



WEBINAR PROCEEDINGS

HEATWAVE EARLY WARNING AND HEAT ACTION PLANS IN SOUTH ASIA

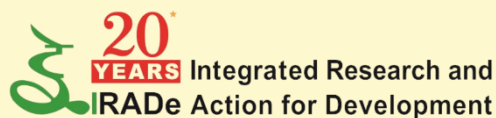
ORGANISED BY

South Asian Meteorological Association (SAMA)

South Asia Heat Health Network (SAHHIN)

Integrated Research and Action for Development (IRADe)

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This publication can be cited as:

IRADe, SAMA, SAHHIN (2024). *Webinar Summary: Heatwave Early Warning and Heat Action Plans in South Asia.*

This document is an outcome of the webinar on “Heatwave Early Warning and Heat Action Plans in South Asia,” held on 09th May 2024. The webinar was co-organised by the South Asian Meteorological Association (SAMA), the South Asian Heat Health Information Network (SAHHIN), and Integrated Research and Action for Development (IRADe).

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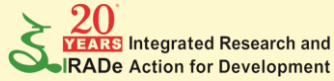
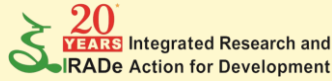


TABLE OF CONTENTS

S. No.	Title	Page No.
01	Background	03
02	Executive Summary	04
03	Inaugural Session	06
04	Setting The Context	07
05	Session – 1: Early Warning Systems in South Asia	08
06	Session – 2: Heat Action Plans in South Asia	14
07	Way Forward	21





I. BACKGROUND

The escalating frequency and intensity of heat waves in South Asia pose a substantial threat to both human well-being and economic stability. These extreme weather events not only exacerbate health issues such as heatstroke and dehydration but also strain healthcare systems and infrastructure. Moreover, the economic repercussions of heatwaves are profound, particularly in countries with limited resources, where livelihoods dependent on agriculture and outdoor labour are disproportionately affected.

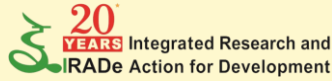
In response to this growing challenge, governments across South Asia have intensified their efforts to enhance preparedness and resilience to heat waves. These initiatives encompass various strategies, including the development of early warning systems, the establishment of heat emergency response plans, and the implementation of public awareness campaigns. Additionally, there is a concerted focus on improving infrastructure resilience, such as the provision of cooling centres and access to potable water during heatwave events.

Despite these proactive measures, the uneven distribution of resources and vulnerabilities within and among countries underscores the need for continued collaboration and support at regional and international levels. Strengthening partnerships for data sharing, technology transfer, and capacity building can further enhance the effectiveness of heatwave management efforts in South Asia. Additionally, investing in research and innovation to better understand the complex dynamics of heatwaves and their impacts can inform evidence-based policies and interventions aimed at mitigating future risks.

In conclusion, addressing the challenges posed by heatwaves in South Asia requires a comprehensive and coordinated approach that integrates scientific knowledge, policy frameworks, and community engagement. By prioritising resilience-building measures and fostering collaboration, the region can better adapt to the changing climate and protect the well-being of its populations.

South Asia is one of the most vulnerable regions to the impact of heatwaves, and there has been a significant rise in their occurrence. Heatwaves impact not only human health but also have significant economic effects, which are unevenly distributed, with poorer countries being more severely impacted. Several proactive efforts have been undertaken by the respective governments of these countries to enhance preparedness for heatwave management.





II. EXECUTIVE SUMMARY

The webinar on “**Heatwave Early Warning and Heat Action Plans in South Asia,**” co-organised by Integrated Research and Action for Development (IRADe), the South Asian Heat Health Information Network (SAHHIN), and the South Asian Meteorological Association (SAMA), brought together experts, practitioners, disaster managers, and policymakers to enhance heat stress management across the South Asian region. The escalating frequency and intensity of heat waves in South Asia pose significant threats to human health, economic stability, and infrastructure. These extreme weather events exacerbate health issues such as heatstroke and dehydration, particularly impacting vulnerable populations and countries with limited resources.

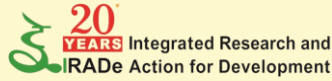
In response, governments across the region have intensified efforts to enhance preparedness and resilience to heatwaves. Proactive measures have been undertaken to improve prevention, preparedness, and mitigation for heatwave management. These efforts include developing early warning systems, heat emergency response plans, and public awareness campaigns. Infrastructure resilience, such as cooling centres and access to potable water, is also being enhanced.

The uneven distribution of resources and vulnerabilities within and among countries underscores the need for continued collaboration at regional and international levels. Strengthening partnerships for data sharing, technology transfer, and capacity building can enhance the effectiveness of heatwave management efforts. Investment in research and innovation is crucial for better understanding the complex and dynamic issues of heatwaves and their impacts. Evidence-based policies and interventions informed by scientific knowledge can help mitigate future risks and improve resilience to heat waves.

There is growing recognition of the need for impact-based warnings to address the multifaceted impacts of heat waves. Collaboration between meteorological experts and sector specialists is essential to develop tailored strategies for different sectors, such as agriculture, water, energy, and health. Organising training programmes and knowledge exchange initiatives can enhance the capacity of South Asian countries to develop and implement effective heatwave management strategies. The Indian Meteorological Department's (IMD) initiative to develop impact-based warnings can serve as a model for regional collaboration and capacity building.

