.

Program Partners and Institutional Mechanism

For a collective impact to reduce the urban heat island effect, the cool roof policy for the state is to be implemented through a robust interagency coordination mechanism, replicated at the city level. The successful implementation of the policy will require collective effort from different state and city level agencies as well as technical, research, NGOs, civil society organizations and private companies.

The Figure below highlights key agencies to be engaged in the cool state policy.

The Policy is to be housed in the Municipal Administration and Urban Development Department (MAUD) of the state of Telangana with Hyderabad city level implementation being coordinated by GHMC and HMDA as the nodal agencies. Similarly, by other city level municipal corporations in the respective cities.

The policy design to be led and overseen by a Cool Roofs Oversight Committee. This committee can have same members as the current technical committee of the ECBC for Telangana chaired by the Principal Secretary MAUD and members from department of energy, and building, department of town and country planning, housing, GHMC, HMDA, as well as leading real estate developers and academic experts (ASCI, IIIT-H).

MAUD as the state nodal department for the policy will lead the overall program implementation and oversee policy progress. It will be responsible for mandating the cool roofs through government orders where required and allocate funds for implementation by building type.

The city level implementation will be led by the respective ULBs in the city. In case of Hyderabad, it is the GHMC and HDMA that will be the city implementation agency responsible for overall program coordination and implementation. The city implementation agency will also mobilize funds required for example implementation of cool roofs in low income housing and slums through the heat action plans. ULBs will also coordinate and conduct the meetings of the oversight committee and undertake program review and impact evaluation. It will submit periodic program implementation reports to MAUD and oversight committee.

The ULB will also coordinate with its publicity department to undertake outreach and communication activities for the cool roofs program with the help of program technical partners (ASCI, IIIT, NRDC etc). The technical partners will also support the ULBs in overall program implementation where required such as identifying technical criteria, drafting GOs, developing training and communication material etc. ULBs will also seek support from community partners such as the local RWAs, NGOs and civil society organization for undertaking awareness building campaigns and mobilizing participation. In addition, the ULBs will also coordinate with other city departments for implementation of aspects related to the program. The technical partners will also support the ULBs in identifying and defining the role of other city departments for program implementation.

10. Implementation Plan

The policy will be implemented over a period of the next 10 years, with a target of 300.3 sq. kms of roofs to be cool roofed by 2031. It will be implemented in a phased manner, guided by the type of desired impact. As highlighted in section 5, the key driver of adoption of cool roofs

would vary by the type of building targeted. A phased implementation would enable plugging in these drivers to achieve the desired overall targets of the policy, and also undertake monitoring and evaluation as the policy progresses to make any course corrections.

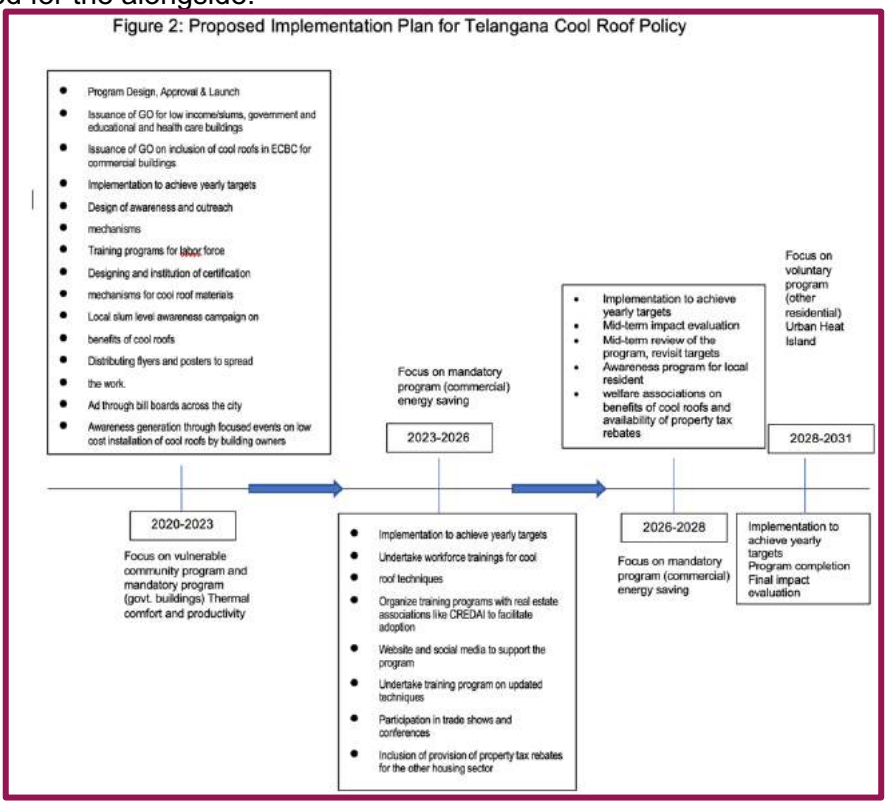
It is expected that the residential segment comprising of individual houses and multi-level residential complexes will be last to take up cool roofs, after having seen the implementation and results achieved of the cool roof technology in the earlier years, this segment is therefore proposed to be focus of the latter part of the implementation plan.

