

# Evaluating Extreme Heat Projects and Programmes: Key Lessons



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## Introduction

*By Dr. Jennifer Doherty, ALNAP, UK*

The 2024 has been a record breaking year for high monthly temperatures with countries across the globe experiencing deadly heatwaves. The effects of continued climate change are predicted to exacerbate these patterns.<sup>1</sup> This important new special issue underscores the need to pay attention to the significant and growing threats posed by extreme heat. The interesting range of articles, drawn from across South Asia and beyond, calls for continued evaluation of interventions tackling extreme heat so that lessons can be learned to improve planning and response.

The need to plan effectively for the risks posed by extreme heat is a clear theme across articles. A key piece of the planning puzzle is identifying when risks can be expected: Spandan Pandya's article asks how we identify when heat is likely to cause a risk and require action. The article advocates for considerations of temperature interaction with humidity by using 'wet bulb' measures to identify risks to people of extreme heat rather than raw Celsius numbers. Articles by Ankit Rathod focus on the processes needed to better incorporate the risks of extreme heat or climate change into the planning cycle, from risk assessments to response plans, to the important step of ensuring the financing is in place to act on those plans.

The article by Rohit Magotra and Ananya Bhatia also focuses on forward planning by using heat action plans for cities as a key example that could reduce the death toll of future extreme heat events. Their contribution particularly

underscores the importance of contextualisation when designing plans, considering requirements of vulnerable people down to the ward level in India. While contextualisation is an important facet of designing interventions, Pasqualino Tomassi's article is a useful reminder that inspiration for what might work can be found in different locations. The article discusses the potential of learning lessons from the creation of green spaces in European cities and opportunities to extrapolate and adapt such approaches in different global regions.

A clear message in this issue is the need to listen to the voices of people most affected by the risks of extreme heat to make plans and policies grounded in people's needs and capacities. Kshitij Gupta draws on the experience of informal sector workers and considers how that could inform heatwave risk mitigation plans, labour policies, and urban planning in India. Amali Tower's article highlights the experiences of another group: migrants, displaced people, and refugees around the world. The article calls for governments and service providers to consider the risks of extreme heat as people move across boundaries.

In addition to highlighting the experiences and requirements of different groups: the article by Mihir R. Bhatt speaks to how we should evaluate all extreme heat projects by focusing on inclusion. Ritwika Chatopadhyay outlines ideas that workers at risk of physical strain and financial losses had for mitigating the effects of extreme heat on small

businesses in India. Similarly, while considering the link between heat and public health for agricultural workers in Bangladesh, Shibu Prosad Baidya highlighted the importance of community-based solutions and their potential connections with policy-level structures. Vishal Pathak reveals the critical role of crop insurance in safeguarding small-scale farmers from the devastating impacts of climate change.

Beyond the message of local voices, experiences and ideas, this special issue also picks up on the role of international mechanisms to support local solutions. Teo Ormond-Skeaping outlines recent international commitments made on climate change-induced loss and damage. The article discusses opportunities for effectively operationalising them in relation to extreme heat events and the need to maintain momentum on those agreements to see their impact in affected contexts.

Together the articles in this special issue provide useful breadth on some of the approaches being used to adapt and anticipate the effects of extreme heat in different locations and for varied populations – with potential solutions being identified from community to international levels. Across this diversity of content sits a strong call to evaluate what is working, where and why, and how lessons can be shared and contextualised across contexts to improve practical outcomes for people whose lives and livelihoods are threatened by the growing risk of extreme heat. ■

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<sup>1</sup> <https://www.chathamhouse.org/2024/08/heatwaves-extreme-heat-and-climate-change>

# IRADe's Climate Adaptive and Inclusive Heat Action Plans for Cities Focused on Vulnerable Communities

By Rohit Magotra and Ananya Bhatia, Integrated Research and Action for Development (IRADe), New Delhi, India

India's megacities face a critical challenge: the escalating impact of extreme heat. In 2024, approximately 150 heat-related deaths and nearly 42,000 suspected heatstroke cases were reported, highlighting the urgent need for improved heatwave preparedness and response systems. Existing Heat Action Plans (HAPs) often lack adequate funding, local adaptation, and targeted protection for vulnerable populations.