Ongoing collaboration and refinement of early warning systems are essential for their effectiveness. Platforms like the South Asian Meteorological Association (SAMA) play a crucial role in facilitating knowledge exchange and fostering collaboration among South Asian countries. In the long run, addressing the challenges posed by heatwaves in South Asia requires a comprehensive and coordinated approach that integrates scientific knowledge, policy frameworks, and community engagement.





Session 1, titled "Early Warning Systems in South Asia," featured a lead presentation by Dr S. C. Bhan, Former Scientist "G" at the Indian Meteorological Department (IMD). Dr Bhan's presentation set the stage for subsequent country presentations, where representatives from Afghanistan, Bangladesh, Myanmar, Nepal, Pakistan, and Sri Lanka shared their respective experiences and strategies in developing and implementing early warning systems for heatwaves. These presentations highlighted the diverse approaches and challenges faced by each country, emphasising the importance of tailored solutions and regional cooperation in enhancing heatwave preparedness and resilience across South Asia.

Session 2 focused on "Heat Action Plans in South Asia," with Mr Rohit Magotra, Deputy Director of IRADe, discussing IRADe's work in developing climate-adaptive and gender-sensitive heat action plans at the ward level for various South Asian cities like Rajkot, Bhubaneswar, and Delhi. He emphasised the severe impacts of extreme heatwave events on human lives, livelihoods, productivity, health, vulnerable groups, biodiversity, and ecology. He also highlighted the benefits of a more targeted and focused approach addressing the most vulnerable groups, demonstrating how these plans can be tailored to effectively address the unique needs of each community, thereby enhancing resilience and preparedness against heat waves.

In the panel discussions, Mr Sarder Shafiqul Alam, Consultant and Trainer of Trainers for LGED, Government of Bangladesh, shared the work done by IRADe in collaboration with the International Centre for Climate Change and Development (ICCCAD) for Rajshahi city where they prepared thermal hotspot mappings, captured location-specific vulnerability through vulnerability mapping and developed the heat action plan for Rajshahi city. Dr Aditi Kapoor, Former Technical Advisor of Red Cross Red Crescent Climate Centre and Co-founder of Alternative Futures, emphasised considering the differential vulnerabilities of intra-city, inter-generational, and intra-generational groups at a very early stage to mitigate the effects of heatwaves on vulnerable societies. Ms Aarti Nain, Advisor for Urban Cooling and Heat Risk Mitigation, United Nations Environment Programme (UNEP), stressed the importance of building design and construction materials for heat resilience, noting that heat resilience techniques can be applied in urban planning through various practices and guidelines. Ms Devika Shisheer Panse, Consultant, South Asia Region Climate Change and Disaster Risk Management, The World Bank, mentioned the integrated approach in planning, building active and passive cooling systems, urban design solutions, early preparedness, and exploring financing sources.

The webinar concluded with remarks from Dr Someshwar Das, Secretary of SAMA, who highlighted the importance of early warning systems for heatwaves and the necessity of communicating these warnings to the public to enhance safety, mitigation, and resilience. He emphasised the need for widespread public awareness, pointing out that South Asia is particularly vulnerable to heatwaves.





III. INAUGURAL SESSION

Prof Jyoti Parikh, Executive Director, IRADe

Prof Jyoti Parikh inaugurated the session by discussing IRADe's current development of gender-sensitive ward-level heat action plans. These plans are being implemented in several cities, including Delhi, Bhubaneswar, Surat and Rajkot in India; Rajshahi in Bangladesh; and Colombo in Sri Lanka. She also highlighted work undertaken for IRC Canada and the Ministry of Earth Sciences, South Asia Heat, aimed at enhancing the effectiveness of early heat warning systems in India. Prof. Parikh emphasised that early warning can significantly impact saving lives and infrastructure and preventing climate change from escalating into a disaster. She noted that hazards only become disasters when there is a lack of preparedness and insufficient infrastructure.

Concluding her speech, she stressed the necessity of continuously building new infrastructure, both in terms of services and facilities, to enable people to promptly cope with climate-related challenges. She expressed her hope that collaborative efforts, such as those facilitated by SAMA, would yield positive outcomes for the region's sizable and predominantly low-income population by providing essential services in advance to mitigate risks. She acknowledged that while the seminar offers a platform for discussion, ongoing collaboration and refinement of early warning systems are crucial for their effectiveness. The team's focus is on improving these systems at the ward level and in various contexts. Prof. Parikh hopes that the initiatives discussed at the seminar will not be limited to the event but will continue to evolve and expand, offering diverse perspectives and policy options for addressing climate-related challenges.

“Hazards only become disasters when there is a lack of preparedness and insufficient infrastructure.”





IV. SETTING THE CONTEXT

Prof Ajit Tyagi, President, SAMA

Prof Ajit Tyagi stated that joint efforts in early warning and management can mitigate hazards and prevent their escalation into disasters. Past events, such as the devastating heatwaves in Europe in 2003, which resulted in over 70,000 deaths, and significant casualties in our own and neighbouring countries, underscore the urgency of action. In 2015, around 2,000 deaths occurred in Karachi, and regions like Odisha, and Andhra Pradesh in India also suffered thousands of losses.

He emphasised the severity of the situation, as highlighted by newspaper reports and climate data. April 2024 was recorded as the hottest April on record, with the preceding 11 months being the warmest consecutive months. 2023 was the warmest year overall, surpassing the critical 1.5°C limit from the pre-industrial period. This alarming trend necessitates immediate action, particularly in integrating early warning systems and heatwave management.