The implementation progression is expected to proceed from focus on improved comfort in the initial phase by focusing on low income/slum houses, government building and educational and healthcare buildings in the initial years (program 1 and 3) (2020-2023). During the initial phase of the program, it is also expected, a robust ecosystem consisting of certification mechanisms, training of labour force with cool roof techniques and standards for cool roof materials, will also be facilitated. This will ensure a smooth functioning of the program in the latter years when the mandatory component (for commercial buildings) kicks in.

With some level of success and results of the program showcased in the initial phases, along with rigorous outreach and awareness measures, the commercial sector could be the focus of implementation in the next phase (2024-2027) (program 1) driven by energy saving potential of cool roofs. Within the commercial sector while mandating the cool roof installation through the ECBC code would ensure adoption in new construction, the existing commercial building sector would come by at later stages (2026-2028). By this time, it is expected that the other housing sector (program 2) through the impacts achieved in the earlier stages and implementation of the enabling measures in form outreach and awareness building would come by (2028-2031), this will move the state to the reduction in the urban heat island effect.

It is also proposed to revisit the policy design and success after first two years of implementation to incorporate the learnings and undertake any course correction that may be required. This will ensure smoother and successful implementation in the next phases of the policy. A robust monitoring & evaluation (M&E) process is proposed to be designed and implemented for the alongside.

Figure 2: Proposed Implementation Plan for Telangana Cool Roof Policy



CASE DEFINITIONS

Range of Heat Illness – Typical Presentations – Symptoms, Sign and Prognosis

Clinical Entity	Age Range	Setting	Carinal Symptoms	Cardinal/Important Signs	Pertinent Negative findings	Prognosis
Heat rash/prickly heat/Miliaria	All, but frequently children	Hot environment; +/- insulating clothing or swaddling (wrap in tight cloths)	Itchy rash with small red dumps at pores in the skin. Seen in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	Diffused red colour skin or vesicular rash, itching of the skin without visible eruption	Not focally distributed like a contact dermatitis	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 (wrap in a tight cloths)	Feeling overheated, light headedness, exhausted and weak, unsteady, feeling of vomiting, sweaty and thirsty, inability to continues activities.	Sweaty/diaphoretic; flushed akin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no difficulty in swallowing food or speech; no overdose history	Full recovery with elimination of exposure and supportive care; progression to heat syncope/stroke if continues exposure
Heat syncope	Typically adults	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight cloths)	Feeling hot and weak; light headedness followed by a brief loss of consciousness	Brief generalized loss of consciousness in hot setting short period of disorientation, if any	No serious activity, no loss of bowel or bladder continence, no focal weakness, no difficulties in food swallowing or speech	Full recovery with elimination of exposure and supportive care; progression to heat stroke if continued exposure
Heat stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight cloths)	Severe overheating; profound weakness; disorientation, not fully alert, convulsion, or other alerted mental status	Flushed, dry skin (not always), core temp >_ 40^0C or 104^0F; alerted mental status with disorientation, incoherent behaviour , coma, convulsion, tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no difficulties in swallowing food or speech, no overdose history.	25-50% mortality even with aggressive care; significant morbidity even if survives.

Table: 4

HEAT ILLNESS TREATMENT PROTOCOL

Recognizing that treatment protocols may vary slightly according to the setting (EMS, health centre, clinic, hospital emergency department, etc.), the following should apply generally to any setting and to all patients with heat related illnesses:

1. Initial patient assessment primary survey (airway, breathing, circulation, disability, exposure), vital signs including temperature
2. Consider heat illness in differential diagnosis if.
    a. Presented with suggestive symptoms and signs
    b. Patient has one or more of the following risk factors:
        I. Extremes of age (infants, elderly)
        II. Debilitation physical deconditioning. 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 onto the skin
    c. Use fan to blow cool air onto 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). If temperature is 40°C or above, initiate IV rehydration and immediately transport to emergency department for stabilization

Format – A **DEATHS REPORTED DUE TO HEATWAVE**

(To be sent by Rev. (DM) Dept. in Secretariat to NDMA)

Name of the state: Year: Reporting Period: Date of Reporting:

District		**Location**						**Occupation**					**Economic**		
		Urban		Rural		Total		Farmers	Labours	Hawkers	Others	Total	BPL	APL	Total
	Age Group	M	F	M	F	M	F								
District-1	0-6 years														
	7-18 Years														
	19-35 Years														
	36-60 Years														
	61 and Above														
	Sub Total														
District-2	0-6 years														
	7-18 Years														
	19-35 Years														
	36-60 Years														
	61 and Above														
	Sub Total														
Total State															

* If any other information related to heatwave, please enclose a separate page

Name and designation of the reporting officer: Signature with Date:

Format B – **MONTHLY DETAILS OF THE DEATHS REPORTED DUE TO HEATWAVE**
(To be sent by District Collectrate (D-Section) to Rev. (DM-1) Dept.)

Name of the District: ……..