The Integrated Research and Action for Development (IRADe) pioneered Heat Stress Action Plans (HSAPs) that set a new standard. These spatially differentiated, ward-level HSAPs focused on vulnerable populations and identified heat hotspots. Implemented in cities like Delhi, Rajkot, Bhubaneswar, Surat, Colombo (Sri Lanka), and Rajshahi (Bangladesh), they led to significant

policy changes. The "Climate Adaptive Heat Action Plan to Manage Heat Stress in Indian Cities," supported by the International Development Research Centre (IDRC) of Canada, extended HSAPs to Delhi, Bhubaneswar, and Rajkot. Meanwhile, the "Integrating Gender-Sensitive Heat Adaptation Plans in the Climate Policy and Guidelines of Selected Cities in South Asia," funded by the Asia-Pacific Network for Global Change Research (APN), emphasised gender-sensitive approaches in cities like Colombo, Rajshahi, and Surat.

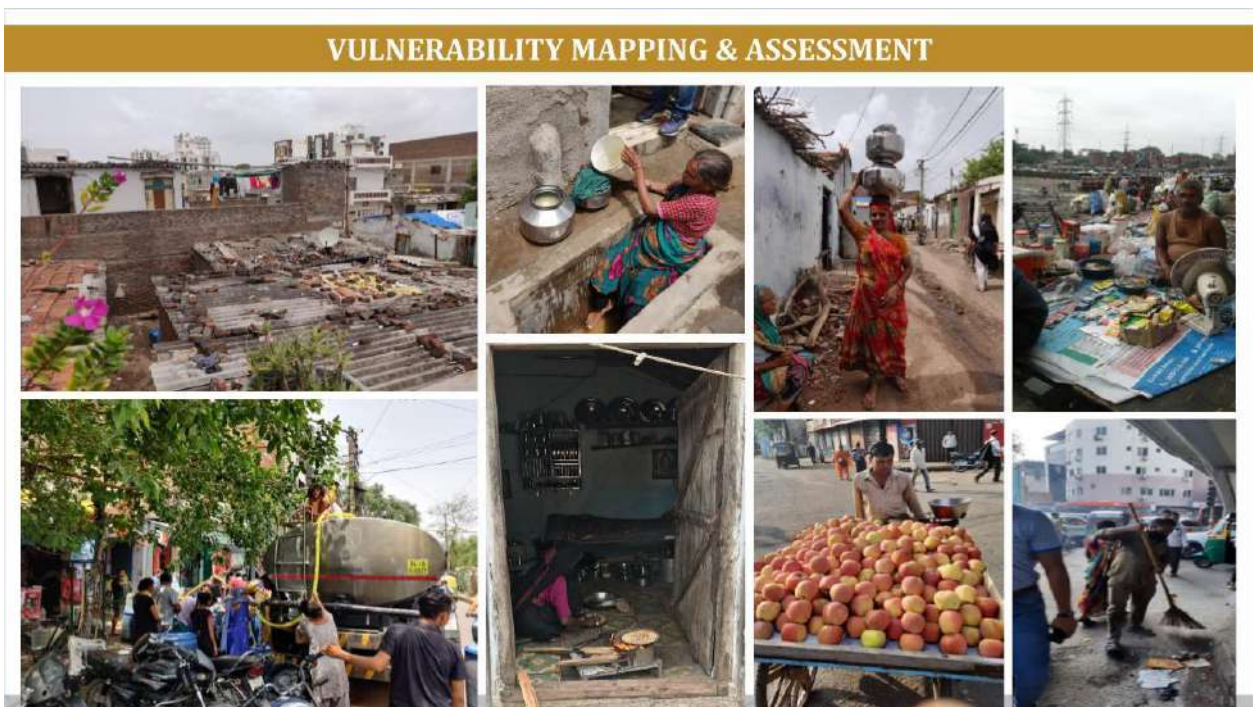
## Pioneering a New Standard: Spatially Differentiated Climate Adaptive Heat Action Plans

IRADe's HSAPs have set a new benchmark for heatwave management. These plans are spatially differentiated, focusing on

ward-level data to identify heat hotspots within a city. Additionally, they prioritise the needs of vulnerable populations most susceptible to heat stress, including outdoor workers, low-income residents in poorly ventilated housing, and the elderly. Notably, cities like Delhi, Rajkot, Bhubaneswar, and Surat in India have successfully implemented HSAPs, resulting in significant policy changes to address extreme heat challenges.