Further, he remarked on the current situation: severe heatwave conditions are being experienced in Southeast Asia and Eastern Asia, including Myanmar, Bangladesh, and Eastern India, with temperatures soaring as high as 45-47°C in some areas. Wildfires have erupted in Nepal and Uttarakhand, while coral bleaching in Lakshadweep and the Gulf of Mannar is being threatened by heatwaves, with potential impacts extending to Sri Lanka. It is evident that proactive measures are imperative. SAMA, as a knowledge centre, has been instrumental in capacity-building initiatives and facilitating knowledge exchange among South Asian countries. SAMA serves as a bridge between South Asian countries, facilitating the transfer of knowledge and expertise to those lacking necessary capacities.

He expressed hope for the active participation of countries across the region, particularly Bangladesh and Nepal, in advancing early warning systems and heatwave management strategies. Platforms like APN aim to strengthen our network and collective response to heatwave activities in South Asia. Your active involvement in our endeavours is welcomed.

“Knowledge Centre becomes instrumental in capacity-building initiatives and facilitating knowledge exchange among South Asian countries. Active participation can serve as a bridge between South Asian countries, facilitating the transfer of knowledge and expertise.”





V. SESSION 1: EARLY WARNING SYSTEMS IN SOUTH ASIA

Lead Presentation: Dr S C Bhan, Former Scientist G, IMD

Dr SC Bhan discussed heatwave early warning systems and heat action plans in South Asia, highlighting the extensive scope of heat management. The region's unique topographical features make it highly susceptible to various hydro meteorological



hazards, including heat waves. Every aspect of heatwaves is on the rise, with increasing frequency, intensity, geographic spread, and duration. Projections indicate a concerning trend of rising heatwave days, with early onset and a shift towards the beginning of the season.

He mentioned that regional outlooks are coordinated by the Regional Climate Centre in Pune, India, under the World Meteorological Organisation. These consensus outlooks indicate high probabilities of above-average temperatures across many parts of the region and serve as vital tools for planning and preparedness by health authorities and disaster managers.

He stated that in India, the heatwave warning system comprises various components, including seasonal outlooks, extended-range forecasts, short and medium-range forecasts, district-wise warnings, and city-specific thresholds for issuing alerts. These forecasts are disseminated through multiple channels to ensure widespread awareness and preparedness. He also underlined that advancements such as the introduction of heat index forecasts and location-specific forecast systems are continuously enhancing the effectiveness of heatwave management efforts. Overall, the heatwave management system in the region is continuously evolving to address the growing challenges posed by heatwaves and climate change.

“Advancements such as the introduction of heat index forecasts and location-specific forecast systems are continuously enhancing the effectiveness of heatwave management efforts.”

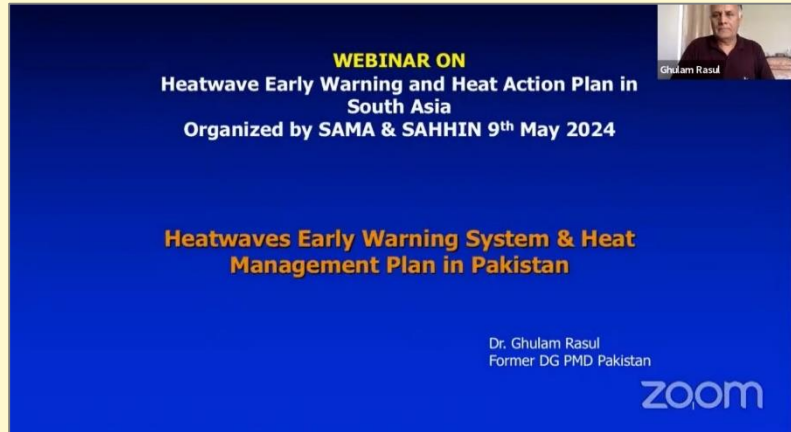




COUNTRY PRESENTATIONS

Pakistan: Dr Ghulam Rasul, Former DGM, Pakistan Met Department

Dr Ghulam Rasul explained that in Pakistan, a heatwave is characterised by a maximum temperature exceeding 45°C for five consecutive days, with considerations for humidity levels and wind speed. Karachi, in particular, faces several contributing factors to heatwaves, such as the formation of low-pressure areas over the Arabian Sea and the discontinuation of sea breeze winds.



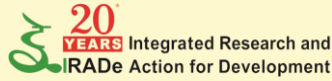
He recalled the severity of the heatwave experienced in Karachi in 2015, which resulted in over 1,200 deaths, primarily due to power outages and water shortages, disproportionately affecting the poor residing in high-rise buildings. In response, various authorities, including the Pakistan Meteorological Department (PMD), undertook initiatives to address these challenges.

He noted that an early warning system was established and has been operational since 2016. This system predicts temperature, wind speed, and humidity three days in advance and issues colour-coded alerts based on temperature thresholds.

He highlighted the importance of collaboration among stakeholders, including national and provincial health authorities, disaster management authorities, media, academia, and local governments, in implementing a comprehensive strategy to mitigate heat waves across urban centres in Pakistan. Public awareness campaigns are being conducted, and efforts are being made to ensure effective dissemination of warning messages through various channels, including media regulatory authorities.

“Collaboration among stakeholders, including national and provincial health authorities, disaster management authorities, media, academia, and local governments, is essential in implementing a comprehensive strategy to mitigate heatwaves across urban centres.”