S.No:	Name and Address	Age	Sex (M/F)	Occupation	Place of death	Date and time of death	Max. Temp. recorded (Rectal and Oral)	Deaths reported during heatwave period or Not	List of chronic diseases present (Ask the family members)	Date and time of post mortem (If conducted)	Date and time of joint enquiry conducted with a revenue authority	Cause of death	Remarks	
													Related to post mortem	Related to joint enquiry
1														
2														
3														
4														

Name and Designation of the Reporting officer:

Signature with Date:

Format A - **DAILY REPORT OF THE HEAT STROKE CASE AND DEATHS**
(To be sent by District Collectrate (D-Section) to Rev. (DM-1) Dept.)

Name of the District: ……

S. No:	Village	PHC	Block/City	Name & Son/ Daughter/Wife of	Occupation	Urban **U** Rural **R**	BPL Y/N	Age/Sex	Date of attack of Heat Stroke	Any Antecedent illness	Cause of death	Death confirmed by MOs and MROs

Name and Designation of the Reporting officer:

Signature with Date:

Format B - **DEATHS DUE TO HEAT RELATED ILLNESS**
(To be cumulated at the State Level and sent to Central Government)

State …….. Date:

S.No:	Name of the District (Name of all Districts)	New cases admitted due to Heat Related Illness since the last reporting period	Cumulative no. of cases admitted due to Heat Related Illness since 1st April …….	Deaths reported due to Heat Related Illness since last reporting period	Cumulative no. of deaths due to Heat Related Illness since 1st April ……..	Remarks (If any shortage of ORS/IV fluids/ Treatment facilities etc.)
	Total					

Name and Designation of the Reporting officer:

Signature with Date:

SYMPTOMS AND FIRST AID FOR VARIOUS HEAT DISORDERS

Heat Disorder	Symptoms	First Aid
Sunburn	Skin redness and pain, possible swelling, blisters, fever, headaches.	Take a shower, using soap, to remove oils that may block pores preventing the body from cooling naturally. If blisters occur, apply dry, sterile dressings and get medical attention.
Heat Cramps	Painful spasms usually in leg and abdominal muscles or extremities. Heavy sweating.	Move to cool or shaded place. Apply firm pressure on cramping muscles or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion	Heavy sweating, weakness skin cold, pale, headache and clammy. Weak pulse. Normal temperature possible. Fainting, vomiting.	Get victim to lie down in a cool place. Loosen clothing. Apply cool, wet cloth. Fan or move victim to air-conditioned place. Give sips of water slowly and If nausea occurs, discontinue. If vomiting occurs, seek immediate medical attention. Or call 108 and 102 for Ambulance
Heat Stroke (Sun Stroke)	High body temperature (106+F). Hot, dry skin. Rapid, strong pulse. Possible unconsciousness. Victim will likely not sweat	Heat stroke is a severe medical emergence. Call108 and 102 for Ambulance for emergency medical services or take the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment. Try a cool bath or sponging to reduce body temperature. Use extreme caution. Remove clothing. Use fans and/or air conditioners. **DO NOT GIVE FLUIDS.**

DOs and Donts

Must for All

- Stay at home and listen to radio; watch TV; read Newspaper for updates/advisories on the local weather and COVID-19 situation.
- Drink sufficient water, as often as possible, even if not thirsty. Persons with epilepsy or heart, kidney or liver disease who are on fluid-restricted diets; or have a problem with fluid retention should consult a doctor before increasing liquid intake.
- Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated.
- Wear lightweight, light coloured, loose, cotton clothes.
- Avoid going out. If it is necessary to go outside, cover your head (cloth/hat or umbrella) and face. Avoid touching any surface, as far as possible.
- Maintain physical distancing at least 1 meter from other persons.
- Wash hands frequently and properly with soap and water. When soap and water is not available, use hand sanitizer.
- Keep separate towels for each member of the house. Wash these towels regularly.

Other Precautions

- Stay indoors as much as possible.
- Keep your home cool - use curtains, shutters or sunshade, and open windows at night. Try to remain on the lower floors.
- Use fans, damp clothing and take a bath in cold water frequently to cope up with excess heat.
- If you feel sick high fever/throbbing headache/dizziness/nausea or disorientation/continuous coughing/shortness of breath, see a doctor immediately.
- Keep animals in shade and give them plenty of water to drink.

DON'Ts

- Do not go out during the lockdown. If you have to go out for essential work as permitted, try to schedule it during cooler hours of the day. Avoid going out during peak heat hours - especially between 12.00 noon and 3.00 p.m.
- Do not go out barefoot or without a face and head cover.
- Avoid cooking during peak hours. Open doors and windows to ventilate cooking area adequately.
- Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrate the body.
- Avoid high-protein, spicy and oily food. Do not eat stale food.
- Don't touch your eyes, nose and mouth without washing your hands.
- Avoid close contact with people who are sick.
- Do not go out if you are sick; Stay at home.

Employers and Workers

DO's

- Provide clean and cool drinking water at the workplace.
- Caution workers to avoid direct sunlight. If they have to work in the open (agricultural labourers, MNREGS workers, etc.), ensure that they cover their heads and face at all times. Schedule strenuous jobs to cooler times of the day.
- Increase the frequency and length of rest breaks for outdoor activities.
- Give special attention to pregnant workers or workers with a medical condition.
- Make all the workers wear face covers, maintain physical distance of 1-1.5 m from others and practice hand hygiene.
- Provide soap and water for frequent hand washing. Caution them to not touch their faces without washing their hands.
- Make provision for lunch/dinner space in a manner such that there is a 1-1.5 m distance between two persons.
- Sanitation workers should cover their heads, wear mask and gloves. Don't touch the mask after wearing it. They should wash their hands thoroughly and frequently.
- Once you go home after work, take a bath and wash your used clothes thoroughly.
- Always follow Social Distancing.
- If someone is sick, he/she must be reported to the duty supervisor.