## From Research to Action: Multi-pronged Approach

The success of Heat Stress Action Plans (HSAPs) hinges on their multifaceted approach. Policy advocacy plays a crucial role, with research findings informing policy changes at the state and city levels. For instance, the Odisha Heat Action



Plan 2020 incorporated vulnerability assessments and heatwave impacts, while the Rajkot Municipal Corporation adjusted heat wave alerts to prevent heat-related mortality. In Delhi, a Heat Stress Advisory was collaboratively developed with the New Delhi Municipal Corporation (NDMC) and translated into Gujarati for Rajkot. Capacity-building efforts involved workshops for over 200 medical professionals in Bhubaneswar, Rajkot, and Delhi, focusing on managing heat-related illnesses. Advocacy also led to the inclusion of heat stress prevention measures on prescription slips in New Delhi hospitals. Additionally, HSAPs were widely disseminated to policymakers, stakeholders, and communities in Bhubaneswar,

Rajkot, and Delhi. Communication efforts included door-to-door surveys, pamphlets in regional languages, LED screens, hoardings, posters, and press releases, reaching nearly 970 households with information about heat wave impacts.

### Socio-Economic Impact and Knowledge Sharing

The HSAPs resulted in significant socio-economic benefits. By identifying vulnerable populations and hotspots, targeted heatwave management strategies were implemented. The Heat Stress Advisory raised awareness among the working class, potentially enhancing productivity during hot weather. Urban local bodies established ORS (Oral Rehydration Solution) corners and Rapid

Response Teams to strengthen resilience during peak summer. Additionally, the South Asian Heat Health Information Network (SAHHIN) facilitated regional collaboration, addressing the increasing intensity and duration of heatwaves.

IRADe's HSAPs demonstrate a successful model for mitigating heat stress and building climate resilience in South Asian cities. Their evidence-based strategies, focused capacity building, and extensive community outreach offer a replicable approach for other urban centres facing the growing threat of extreme heat. The establishment of SAHHIN strengthens regional collaboration and ensures continued knowledge exchange to tackle future heatwave challenges. ■

## HEATWAVE MEASUREMENT

# Ditching the Celsius: A Measurement Perspective

By Spandan Pandya, Physics Department, Ashoka University, Haryana, India

### Overview of the Problem

Heatwaves are progressively becoming an integral aspect of India's quotidian reality, presenting a formidable challenge for policymakers. The first step in addressing this looming epidemic is to operationalise heatwaves using a scientific framework. The NDMA defines a heatwave in the following form<sup>2</sup>:

When the normal maximum temperature of a station is less than or equal to 40°C Heat Wave Departure from normal is 5°C to 6°C

When the normal maximum temperature of a station is more than 40°C Heat Wave Departure from normal is 4°C to 5°C

Notice how both these definitions rely heavily on the idea of temperature and Celsius being the sole litmus test of what constitutes a heatwave. Therefore, for many naïve policymakers, temperature control becomes the sole method of combatting heatwaves. The data for heatwaves immediately brings this folly to the foreground. The government data argues that:

“at least 264 people have died across 14 states due to heatwaves this year as of June 30, 2023. Of this, 120 deaths – the highest human causality in the state due to heatwaves since 2015 – or close to 45 percent, were reported from Kerala”<sup>3</sup>.

This data does not seem to match the Celsius-oriented policymaker's thought process, since one barely associates Kerala with scorching heat. Despite this, the data seems to suggest a lot more deaths in a humid but low-temperature environment rather than a high-temperature but

<sup>2</sup> NCDC, MoHFW (no date) *National Disaster Management Authority, Heat Wave* | NDMA, GoI. Available at: <https://www.ndma.gov.in/Natural-Hazards/Heat-Wave#:~:text=A%20Heat%20Wave%20is%20a,cases%20even%20extend%20till%20July>. (Accessed: 20 June 2024).

<sup>3</sup> Pandey, K. (2023) *Data gaps in heatwave deaths widen as India battles record-smashing temperatures*, Down To Earth. Available at: <https://www.downtoearth.org.in/news/climate-change/data-gaps-in-heatwave-deaths-widen-as-india-battles-record-smashing-temperatures-90839> (Accessed: 20 June 2024).

dry environment. In reality, what really aggravates heatwave deaths is a correlation between temperature and humidity rather than an absolute temperature scale. This gap indicates the need for a new scale of measurement that is convenient rather than the one accepted in scientific papers.

**The Wet Bulb Temperature**

A more humane parameter to measure the temperature accurately predicting the presence of a heatwave is the “wet bulb temperature”. A wet-bulb temperature is a simple measurement where a muslin cloth is dipped into water to mimic humid conditions, and then this damp cloth is tied to a mercury thermometer. This “wet bulb temperature” tries to mimic how all human beings interact with heat – by sweating through their pores. Consider the skin on your body, for example, the wet-bulb temperature will show the minimum temperature the skin can reach if it’s a hot day outside and there is sweat evaporating from its surface.