Myanmar: Dr May Khin Chaw, Director, Department of Meteorology and Hydrology, Myanmar

Dr May Khin Chaw from the Department of Meteorology and Hydrology spoke about several issues raised by climate-related organisations, such as IPCC. IPCC predicts an increase in the intensity, frequency, and duration of heat waves due to further global warming. In 2024, many South Asian countries issued a series of heat alerts due to extreme heat events.



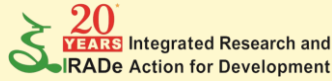
She remarked that on April 20, 2024, a new global record was set with an average temperature of 0.67°C above the April average for 1991 to 2020. In 2010, a record-high temperature of 47.2°C was recorded, leading to challenges such as the drying up of lakes and water shortages.

She highlighted that new maximum daily temperature records have been observed at various locations this year, indicating a trend of increasing temperatures. Climate models project further temperature increases, which could exacerbate the intensity and frequency of heat waves. Efforts are underway to address these challenges, with early warning systems and collaborative endeavours deemed crucial.

She noted that technical knowledge gaps are now being addressed through initiatives aimed at enhancing regional cooperation and capacity building. Currently, our department is actively participating in summer activities and will continue to cooperate in future endeavours, including those of the South Asia Heat Health Information Network.

“Technical knowledge gaps need to be worked upon and cooperative understanding to be established within regions for capacity building and active participation.”





Nepal: Ms Bibhuti Pokharel, Head of Climate Analysis, Department of Hydrology and Meteorology, Nepal

Ms Bibhuti presented certain meteorological factors, such as the prevalence of hot, dry air over a region and the absence of moisture in the upper atmosphere, particularly with cloudless skies and a large amplitude of anticyclonic flow, contribute to heatwaves in Nepal, mainly experienced from April to June, occasionally extending into July. The prediction of heat waves is primarily based on synoptic analysis of various meteorological parameters and consensus guidance from regional and global numerical prediction models like WRF and GFS.



She further explained that the classification of heatwave severity is based on maximum temperatures, with categories ranging from hot days to extreme heatwaves, determined by percentile thresholds and consecutive days of occurrence. Historical records from 2023 indicate increased temperatures, particularly in the Terai region.

She underscored the fact that future projections suggest a rise in extreme temperatures, especially in the eastern Terai region, necessitating preparedness measures. Special weather bulletins and early warning systems are issued through the Meteorological Forecast Division's website to mitigate the impacts of heat waves. The state of climate drivers currently shows ENSO-neutral conditions, while forecasts indicate an increase in maximum temperatures in the coming weeks. Heat early action plans are integral components of city climate adaptation strategies, with coordination among various governmental and non-governmental agencies for effective implementation. General advisories for heatwave emergencies, including the avoidance of sun exposure during peak hours, are issued, along with specific guidelines for vulnerable groups.

She then addressed this issue by citing the Nepalgunj Heat Action Plan for 2023 which outlines target areas, coordination mechanisms, and public awareness campaigns, emphasising the importance of cooling centres and access to drinking water.

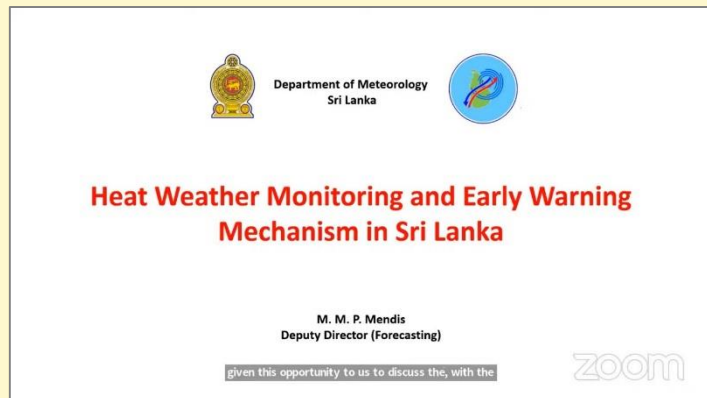
“Heat early action plans are integral components of city climate adaptation strategies, with coordination among various governmental and non-governmental agencies for effective implementation.”





Sri Lanka: Mr MMP Mendis, Deputy Director, Sri Lanka Met Department

Mr Mendis remarked that while there isn't a standardised global mechanism for defining heatwaves, various countries have developed their definitions based on factors such as high-pressure systems, global warming, urban heat island effects, drought, climate variability, geographical conditions, and human activities.



He explained that in the context of Sri Lanka, heatwaves are not as common due to its geographical features and the absence of seasonal high-pressure cells. However, warm weather conditions are experienced from February to May, attributed to weak wind flow, high radiation, dry weather, low humidity, and local wind systems like the Kachan winds. Monitoring efforts involve evaluating meteorological data against established criteria and comfort indices, analysing health threats, and issuing advisories.

He highlighted that the Heat Index and the Universal Thermal Climate Index (UTCI) are two key indices used for this purpose. The Heat Index categorises temperatures into normal, caution, and extreme caution levels, while the UTCI incorporates multiple factors such as air temperature, wind speed, vapour pressure, and solar radiation. Although the process of categorising UTCI values is ongoing, warnings are currently issued based on the Heat Index. Increased temperatures, especially during February, March, and April, have been observed through monitoring efforts.

He cited that warnings are disseminated through various channels such as the website, Facebook page, email, and collaboration with disaster management authorities. Additionally, tailored advisories are provided for different sectors like schools and outdoor workers.

He emphasised that to minimise risks associated with heatwaves, collaborative research is needed to identify effective factors and develop warning criteria. Efforts aim to establish temperature thresholds associated with adverse health outcomes and implement eco-friendly solutions while raising public awareness about coping strategies.