Don'ts

- Don't spit, smoke or chew tobacco at workplace.
- Don't shake hands or hug others.
- Don't touch your face - especially eyes, nose and mouth. Avoid close contact with people who are sick.
- Don't go to work if you are sick; Stay at home.

Police / Traffic Police Personnel

- Wear cool jacket while on duty during the day.
- Stop people/vehicles at a distance from you. Do not touch the documents you are checking.
- Also avoid touching any surface, as far as possible.
- As far as possible, wash your hand regularly and thoroughly. If soap and water are not readily available, use hand sanitizer. DO NOT touch your face with unwashed hands.
- Wear face mask at all times. Change them periodically and dispose of the used mask safely.
- Drink sufficient water, as often as possible, even if not thirsty.
- Use protective gear - shade, sunglasses, and sunscreen
- As far as possible, relatively young personnel should be put on traffic duty during the day. When you go home after work, take a bath and wash your used clothes thoroughly.

Senior Citizen

- Stay indoors as much as possible. Don't go to crowded places like parks, markets and religious places.
- Keep your home cool, use curtains and fans or cooler.
- Maintain hygiene by regularly washing hands, especially before having meals.
- Call a doctor immediately if you feel sick and experience any of the following:
    - *High body temperature, with or without body ache*
    - *Throbbing headache, dizziness, nausea or disorientation*
    - *Coughing and/or shortness of breath*
    - *Unusually poor appetite*
- If you are looking after a senior citizen:
    - Help her/him in regularly washing hands.
    - Ensure timely meals and water intake.
    - Use a face cover to cover your nose and mouth while attending on him/her.
    - Wash your hands thoroughly before touching him/her.
    - **In** case you are suffering from fever/ cough / breathing difficulty, don't go near her/him. Try to make someone else attend to him/her during that time.

GROUND WATER STATUS

Comparison of average depth to ground water levels

S. NO.	DISTRICT	AVERAGE DEPTH TO WATER LEVEL (in m bgl)				FLUCTUATION DURING JANUARY-2021 WITH RESPECT TO (m)		
		Jan-20	May-20	Nov-20	Jan-21	Nov-20	May-20	Jan-20
1	ADILABAD	6.93	9.32	5.34	7.12	-1.78	2.20	-0.19
2	BHADRADRI	8.17	10.92	5.57	6.87	-1.30	4.05	1.30
3	BHUPALPALLY	10.67	12.70	8.73	10.70	-1.97	2.00	-0.03
4	HYDERABAD	7.68	10.51	3.95	5.11	-1.16	5.40	2.57
5	JAGITYAL	4.96	6.49	3.49	4.31	-0.82	2.18	0.65
6	JANGAON	8.15	10.50	3.32	5.13	-1.81	5.37	3.02
7	JOGULAMBA(GADWAL)	8.16	12.20	5.41	5.87	-0.46	6.33	2.29
8	KAMAREDDY	10.69	14.57	6.47	9.65	-3.18	4.92	1.04
9	KARIMNAGAR	6.24	8.45	3.71	6.27	-2.56	2.18	-0.03
10	KHAMMAM	4.93	6.77	2.72	3.83	-1.11	2.94	1.10
11	KUMURAM BHEEM	6.94	8.97	6.25	6.94	-0.69	2.03	0.00
12	MAHABUBABAD	6.24	8.53	2.45	4.08	-1.63	4.45	2.16
13	MAHABUBNAGAR	12.00	14.93	4.65	6.92	-2.27	8.01	5.08
14	MANCHERIAL	4.85	6.90	3.90	5.32	-1.42	1.58	-0.47
15	MEDAK	18.34	22.72	8.73	11.48	-2.75	11.24	6.86
16	MEDCHAL	10.48	13.44	5.29	6.82	-1.53	6.62	3.66
17	MULUGU	6.81	9.66	4.82	6.72	-1.90	2.94	0.09
18	NAGARKURNOOL	9.55	9.94	4.06	5.04	-0.98	4.90	4.51
19	NALGONDA	9.77	11.24	4.71	5.93	-1.22	5.31	3.84
20	NARAYANPET	9.87	11.61	4.58	5.22	-0.64	6.39	4.65
21	NIRMAL	7.55	11.67	6.08	7.92	-1.84	3.75	-0.37
22	NIZAMABAD	8.91	11.95	6.77	9.42	-2.65	2.53	-0.51
23	PEDDAPALLY	6.99	8.27	5.15	6.88	-1.73	1.39	0.11
24	RANGAREDDY	14.67	16.91	5.17	6.51	-1.34	10.40	8.16
25	SANGAREDDY	18.77	22.20	11.67	11.16	0.51	11.04	7.61
26	SIDDIPET	12.24	15.61	6.19	8.16	-1.97	7.45	4.08
27	SIRCILLA	8.18	11.07	3.70	6.30	-2.60	4.77	1.88
28	SURYAPET	5.99	6.91	2.78	4.88	-2.10	2.03	1.11
29	VIKARABAD	14.10	16.40	7.40	9.37	-1.97	7.03	4.73
30	WANAPARTHY	4.39	5.15	1.91	2.69	-0.78	2.46	1.70
31	WARANGAL (R)	5.05	6.81	2.21	4.58	-2.37	2.23	0.47
32	WARANGAL (U)	5.05	7.25	2.29	3.73	-1.44	3.52	1.32
33	YADADRI	9.80	11.52	4.00	5.71	-1.71	5.81	4.09
	TELANGANA	8.88	11.28	4.95	6.56	-1.61	4.72	2.32
Average Ground Water Level in January-2021 (minimum) = 2.69 m-bgl in Wanaparthy Dist								
Average Ground Water Level in January-2021 (maximum) = 11.48 m-bgl in Medak Dist								
Average Ground Water Level Rise(maximum) January-2020 to January-2021 = 8.16 m in Rangareddy Dist								
Average Ground Water Level Rise(minimum) January-2020 to January-2021 = 0.09m in Mulugu Dist								
*mbgl:-meters below ground level								