An absolute temperature of 40°C in Gujarat with no humidity will still allow people to sweat naturally. However, even a 36°C temperature in Kerala with a 90% humidity level can stop people from cooling themselves through evaporative



Two comparable temperature measurements, a man trying to protect himself from the heatwave, and a damp muslin-clad thermometer.

losses, leading to increased heatstroke casualties. The highest acceptable wet-bulb temperature for humans is 35°C (95°F) for six hours. Above that point, even healthy people begin to develop serious, often deadly health problems. This level is crucial because it’s impossible to escape such effects even with unlimited water and shade. If a policy-maker were to look at the temperature readings in Delhi and decide to mist Kerala, areas would become even more humid, worsening the heat wave scenario.

**Alternate Realisations**

The idea that Celsius needs additional realisations to make it more conducive to measure comfort is being seriously considered even in

the space of commercial weather forecasting services and personal health devices. Many algorithms have been devised to come up with Celsius equivalent temperatures which include the effects of shade, clothing, wind, temperature fluctuations, and working hours. All these parameters and models to obtain temperatures are important in our quest to understand heat waves as a real catastrophe that needs to be mitigated.

**Conclusion:**

Even after sustained heatwaves, the world has not come up with a single definition of what it means to classify heatwaves as a calamity. The definitions that rely on Celsius alone are not enough to implement a thorough policy that applies to geographically and climatically diverse parts of the world. The problem of heatwave is multipronged. In this regard, the Wet Bulb Temperature paves the way for an easy-to-track unit of temperature that takes into consideration not only temperature but also humidity. Setting a standardised wet temperature scale in all weather stations in the country and conducting heat surveys with this unit can save many lives. ■

TUE 4/2  **34°** /21°

Mostly sunny

RealFeel® **36°** Max UV Index

RealFeel Shade™ **32°** Wind

*AccuWeather shows RealFeel, a proprietary parameter that tries to incorporate human heat receptivity and model outdoor comfort.*

# Extreme Heat in Cities: How Do We Evaluate New Initiatives?

By Pasqualino Tomassi, Co-Chair, IUCN Urban Alliance, Switzerland

As urbanisation accelerates and climate change intensifies, cities face increasingly frequent and severe heatwaves. This challenge demands innovative solutions, but evaluating the effectiveness of new initiatives is crucial for ensuring their impact.

Cities experience the urban heat island (UHI) effect, with temperatures significantly higher than surrounding areas (Figure 1). This is largely due to dense construction, dark surfaces, and lack of vegetation. The consequences are serious, impacting public health, increasing energy consumption, and even causing premature mortality (Figure 2). Short-term temperature peaks are particularly concerning, as they can be much more intense than seasonal averages and pose a greater immediate risk to human health.



Figure 1. WMO, courtesy of Kamyar Fuladlu.

Studies on European cities have identified key strategies for combating extreme heat (Figure 3):

Exploiting existing data: Utilise available monitoring systems and modeling techniques, like satellite

remote sensing, to inform decision-making processes.

Implementing behavioral change: Public awareness campaigns, early warning systems, and targeted protection for vulnerable groups.

Establishing heat action plans and appointing heat officers to coordinate responses.

Adopting multi-scale and cross-sectoral approaches: address heat extremes by considering different spatial scales, from individual buildings to entire cities, and fostering collaboration between government levels and urban departments.

Among these strategies, one of the most promising solutions for mitigating the UHI effect is enhancing urban green infrastructure (Figure 4). Research across 93 European cities indicates that increasing tree cover to 30% could reduce heat-related deaths by nearly 40%. However, the effectiveness of green spaces in