“To minimise risks associated with heatwaves, collaborative research is needed to identify effective factors and develop warning criteria.”





Bangladesh: Dr Md. Abdul Mannan, Bangladesh Met Department

Dr Md. Abdul Mannan explained that in Bangladesh, the monsoon is considered the most vulnerable season, and the distribution of average temperatures, especially maximum temperatures, indicates that the western to central parts of the country are highly susceptible to high temperatures and heatwave conditions. From 2014 to 2021, there has been a consistent observation of numerous hot days, particularly in the western and central regions, with occasional years experiencing more severe conditions than others.

He remarked that the high moisture content over Bangladesh, coupled with anticyclonic flow from the Bay of Bengal, contributes significantly to discomfort among the population, especially in the central to southern parts of the country. Existing definitions often consider temperature values above the 99th percentile and consecutive occurrences lasting for more than three days as indicative of severe heat conditions. He underscored that the observational facilities across Bangladesh, comprising 61 surface observatories, provide temperature records, particularly maximum temperatures.

Analysis reveals that in recent years, a significant number of stations have recorded high-temperature conditions, particularly in the western regions. However, narrow bands of such conditions may not cause significant discomfort, as they often dissipate within a few days. The south-eastern parts of Bangladesh, traditionally less susceptible, have experienced an increase in heatwave occurrences in recent years, extending even to eastern regions. Temperature records from 2024 show a notable increase, particularly from March onwards, surpassing previous highs. Despite claims of 2024 being the most discomforting year, historical analysis reveals that 1960 witnessed more severe conditions, indicating a trend of increasing heatwave occurrences in Bangladesh. Temperature records from key stations such as Kula in the south corroborate this trend, with 2024 marking unprecedented highs.

He addressed the consecutive occurrence of heatwave events in recent years, underscoring the escalating nature of heatwave impacts in Bangladesh. Climate projections indicate a further increase in the frequency and intensity of heatwave events, particularly in western and south-western regions, with north-eastern and south-eastern areas also at risk in the future.

“To mitigate the risks associated with heatwaves, comprehensive studies on their impacts are necessary, including understanding their spatial and temporal distribution. Climate models project an alarming increase in heatwave risks by 2030 and beyond, necessitating urgent measures to adapt and mitigate their adverse effects on the population.”





VI. SESSION 2- HEAT ACTION PLANS IN SOUTH ASIA

Lead presentation: Mr Rohit Magotra, Deputy Director, IRADe

In his presentation, Mr Magotra emphasised and presented IRADe's work in developing climate-adaptive and gender-sensitive heat action plans at the ward level for various South Asian cities: Rajkot, Bhubaneswar, and Delhi. He also highlighted various other tasks undertaken by IRADe, such as developing training manuals, conducting vulnerability assessments, undertaking health impact studies, and identifying and mapping Urban Heat Islands. Additionally, he focused on engaging with municipal corporations, particularly in cities, to develop climate-adaptive heat action plans, engaging with the IMD and DMA, and other partner agencies, including the Indian Institute of Public Health, Gandhinagar, and the Institute of Public Health, Bhubaneswar. He further emphasised the tremendous amount of research concerning understanding the impacts of heat on people, particularly on their health, livelihoods, and productivity. He also addressed capacity-building gaps within municipal corporations and associated departments responsible for implementing heat action plans, particularly within the medical community, and highlighted the importance of bringing evidence for climate change and rising temperatures in cities and identifying the factors driving vulnerability.

The first thing he stressed was reviewing the existing heat action work in South Asia. The South Asia Heat Health Initiative (SAHHIN) is a multistakeholder engaged in building a Heat-Resilient South Asia, established in 2020 by IRADe. It is supported by the International Development Research Centre (IDRC) and the Asia Pacific Adaptation Network (APN) and is a complementary network of the Global Heat Health Information Network (GHHIN).

He emphasised that according to findings, 2023 was the warmest year, to be followed by 2024; not only the land and air, but the oceans are also warming faster than ever. The Indian Ocean is moving towards a state of near-permanent marine heatwaves, with 2020-250 days of heatwaves projected in a year until 2050 (Future Projections for the Tropical Indian Ocean, 2024). South Asia is the most vulnerable region globally to the impact of heatwaves due to its high exposure to warm climates. He further pointed out that the rising global temperatures would cause a high rise in the heat index, a combination of humidity and temperature, severely affecting coastal areas. Several parts of South Asia are already reporting heatwaves.

In his presentation, Mr Magotra mentioned some extreme heatwave events that have had a severe impact on human lives and health. For example, the heatwave in Moscow, Russia, in 2010 killed 55,736 people; the European heatwave in 2003 had a death toll of more than 70,000 with a Wet Bulb Temperature of around 28°C; in Ahmedabad, India, in 2010, 1,344 additional deaths were registered in the city throughout May; in Karachi, Pakistan, in 2018, 65 people died in just three days; in Jacobabad, Pakistan, in 2021, the world's hottest city hit 52°C; in Lytton, Canada, in 2021, the temperature hit 49.6°C, where the average maximum temperature is 24°C during June (Village on Fire); in California, USA, in 2021, 350 homes were destroyed, and more than 17,000 structures were threatened.