Source: Ground water department, Govt. Telangana

Comparison of average depth to ground water level and rain fall

S.No	District Name	Rainfall (mm) up to December-2020 (01-06-2020 TO 31-01-2021)			Average Depth to ground water levels in (mbgl)		Fluctuation in water level during Jan-21 w.r.to Jan-20 (m)
		Normal Rainfall (up to Jan-21)	Actual Rainfall (up to Jan-21)	% Dev	Jan-20	Jan-21	
1	ADILABAD	1144.8	977	-15	6.93	7.12	-0.19
2	BHADRADRI	1030.9	1762.3	71	8.17	6.87	1.30
3	BHUPALPALLY	1038.3	1605	55	10.67	10.70	-0.03
4	HYDERABAD	719.1	1260	75	7.68	5.11	2.57
5	JAGITYAL	981.9	1047.4	7	4.96	4.31	0.65
6	JANGAON	805.9	1369.2	70	8.15	5.13	3.02
7	JOGULAMBA(GADWAL)	502.1	1068.5	113	8.16	5.87	2.29
8	KAMAREDDY	985.8	1196.7	21	10.69	9.65	1.04
9	KARIMNAGAR	842.5	1391.9	65	6.24	6.27	-0.03
10	KHAMMAM	948.7	1298	37	4.93	3.83	1.10
11	KUMURAM BHEEM	1145.5	1142.8	-0.2	6.94	6.94	0.00
12	MAHABUBABAD	928.9	1517.4	63	6.24	4.08	2.16
13	MAHABUBNAGAR	590.9	1144.1	94	12.00	6.92	5.08
14	MANCHERIAL	11041.0	1178	7	4.85	5.32	-0.47
15	MEDAK	867.4	1243.8	43	18.34	11.48	6.86
16	MEDCHAL	711.0	1185.4	67	10.48	6.82	3.66
17	MULUGU	1217.1	2054.2	69	6.81	6.72	0.09
18	NAGARKURNOOL	604.5	1017.5	68	9.55	5.04	4.51
19	NALGONDA	660.1	863.4	31	9.77	5.93	3.84
20	NARAYANPET	534.5	1162	117	9.87	5.22	4.65
21	NIRMAL	1086.0	908.3	-16	7.55	7.92	-0.37
22	NIZAMABAD	999.7	982.8	-2	8.91	9.42	-0.51
23	PEDDAPALLY	1008.9	1296.5	28	6.99	6.88	0.11
24	RANGAREDDY	640.3	1144	79	14.67	6.51	8.16
25	SANGAREDDY	838.0	1149.1	37	18.77	11.16	7.61
26	SIDDIPET	728.7	1454.5	100	12.24	8.16	4.08
27	SIRCILLA	860.5	1306.4	52	8.18	6.30	1.88
28	SURYAPET	786.2	962.6	22	5.99	4.88	1.11
29	VIKARABAD	759.5	1149.6	51	14.10	9.37	4.73
30	WANAPARTHY	544.7	1270.9	133	4.39	2.69	1.70
31	WARANGAL (R)	968.7	1730.6	79	5.05	4.58	0.47
32	WARANGAL (U)	832.3	1684.2	102	5.05	3.73	1.32
33	YADADRI	701.7	1040.9	48	9.80	5.71	4.09
	TELANGANA STATE	852.2	1259.7	48	8.88	6.56	2.32

Source: Ground water department, Govt. Telangana

ASPECTS TO BE CONSIDERED BY CONCERNED LINE DEPARTMENTS WHILE PREPARING ACTION PLANS FOR URBAN SLUMS

Cool Roofs to Provide Affordable Thermal Comfort: Urban residents living in slums have fewer options available to adapt to rising temperatures. This increases their vulnerability to heat and results in greater adverse impacts of extreme heat on these communities. Telangana state has developed a draft Cool roof policy which is attached in the annex 2.