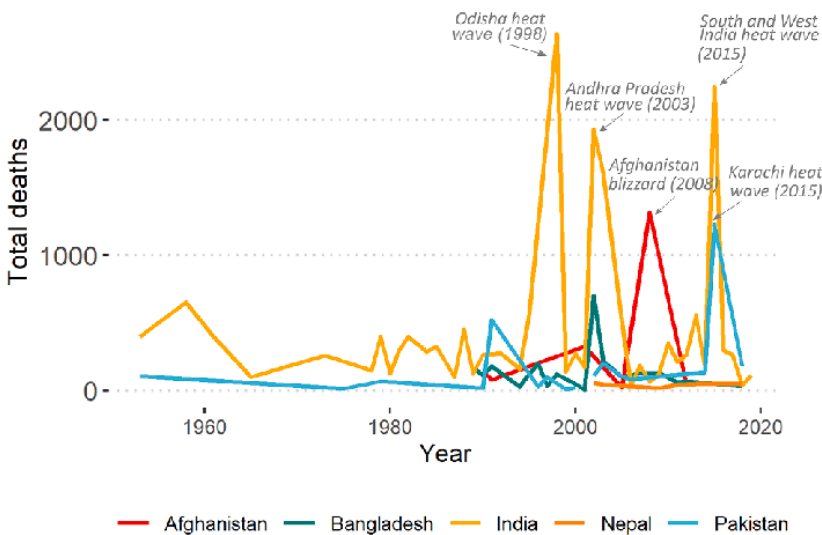


Figure 2. Deaths from extreme temperature events in South Asia. Source: Own figure, EM-DAT database\* (Centre for Research on the Epidemiology of Disasters CRED, 2019) \*The data in the database are compiled from various sources, including UN agencies, non-governmental organisations, insurance companies, research institutes and press agencies. An extreme event is considered in the database only if >10 fatalities were reported.



Figure 3. Creating Nature-Positive Cities. Application of IUCN knowledge products in cities for the well-being of citizens and the protection of urban nature. © IUCN, International Union for Conservation of Nature and Natural Resources.



Figure 4. A comparative before-and-after image of a road in Lyon with and without increased tree cover.

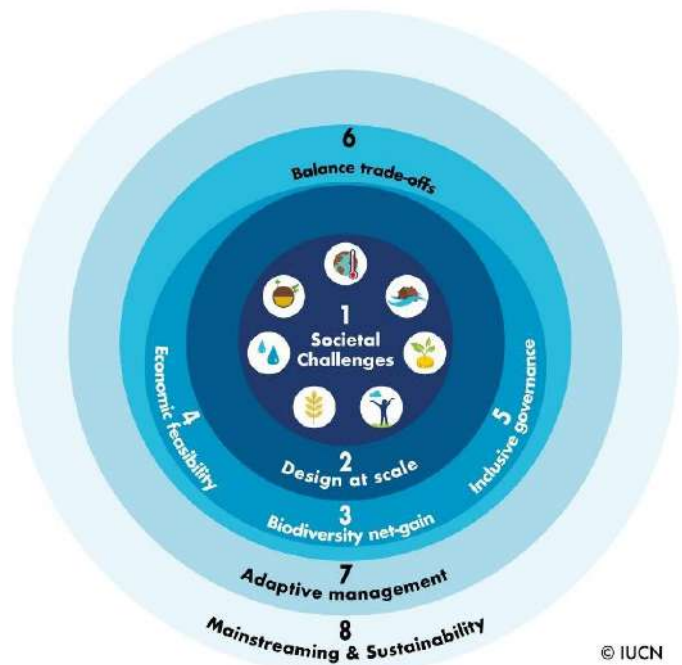


Figure 5. The eight Criteria that make up the IUCN Global Standard for NbS are all interconnected. © IUCN, International Union for Conservation of Nature and Natural Resources.

cooling urban areas relies on various factors such as their size, shape, composition, and spatial configuration. Integrating more green areas into urban planning not only helps in reducing temperatures but also contributes to improving air quality and supporting biodiversity.

Implementing effective solutions requires understanding the challenges and opportunities unique to each city. There is a need for measurable indicators and evaluation tools to track progress and assess the impact of adaptation and mitigation efforts. The Sustainable Development Goals (SDGs) framework offers a structured set of universally recognised metrics to guide cities and countries in implementing,

evaluating, and improving their adaptation and mitigation responses.

Complementing this, the IUCN Global Standard for Nature-based Solutions (NbS) provides a more specific framework tailored to the design and evaluation of interventions that utilise the benefits of natural systems. This standard, with its eight interconnected criteria and 28 indicators, ensures that NbS interventions are not only effective in addressing immediate challenges, such as extreme heat, but are also sustainable and adaptable in the long term (Figure 5). By aligning NbS strategies with the broader SDGs framework, cities can create interventions that are both impactful and resilient, addressing environmental, social, and economic dimensions of urban heat mitigation.