He further stressed the impact of global warming, highlighting that sea warming is killing sea life and affecting ecosystems. This not only results in the loss of marine life but also impacts the livelihoods of people dependent on marine resources such as seaweed, fish, and oysters. To illustrate, he mentioned that during the Canada Heatwave in 2021, an estimated 1 billion creatures were killed, and in the Pacific Northwest Heatwave of 2021, 10,000 fish died in rivers and lakes. Additionally, extreme heatwaves lead to crop yield loss. For example, during the Egypt Heatwave in 2021, for every 1-degree increase in temperature, the yields of wheat, soybean, mustard, groundnut, and potato are expected to decline by 3-7% (Indian Council of Agricultural Research, 2023).

He also emphasised that by 2030, lost labour due to rising heat and humidity could risk up to 4.5% of India's GDP (World Bank, 2022). Other losses may include biodiversity loss, crop failure, droughts, water supply shortages, impacts on agriculture, and labour, among others.

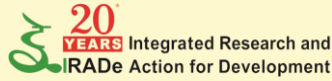
Heat Action Plans (HAP)

In his presentation, he emphasised the application of HAP, which is a critical adaptation measure to manage growing heat stress. He further stressed that HAP provides a framework for implementing, coordinating, and evaluating extreme heat response to reduce the negative impact of extreme heat. It also facilitates early warning and coordination with emergency response systems. Additionally, he highlighted that heatwaves are a relative phenomenon, representing a deviation from average temperatures. When a state announces heatwave conditions, various alert mechanisms and early warning systems are issued based on which actions should be taken.

He further mentioned that in India, heatwaves have increased in nine states from 2015 to 2019, based on data from IMD and the NDM, while the number of heatwave days has increased in the last three years. There has been a rise in both frequency and intensity, making these action plans critical to reduce and minimise the impact of heat waves. In India, 21 states, over 200 districts, and more than 20 cities have developed heat Action Plans. City-level heat action plans/emergency action protocols in South Asia are implemented in Karachi (Pakistan), Nepalgunj (Nepal), Dhaka, Rajshahi (Bangladesh), Colombo, and Male (Maldives). While the existing action plan has a comprehensive framework, it lacks focus on the spatial ability to identify heat islands and vulnerable groups. Thus, the emphasis has mainly been on the climate adaptiveness feature of heat action plans, addressing these gaps and developing a framework for climate-adaptive, gender-sensitive, and targeted heat action plans for vulnerable communities.

There are numerous benefits of heat action plans: they reduce economic losses, improve preparedness, and provide localised solutions for protecting the urban poor, women, and other vulnerable groups. The primary reason these action plans are necessary is because they reduce mortality associated with heat-related conditions.





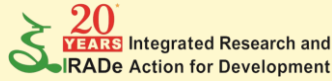
He explained what the climate action plan entails. Firstly, it's crucial to understand your city, areas, or ward slum pockets. Hence, it's essential to comprehend the geography and climatology; temperatures are rising, with cities experiencing an increase of around 1 to 1.5 degrees during the summer season. Over the years, this rise has been significant, particularly in light of the increasing heat and varying humidity levels. These factors set the foundation to understand the need for concrete efforts given the escalating impact of climate change on heat waves.

Moving forward to Urban Heat Island Mapping, certain pockets are hotter due to factors such as geography, land use patterns, and energy consumption. Prioritising these areas is essential rather than adopting a one-size-fits-all approach to addressing heat.

Next, we will focus on vulnerability mapping, which should include identifying vulnerable areas and groups with a targeted approach and methodology. These maps are crucial for understanding the specific vulnerabilities of the index city and the factors contributing to vulnerability. We have documented a step-by-step process to develop a heat action plan, including identifying thresholds, engaging with stakeholders, defining necessary strategies and actions before the summer period, establishing early warning and preparedness mechanisms, and engaging with the Health and Transport Departments. Such measures will be instrumental in reducing vulnerability.

He concluded that heat action plans have gained significant traction within South Asia. It's crucial to be prepared for the future as the climate is changing, leading to an increase in reported cases in cities. Therefore, a more targeted and focused approach to preparedness, along with mitigation strategies, is needed.





PANEL DISCUSSION

Mr Sarder Shafiqul Alam, Consultant and Trainer of Trainers for LGED, Govt. of Bangladesh

Mr Sarder Shafiqul Alam highlighted that Rajshahi city is the most affected by the heatwave. He emphasised the importance of preparing a fact sheet on the city, which includes its location, demography, economic factors, and infrastructure services such as water



supply, housing, sanitation, and health facilities. Additionally, they conducted a climate change analysis using previous data and made projections on maximum, average, and minimum temperatures, as well as average rainfall and humidity.

He noted that from 2023 to 2024, the heat impact in Bangladesh is escalating from moderate to severe. He advocated for collecting world maps and identifying the most vulnerable groups, particularly slum dwellers. Selected individuals underwent household surveys and in-depth interviews on city development, stakeholder involvement at the city authority level, and engagement with non-governmental organisations (NGOs). Following the household surveys, he stressed the importance of developing a partnership agreement with the city-level authority to establish a heat action plan, followed by engagement in a consultation workshop. Additionally, he mentioned the publication of a press release on the findings of the workshop. They also contributed to the training manual with IRADe to align it with the Bangladesh context.

He highlighted water supply, health, biodiversity, and solid waste management in Rajshahi as the four significant sectors impacted by heat. The City Corporation implemented several projects in mass plantation to address greenhouse gas emissions, solar street lighting, and efficient waste and garbage management. Instead of calling them heat action plans, the city has various activities. He further concluded that the city faces frequent annual increases in maximum and minimum temperatures. Extreme heat affects livelihoods, productivity, income levels, and outdoor workers, leading to a rise in morbidity and mortality, particularly among older people, children, and women.