Higher Exposure to Extreme Heat: Slum residents are more likely to be exposed to heat since they work primarily outside or in unventilated conditions, they live in homes constructed of heat-trapping materials with tin or tarpaulin roofs, and their communities lack trees and shade

Greater Susceptibility to Health Effects of Extreme Heat: Lack of access to clean water, poor sanitation, over-crowding, malnutrition, and a high prevalence of undiagnosed/untreated chronic medical conditions due to poor access to healthcare heighten slum community members' susceptibility to extreme heat's effects on health.

Available Adaptation Options : Slum residents lack control over their home and work environments, with limited access to (and inability to afford) reliable electricity and cooling methods like fans, air coolers and air conditioning, insufficient access to cooling spaces, and a dearth of health information on which to act. All these factors reduce slum residents opportunities to adapt to increasing temperatures.

Livestock preparedness during hot weather: Extreme heat causes significant stress to livestock. There is a need to plan well for reducing the impacts of high temperatures on livestock. Keeping an eye on the weather forecasts, and developing a mitigation plan for high to extreme temperature can be effective in ensuring that the livestock has sufficient shade and water on hot days.

Note:

Acclimatization: Those who come from a cooler climate to a hotter climate, especially during the heatwave season, are at risk. They should be advised not to move out in open for a period of one week. This helps the body get acclimatized to heat. They should also be advised to drink plenty of water. Acclimatization is achieved by gradual exposure to the hot environment during a heatwave season.

Identification of Heatwave related illnesses and recordings of casualties: It is important to undertake an objective identification of heat wave illnesses and systematically record causalities resulting from heat wave. States may form committees at the district level with members not below the rank of Assistant Civil Surgeon, Tahsildar, and Inspector of Police to enquire into the deaths due to heat strokes/ heat waves for correct reporting. In order to do so, the following four factors need to be taken into account:

- Recorded maximum temperature during the particular time period and place.
- Recording incidents, witnesses, evidence or verbal- autopsy.
- Post-mortem/medical check-up report with causes.
- Local authority or Local body enquiry/verification report.
- Cases of heat exhaustion and heat stroke should be reported.

IEC MATERIALS

COVID – 19 మరియు ఎండతీవ్రత, వడగాలుల సమయంలో పాటించవలసిన జాగ్రత్తలు

చేయవలసినవి/ చేయకూడనివి

స్థానిక వాతావరణం మరియు COVID-19 పరిస్థితులపై సమాచారం మరియు సలహాల కోసం వార్తాపత్రిక చదవండి, రేడియో వినండి లేదా టీవీ చూడండి. తప్పనిసరిగా ఇంట్లోనే ఉండండి.

అత్యవసరమైన పనులకు మాత్రమే బయటకు వెళ్ళండి. బయటకు వెళ్ళిన ప్రతి సారి మాస్క్ మరియు టోపీ ధరించండి.

పనిచేసే స్థలంలో లేదా భోజన ప్రదేశాలలో వ్యక్తుల మధ్య కనీసం 1 నుంచి 1.5 మీటర్ల భౌతిక దూరం ఉండేటట్లు చూడాలి.

ఏ వస్తువునైనా తాకిన తర్వాత, చేతులను సబ్బు మరియు నీటితో శుభ్రంగా కడుక్కోవాలి, అవి లేనప్పుడు, హ్యాండ్ శానిటైజర్ తప్పనిసరిగా వాడాలి.

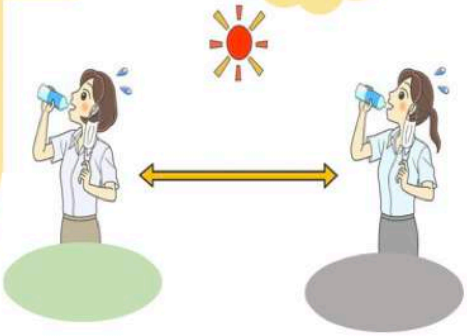
ఇంట్లో ఉన్న ప్రతి ఒక్కరూ వేరువేరు టవల్స్ వాడాలి, అవి తరచుగా శుభ్రపరుచుకోవాలి.

పని ప్రదేశాలలో ఎవరిని ముట్టుకోకూడదు

పని పూర్తయిన తర్వాత ఇంటికి వెళ్ళి స్నానము చేసి, దుస్తులను వెంటనే శుభ్రపరుచుకోవాలి

పని ప్రదేశాలలో మీకు కేటాయించిన వస్తువులను మాత్రమే వాడండి. మీరు వాడిన వాటిని ఇతరుల వస్తువులతో కలపకండి.

పని ప్రదేశాలలో పొగాకు తాగడం, తంబాకు నమలడం, మరియు ఉమ్మివేయడం చేయకూడదు.



ఎవరికైనా ఆరోగ్య సంబంధ ఇబ్బందులు ఉంటే వెంటనే తదితర అధికారికి తెలపాలి.