In conclusion, combating extreme heat in cities necessitates a multi-faceted approach incorporating diverse solutions tailored to each urban environment. Developing and implementing comprehensive evaluation systems is crucial. By integrating the SDGs framework with tools like the IUCN Global Standard for NbS, and considering factors beyond temperature reduction, such as social equity and biodiversity, we can create truly sustainable and resilient cities. The urgency of addressing urban heat requires not only innovative strategies but also robust methods to assess their effectiveness, ensuring that our efforts lead to meaningful improvements in urban environments and quality of life. ■

## HEATWAVE RISK REDUCTION

# Heatwave Risk Mitigation and Management in Lucknow: A Demand Survey for Informal Sector Workers

By Kshitij Gupta, AIDMI, India

The risk of extreme heat is rising across the world. Recently, the UN Secretary General Antonio Guterres, acknowledged this elevated risk by issuing a call to action against extreme heat. Mr. Guterres stated that extreme heat increasingly tearing through economies, widening inequalities, undermining the Sustainable Development Goals, and killing people. He also stated that caring for the vulnerable especially the urban poor should be a top priority.<sup>4</sup> In a similar vein, the Indian Prime

Minister Shri Narendra Modi also acknowledged the risk of extreme heat in India. In a recent meeting with key departmental secretaries, the Indian PM reviewed the preparedness of the health sector to respond to the risk of heatwaves. The PM stressed upon the whole of government approach and said all arms of the government at central, state and district levels, besides various ministries, need to work on this in synergy.<sup>5</sup>

The All India Disaster Mitigation Institute (AIDMI) heeded this necessary call to action against extreme heat by both the UN Secretary-General and the Indian Prime Minister by conducting a demand survey on Heatwave Risk Mitigation and Management in the city of Lucknow, Uttar Pradesh. This demand survey study has been undertaken by AIDMI to have a look at the ground level impacts of heatwaves on the people especially working poor in the informal sector

<sup>4</sup> United Nations. (2024, July 25). Secretary-General's press conference on extreme heat. Retrieved from

<https://www.un.org/sg/en/content/sg/press-encounter/2024-07-25/secretary-generals-press-conference-extreme-heat>

<sup>5</sup> Press Information Bureau, Government of India. (2024, July 25). Cabinet approves continuation of National Health Mission (NHM) with a budget of Rs. 5,000 crores. Retrieved from <https://pib.gov.in/PressReleasePage.aspx?PRID=2017685>



of the urban economy in Lucknow, Uttar Pradesh, Uttar Pradesh.

Overall, this demand survey covered 121 urban low-income sector workers and entrepreneurs who were street vendors, auto drivers, construction and domestic workers along with fruit and vegetable sellers from various areas of Lucknow, Uttar Pradesh. Moreover, the demand survey also suggested the remedial measures to be taken by the state, municipal and civil society to avoid deaths and mitigate the sufferings caused by the heatwaves.

The principal findings of this demand survey highlighted many areas of action for effective management and mitigation of extreme heat risk of urban informal workers. Firstly, vulnerabilities should be properly mapped to identify the hotspots and geographic concentrations of urban workers for better targeting of the vulnerable population. Secondly, participatory research needs to be taken up with the informal workers to identify robust adaptation strategies against extreme heat risk. Thirdly, increasing access to affordable cooling solutions for the informal sector workers is critical. Fourthly, local governments, urban planners and architects need to come together to provide climate-resilient infrastructure to these informal sector workers. Fifthly, it is essential to tailor and contextualise heatwave early warning systems for reaching the last time. Sixthly, favourable policy and regulatory frameworks such as labour policies, zoning regulations, and urban planning guidelines that prioritise the well-being and resilience of these communities should be prioritised.



*A female street vendor selling plastic goods in Lucknow, Uttar Pradesh. Photo: AIDMI.*

[As 2024 is slated to breach all previous temperature records to become the hottest year on record](#), there is a need for urgent heat action against the risk of extreme heat in India. Heatwaves are still not included in the list of notified central disasters in India. AIDMI's action research and advocacy work highlights how it is time for every state to issue its own call to action against the risk of extreme heat. Such a call to action should pervade to the

sub-national level as well, wherein all municipal corporations and municipalities should have their own roadmap and heatwave action plans to better address the needs of the informal workers. Only these collective efforts can help in achieving climate resilience, promoting sustainable livelihoods, and safeguarding the well-being of vulnerable populations in the face of extreme heat events. ■

# Extreme Heat in Bangladesh: Evaluating Cooling Projects

By *Shibu Prosad Baidya*, Founder & CEO, Barokupot Ganochetona Foundation-BGF, Bangladesh

Extreme heat is a significant and growing challenge in Bangladesh, exacerbated by climate change and rapid urbanisation. The country has been experiencing increasingly severe heatwaves, which pose serious risks to public health, agriculture, and the overall well-being of its citizens. In response, various cooling projects and programmes have been initiated to mitigate the impact of extreme heat.