To develop city preparedness for managing heat waves, there is a need to prepare thermal hotspot mappings, location-specific vulnerability mapping, capacity-building mitigation adaptation strategies, and a gender-inclusive framework for heat action plans. Training for capacity and disaster heat action plans among stakeholders, and community members, and the implementation, monitoring, and evaluation of heat action plans should not only be at the city level but also the national and South Asian regional levels.





Dr Aditi Kapoor, Former Technical Advisor, Red Cross Red Crescent Climate Centre and Co-founder, Alternative Futures

Dr Aditi Kapoor presented a video made by the Indian Red Cross Society, which she also participated in. The video showcased flash mobs organised at airports, markets, and cargo areas, where many people work in the heat. These efforts aimed to raise awareness among individuals to drink more water, eat properly, and cover their heads and bodies with cloth when going outside. Additionally, they encouraged people to avoid going out during the hottest hours of the day, from 12 to 3. The initiative also urged people to share this information with their friends and acquaintances.

She emphasised the importance of creating public awareness as a prerequisite for early warning and action. For instance, in Dhaka, the Red Crescent collaborated with BBC Media Action and a Youth Icon to disseminate messages, especially in the local language. She stressed that raising awareness is crucial to reduce the impact on vulnerable groups. While early warning systems are robust in South Asia, there is a gap in last-mile connectivity, which they are trying to address.

She explained that vulnerabilities can vary within cities. For example, they analysed data from three different areas in Surat and found that home-based workers, who cannot leave work during hot hours due to their wage structures, require specific cooling solutions. Vulnerabilities can also be intergenerational or intragenerational, affecting children, elders, pregnant women, lactating women, and individuals with specific health conditions differently. Pollution exacerbates these vulnerabilities, with ground-level ozone increasing during heatwaves.

She underscored the importance of considering differential vulnerabilities for early action and advocated for a vulnerability framework. This involves working with local organisations to collect data and implementing forecast-based financing to prevent disasters. Ms Kapoor also highlighted examples from Vietnam where awareness campaigns, capacity-building, vulnerability mapping, retrofitting houses, and establishing cooling centres helped mitigate heat disasters.

Furthermore, she discussed the implications of cool roofs, gardens, and spray parks in Cape Town and their adoption in Europe and Australia. Additionally, she suggested infrastructure developments such as shaded verandas in market areas, heat-reflective road surfaces, shaded pedestrian pathways, and air-conditioned cubicles at ATMs to address the needs of neglected populations.





Ms Aarti Nain, Advisor for Urban Cooling and Heat Risk Mitigation, United Nations Environment Programme (UNEP)

Ms Aarti Nain highlighted collaborative efforts with institutions like the National Institute of Urban Affairs (NIUA) and the state governments of Tamil Nadu, Maharashtra, and others to integrate heat resilience into urban planning and building design. She stressed the importance of incorporating heat-resilient practices into basic building design and construction materials. Reflective roofs, for instance, offer a cost-effective solution that benefits vulnerable communities and those with limited economic resources.

Moreover, she discussed how heat resilience can be integrated into urban planning by increasing the percentage of green cover and ensuring well-ventilated and shaded streets and open spaces. Incorporating trees and shelter shading devices into urban design can help mitigate heat islands. In the context of city redevelopment or new developments, she underscored the importance of mixed-use planning and transit-oriented development to combat urban heat islands. She recommended examining regulations such as master plans, local area plans, development control norms, and building bylaws to incorporate heat mitigation measures. For example, integrating shading devices or thermal insulation into building designs can reduce heat gain inside buildings.

She stressed the importance of adopting heat action guidelines from the National Disaster Management Authority (NDMA), which advocates for the adoption of energy codes or standalone guidelines for cooling buildings and creating heat-resilient urban environments.

She emphasised the need for cities and states to conduct urban heat island assessments and utilise master plans to increase green cover and manage it effectively. She suggested strategies such as redeveloping water bodies, implementing storm water management systems, and designing urban spaces to mitigate heat during heatwaves. Green roofs were also highlighted as a method to reduce local temperatures. Additionally, she advocated for the use of digital technologies, such as apps and websites, to inform people about cool sites like green spaces and water bodies where they can seek shelter during heatwaves.

She concluded by emphasising the importance of effectively implementing heat action plans and educating cities about adopting heat mitigation measures to combat rising temperatures effectively.





Ms Devika Shisheer Panse, Consultant, SAR Climate Change and DRM, The World Bank

Ms Devika Shisheer Panse analysed the effectiveness of heat action plans in India and highlighted several key findings. Firstly, many heat action plans failed to identify and target vulnerable groups effectively. Secondly, she stressed the importance of ensuring that action plans are sectoral and target-oriented. Additionally, she noted that the World Bank is pursuing an integrated approach to combine various elements of urban heat, active cooling, and passive cooling for heat mitigation, emphasising the necessity of policy planning regarding heat stress.

She pointed out three crucial considerations: heat metrics, meteorological services, and preparedness. Secondly, she highlighted the importance of providing thermal comfort in the built environment, including commercial and residential buildings. Thirdly, she underscored the need for active cooling solutions across these sectors.

Furthermore, she emphasised the importance of discussing heat action plans and identifying their funding and implementation strategies. Her work primarily focuses on an integrated approach, incorporating active and passive urban design solutions and exploring financing options.