DOs

DON'Ts

Image references
Statics.vecteezy.com
Pinrest.com
Dreamstime.com
Creative market. com

LINKS FOR INFORMATION EDUCATION AND COMMUNICATION (IEC) MATERIALS

Print Ads (Hindi)
https://drive.google.com/drive/folders/1QdT7Bg9Zp3YJzhWn3_G2ktxj0ih2VE0h?usp=sharing

Print Ads (English)
https://drive.google.com/drive/folders/14L4olisrH5f1_PUaFl7VfsiTE9Z99OEm?usp=sharing

Social Media
https://drive.google.com/drive/folders/1gjyf9ax-nJ-r6ViUlbw86ULObKgdmFxs?usp=sharing

YouTube playlist (English)
https://youtube.com/playlist?list=PLOuQBh7LWB0jkqsur5Ce2xLjZwXXl7mTr

YouTube playlist (Hindi)
https://youtube.com/playlist?list=PLOuQBh7LWB0jlLuA3YvSuCoX16bmYveuP

Heat Wave TVCs films
https://drive.google.com/drive/folders/1PxyE74rcQIDshmaYHtOpE-Lqez-6Q7iF?usp=sharing

Lightning TVCs film-
https://drive.google.com/drive/folders/1ucxl9bLWW3BdDvXTwPlWgG-3AT9itFys?usp=sharing

How to open Heat Wave TVCs

Click on link -> New videos (2020) -> English (10 videos)
Click on link -> New videos (2020) -> Hindi (10 videos)
Click on link -> Old videos (2017) -> English (10 videos)
Click on link -> Old videos (2017) -> Hindi (10 videos)

How to open Thunderstorm and lightning TVCs

Click on link -> Animation (latest) -> 2 videos
Click on link -> New -> English (5 videos)
Click on link -> New -> Hindi (5 videos)


HEAT WAVE
CAN BE FATAL!
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water) lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella.
• Keep animals in shade and give them plenty of water to drink.
• Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.
HEAT WAVE


PROTECT
YOUR ANIMALS
FROM HEAT WAVE
PRECAUTIONS FOR PETS DURING HEAT WAVE
• If possible, bring your pets inside when it is very hot.
• If they can't be left inside, make sure there are some sheltered shady spots in the garden where your pet can rest. Check there will be shade at all times of day, as that will change depending on the position of the sun.
• Don't leave pets in closed garden sheds or garages, as these can heat up very quickly on a hot day.
• Make sure your pets have plenty of clean, fresh water to drink and that it is not placed in the sun. Putting ice blocks in your pet's water during the day will help keep it cool.
• Consider having two drinking bowls in case one runs out of water or gets knocked over.
• Don't leave your pet's food outside in the heat. If your pet does not eat its food when first given, bring it inside and put in the fridge until later.
• If you have a dog, avoid walking it in the heat. Take it for a walk in the early morning or evening when it is cooler.
• Don't let your dog walk on hot surfaces (pavements, bitumen roads, hot sand), as their paws are sensitive and can get burnt.
• Never leave pets alone in a car in any circumstance, even if the windows are partly open.
HEAT WAVE


Are you prepared for the
HEAT WAVE?
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water) lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella.
• Keep animals in shade and give them plenty of water to drink.
• Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.
HEAT WAVE


AVOID
STRENUOUS
ACTIVITIES
WHEN OUTSIDE
IN THE AFTERNOON
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water) lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella.
• Keep animals in shade and give them plenty of water to drink.
• Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.
HEAT WAVE

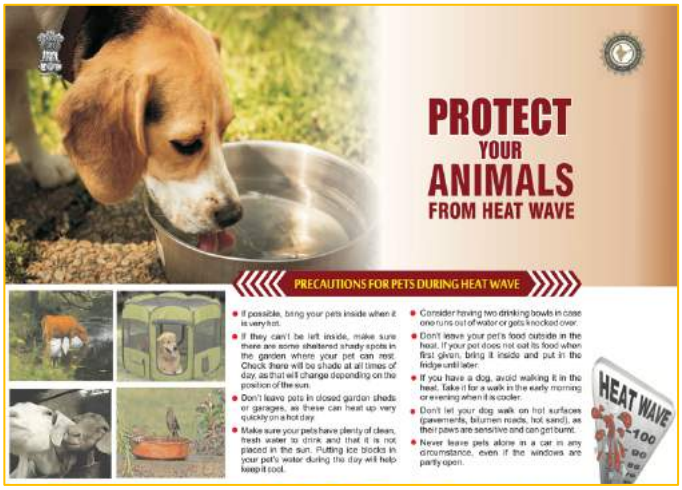

AVOID
GOING OUT IN THE
SUN
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water) lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella.
• Keep animals in shade and give them plenty of water to drink.
• Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.
HEAT WAVE


AVOID
GOING OUT IN THE
SUN
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water) lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella.
• Keep animals in shade and give them plenty of water to drink.
• Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.
HEAT WAVE


WORKING OUTDOORS IN
HEAT WAVE?
TAKE THE FOLLOWING PRECAUTIONS
• Listen to Radio; watch TV; read Newspaper for local weather news.
• Drink sufficient water - even if not thirsty.
• Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated.
• Wear lightweight, light-coloured, loose, cotton clothes.
• Cover your head: Use a cloth, hat or umbrella
• Do not go out barefoot
• Do not go out barefoot
• Use hand fans to give yourself an air of relief every now and then.
• Take small breaks to catch up on some rest.
• Take refuge under a tree/shade.Use hand fans to give yourself an air of relief every now and then.
HEAT WAVE