One of the most pressing issues arising from extreme heat is its detrimental effect on public health. Increased temperatures can lead to heat-related illnesses, including heat stroke and dehydration, particularly among vulnerable populations such as the elderly, children, and outdoor workers. Moreover, the agricultural sector, which a significant portion of the population relies on for their livelihood, faces reduced crop yields and increased water stress during heatwaves. Urban areas, characterised by dense construction and limited green spaces, experience the urban heat island effect, further amplifying the heat.

In addressing these challenges, several cooling initiatives have been

implemented across Bangladesh. One notable example is the use of cool roofs, which involve coating rooftops with reflective materials to reduce indoor temperatures. This simple yet effective solution has shown promising results in lowering energy consumption for cooling and enhancing indoor comfort. Another significant initiative is urban greening efforts, which include planting trees and creating green belts in cities. These efforts not only provide shade but also improve air quality and enhance the aesthetic appeal of urban areas.

Community-based solutions have also played a vital role in mitigating extreme heat. The promotion of shaded public spaces, such as parks and community centres, offers residents a place to seek respite from the heat. These spaces are particularly beneficial in densely populated urban areas where access to cooling is limited. Additionally, educational campaigns aimed at raising awareness about heat-related risks and promoting heat safety measures have empowered communities to take proactive steps

in protecting themselves during heatwaves.

Evaluating the effectiveness, sustainability, and scalability of these cooling projects is essential for understanding their impact and identifying areas for improvement. Quantitative data, such as temperature reductions and energy savings, provide measurable indicators of success. Qualitative insights from community feedback and case studies offer valuable perspectives on the practicality and acceptance of these initiatives.

In conclusion, addressing extreme heat in Bangladesh requires a multifaceted approach that combines innovative cooling solutions, community engagement, and supportive policy frameworks. The ongoing evaluation of these initiatives is crucial for ensuring their long-term success and adaptability. As Bangladesh continues to face the challenges of climate change and urbanisation, sustained efforts to implement and refine cooling projects will be vital in safeguarding the health and well-being of its citizens. ■



# No Refuge from Heat: Why Extreme Heat Hurts People on the Move

By Amali Tower, Founder, Executive Director, [Climate Refugees](#), USA

Sudanese refugees are dying from extreme heat while fleeing war. This was the reality for at least 80 refugees who were attempting to seek protection in Egypt, but [died](#) in early June when temperatures hit nearly 50 degrees Celsius in Aswan.

In fact, a months-long global heatwave is impacting lives on at least four continents, where hundreds of deaths have been recorded in [India](#), [Greece](#), [Mexico](#) and beyond.

Over the past year, [6.3 billion people](#) have experienced at least 31 days of extreme heat. This is an impact of climate change, made at least two times more likely because of human actions. Everyone is vulnerable to the health hazards of extreme heat that can produce everything from dizziness and headaches to more deadly symptoms like dehydration and heatstroke. Heatstroke has led to at least 110 deaths and 40,000 suspected cases in India alone this year.

The very young, the very old, outdoor laborers, the poor and marginalised are at greatest risk to extreme heat. So, too, are migrants, displaced persons and refugees.

In a pattern that repeats year upon year, a 45-year-old Mexican migrant [died](#) in June from heatstroke as he attempted to migrate irregularly through the Chihuahua desert to the United States. Highly securitised US border policies render the US-Mexico journey the [deadliest land route](#) for migrants worldwide, where heatstroke has already contributed to [77 migrant deaths](#) this year, according to US Border Patrol.

[Research](#) reveals extreme heat is also a threat to those living in camps and temporary settlements, where an

increase in the frequency and length of heatwaves has been documented over a 30-year period. Settlements are situated in difficult and unforgiving terrains, exposing millions of displaced persons to extreme heat. Life in tents and tin shacks exacerbate extreme heat conditions. During a heatwave in Syria last year, one displaced woman [described](#) the conditions as living “inside an oven, struggling to breathe due to the heat inside the tent.”

Reflective of why many migrants are vulnerable to smugglers, countries are increasingly utilising migration deterrence measures. This is especially true for Global North countries, like those in the European Union and the US. Reflecting the outflow of civilians, Egypt now enforces a visa requirement for Sudanese nationals fleeing war. Thus, people on the move are particularly vulnerable to extreme climate impacts because of border closures and visa restrictions, and also, because settlements are located in countries most vulnerable to climate change.

Governments and relevant service agencies have a duty to uphold international human rights obligations to protect people from heat, including making efforts to protect migrants, refugees and displaced persons. Some measures that are imperative in the era of the climate crisis, include:

**Ensure access to cool environments during a heatwave.** In camps and temporary settlements, this must include access to cooling centres, especially for the elderly and vulnerable, air conditioning, shaded areas, or well-staffed public centres

where ventilation, shaded cover, water distribution and other protections can be administered.