She provided an example of an initiative by the commercial sector, where Infosys integrated passive design measures and strategic building insulation to reduce the need for active cooling on their campuses. Scaling such ideas can meet thermal comfort goals sustainably. She highlighted the significance of reducing the need for cooling and meeting the growing demand for active cooling in a sustainable manner, particularly focusing on vulnerable populations.

She stressed the importance of directing initiatives towards vulnerable populations, such as integrating thermal comfort parameters into affordable housing schemes by the government. Many vulnerable individuals cannot afford active cooling solutions and suffer from power cuts during heat stress. The World Bank prioritises addressing the needs of vulnerable populations and collaborates with governments to provide thermal comfort solutions.





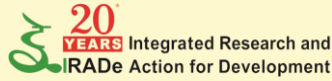
VII. WAY FORWARD

In South Asia, a detailed and in-depth analysis of heatwaves is being conducted by all countries. Efforts are also being made to validate heat indices. However, what is truly necessary are impact-based warnings, which we will discuss at the next level. At the first level, the focus is on establishing an early warning system related to human health, for which health data is crucial. Each country, and even regions within countries, exhibits significant variation, making uniform threshold warnings impractical. Therefore, a combination of forecast data and health data is required.

Moving to the next level involves assessing the impact on various sectors, including agriculture, water, energy, and health. Each sector will have different thresholds corresponding to different temperatures. As the frequency, intensity, and duration of heat waves increase, their impact extends beyond human health to social, economic, ecological, and biodiversity aspects.

The meteorological community needs to collaborate with sector specialists to develop impact-based warnings. The Indian Meteorological Department (IMD) has initiated this process, and organising training programs on developing impact-based warnings for neighbouring South Asian countries would be beneficial.





VIII. ANNEXURE







Webinar on HEATWAVE EARLY WARNING & HEAT ACTION PLANS IN SOUTH ASIA


 09 May 2024


 2:30 PM-5:00 PM (IST)
 09:00 AM-11:30 AM (GMT)

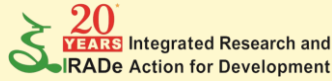

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AGENDA

Inaugural Session	
2:30 PM- 2:35 PM	Welcome Remarks by Prof Jyoti K Parikh, Executive Director, IRADe
2:35 PM- 2:40 PM	Setting the context by Prof Ajit Tyagi, President, SAMA
2:40 PM- 4:00 PM	Session 1- Early Warning Systems in South Asia
2:40 PM- 2:55 PM	Lead Presentation: Dr S C Bhan, Former Scientist G, IMD
2:55 PM- 3:45 PM	Country Presentations:
	Afghanistan: Ms Soma Popalzi, Head, Research Division, Afghanistan Met Dept
	Bangladesh: Dr Abdul Manan, Bangladesh Met Department
	Myanmar: Dr May Khin Chaw, Director, Department of Meteorology and Hydrology, Myanmar
	Nepal: Ms. Bibhuti Pokharel, Head of Climate Analysis, Department of Hydrology and Meteorology, Nepal
	Pakistan: Dr Ghulam Rasul, Former DGM, Pakistan Met Department
	Sri Lanka: Mr MMP Mendis, Deputy Director, Sri Lanka Met Department
3:45 PM- 4:00 PM	Discussions and Way forward
4:00 PM- 4:55 PM	Session 2- Heat Action Plans in South Asia
4:00 PM- 4:15 PM	Lead presentation: Mr Rohit Magotra, Deputy Director, IRADe
4:15 PM- 4:40 PM	Panelists
	<ul style="list-style-type: none"> Mr Sarder Shafiqul Alam, Consultant and Trainer of Trainers for LGED, Govt. of Bangladesh Ms Aarti Nain, Advisor for Urban Cooling and Heat Risk Mitigation, United Nations Environment Programme (UNEP) Ms Devika Shisheer Panse, Consultant, SAR Climate Change and DRM, The World Bank Ms Aditi Kapoor, Former Technical Advisor, Red Cross Red Crescent Climate Centre and Co-founder, Alternative Futures Mr Laba Kumar Sarma, Disaster Management Programme Head, Indian Red Cross Society (IRCS), Assam
4:40 PM- 4:55 PM	Discussions and Session way forward
4:55 PM- 5:00 PM	Concluding remarks : Prof Someshwar Das, Secretary, SAMA







About SAHHIN

Since 2020, the South Asia Heat Health Initiative (SAHHIN) hosted at IRADe has been established as a complementary node of the Global Heat Health Information Network (GHHIN) supported by the World Health Organisation (WHO) and the World Meteorological Organisation (WMO). SAHHIN is an independent, voluntary, and member-driven forum of scientists, practitioners, and policymakers focused on improving capacity to protect populations from the avoidable health risks of extreme heat in a changing climate. For more details: <https://climateandcities.org/>

About SAMA

South Asian Meteorological Association (SAMA) is a non-profit scientific society of nine South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka engaged in promoting regional cooperation in the field of meteorology and allied sciences. For more details: <https://southasianmet.org/>

About IRADe

IRADe is an autonomous advanced research institute and reputed think tank in Asia. Its research covers many areas including energy and power systems, urban development, climate change, and environment, poverty alleviation and gender, food security and agriculture as well as the policies that affect these areas. Over the past 20 years, the multidisciplinary, outcome-oriented perspectives provided by IRADe have formed the basis of numerous policy decisions taken by the Government of India. IRADe has contributed to policy inputs to Govt. of India climate negotiations at the Conference of the Parties (COP). Policy-related suggestions put forward by IRADe in connection with the power and the energy sector, moreover, have made their way into government policies in other South Asian countries. For more details: <https://irade.org/>