LET THEM NOT
SWEAT
FOR THE WRONG
REASONS
HOW TO PROTECT CHILDREN FROM HEAT WAVE
Children Should:
• Always carry a bottle of water. Drink lemon water/ buttermilk/ coconut water/ fresh fruit juice regularly.
• Wear light coloured, lightweight, loose cotton clothes.
• Cover their heads when out in the sun with a cap and an umbrella.
• Avoid junk food during summer. Go for fresh fruits, salads and home-cooked meals.
• Stay out of direct sunlight, especially during peak hours from 12 noon to 4 p.m. Play outdoor games in the evenings.
• Take the child to a doctor if he/she complains of dizziness, nausea, constant headache, chest pain and breathing problems.
HEAT WAVE


CARE
FOR THE OLD & FRAIL
IN THE RISING HEAT
TAKE THE FOLLOWING PRECAUTIONS
• Check on them twice a day during extreme heat, especially if he/she lives alone.
• Make sure they have access to a phone.
• If they seem to be suffering from heat stress, cool them down.
• Use cool baths, showers, or place wet towels on their neck and underarms.
• Call a doctor or an ambulance after taking steps to cool them down.
• Encourage them to keep a bottle of water with them at all times.
HEAT WAVE


PROTECT
YOUR
ANIMALS
FROM HEAT WAVE
PRECAUTIONS FOR PETS DURING HEAT WAVE
• If possible, bring your pets inside when it is very hot.
• If they can't be left inside, make sure there are some sheltered shady spots in the garden where your pet can rest. Check there will be shade at all times of day, as that will change depending on the position of the sun.
• Don't leave pets in closed garden sheds or garages, as these can heat up very quickly on a hot day.
• Make sure your pets have plenty of clean, fresh water to drink and that it is not placed in the sun. Putting ice blocks in your pet's water during the day will help keep it cool.
• Consider having two drinking bowls in case one runs out of water or gets knocked over.
• Don't leave your pet's food outside in the heat. If your pet does not eat its food when first given, bring it inside and put in the fridge until later.
• If you have a dog, avoid walking it in the heat. Take it for a walk in the early morning or evening when it is cooler.
• Don't let your dog walk on hot surfaces (pavements, bitumen roads, hot sand), as their paws are sensitive and can get burnt.
• Never leave pets alone in a car in any circumstance, even if the windows are partly open.
HEAT WAVE

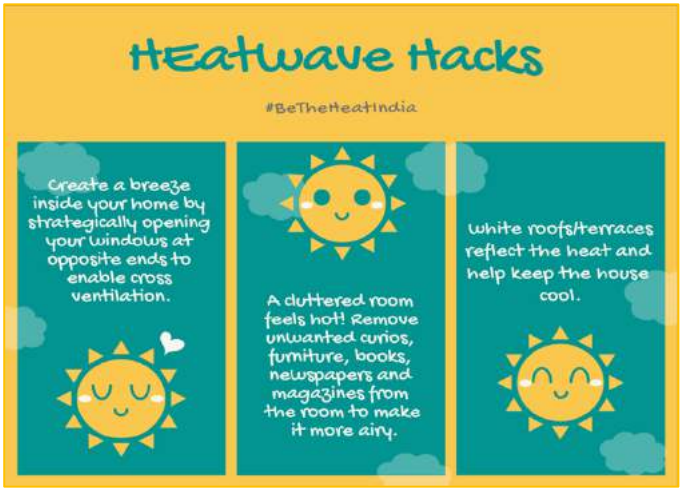

PROTECT
YOUR CHILDREN
FROM THE
HEATWAVE
PRECAUTIONS FOR CHILDREN
Children Should:
• Always carry a bottle of water. Drink lemon water/ buttermilk/ coconut water/ fresh fruit juice regularly.
• Wear light coloured, lightweight, loose cotton clothes.
• Cover their heads when out in the sun with a cap and an umbrella.
• Avoid junk food during summer. Go for fresh fruits, salads and home-cooked meals.
• Stay out of direct sunlight, especially during peak hours from 12 noon to 4 p.m. Play outdoor games in the evenings.
• Take the child to a doctor if he/she complains of dizziness, nausea, constant headache, chest pain and breathing problems.
HEAT WAVE


PROTECT
YOUR INFANTS
FROM THE
HEAT WAVE
TAKE THE FOLLOWING PRECAUTIONS
• Do not leave kids unsupervised in parked cars. Vehicles can rapidly heat up to dangerous temperatures.
• Give them plenty of fluids to drink. Learn how to identify heat-related illnesses in infants.
• Check on the child for concentrated (dark-coloured) urine, which can indicate dehydration.
HEAT WAVE


#BeatTheHeatIndia
Do not go
out barefoot


#BeatTheHeatIndia
Avoid cooking
during
peak hours


°C
°F
120
100
#BeatTheHeatIndia
Avoid going out
in the sun, especially
between 12.00 noon
and 3.00 p.m.


Heatwave Hacks
#BeTheHeatIndia
Create a breeze inside your home by strategically opening your windows at opposite ends to enable cross ventilation.
A cluttered room feels hot! Remove unwanted curios, furniture, books, newspapers and magazines from the room to make it more airy.
White roofs/terraces reflect the heat and help keep the house cool.

GOVERNMENT OF TELANGANA

HEATWAVE ACTION PLAN 2021

REVENUE (DISASTER MANAGEMENT) DEPARTMENT

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unicef
for every child