**Adopt migration and border policies in line with climate realities.** Governments must realise that border restrictions do not deter many migrants who, for a variety of reasons, have no choice but to move, even during dangerous climate conditions. Especially during deadly heatwaves, States must work with interlocutors to facilitate movement within transboundary corridors.

**Ensure that people on the move are informed of heat advisories, imminent risks and emergency assistance is made available along transboundary land routes.** Warnings and assistance provisions should be made available in relevant migrant languages and take into account pre-literate populations and people without access to technology.

**Ensuring Just Tech principles, host countries and service agencies must utilise remote sensing to map, assess and monitor the environmental and climate hazards in refugee and displaced person settlements.** This is crucial to protect the needs of exposed communities and to better plan and manage increasing risks.

**Support further research on the extreme heat-migration nexus in order to respond to current migration flows and anticipate future movements.** This includes facilitating migration - including seasonal and temporary migration - as an adaptation measure to extreme climate impacts, including heat while supporting host communities in need of labour and other benefits of migration. ■

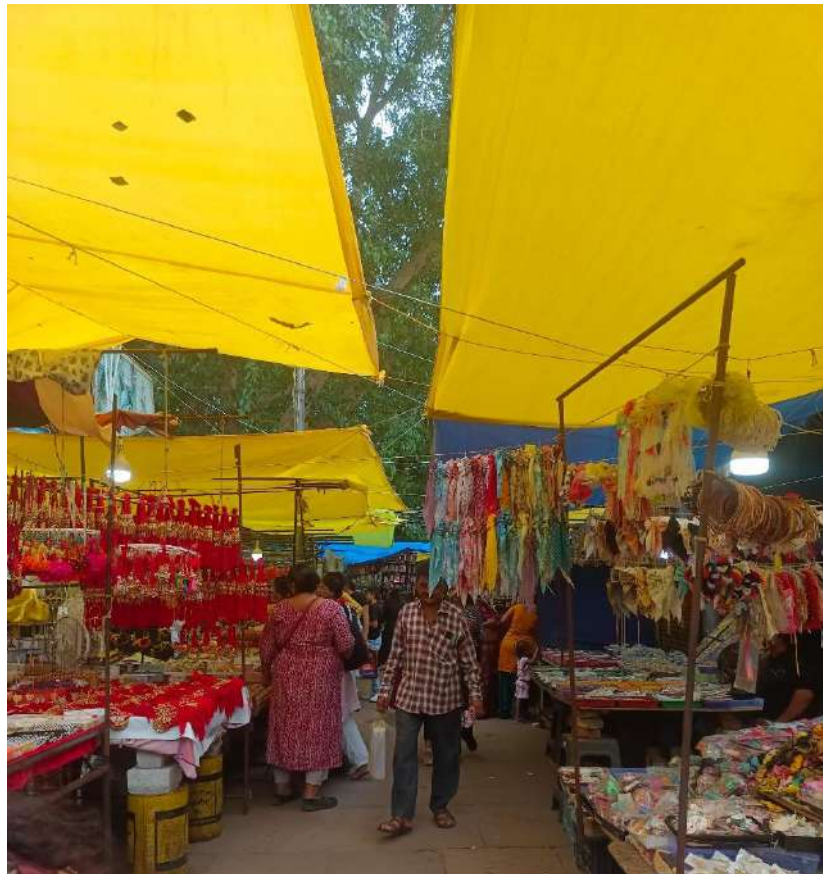
# Struggling to Survive: Unheard Voices of Small Businesses on Extreme Heat

By Ritwika Chatopadyay, AIDMI, India

## Introduction

The Ahmedabad heatwaves saw a far-reaching impact on the citizens, but none as much as it had on the street vendors who brave the scorching sun every day. Such harsh weather brings plummeting sales, serious health risks and extremely precarious working conditions to these informal businessmen who are part of the very fabric of the economy of the city. Their plight badly goes unheard. Inadequate support does not only put their health at risk but also their livelihood, as continuous heatwave cause both physical strain and financial losses. Realising the need for understanding their struggles during the heatwaves, AIDMI arranges for a documentation study on their challenges and responses with an aim of decisive action and interventions to ensure their well-being, safety and continued contribution to the city's economy.

The heatwave impacts people in general, with the most affected being the street vendors who are exposed to the scorching sun all day long. The impact on the informal economy is often unheard, despite the urgent support needed by these businessmen. Most of the informal businessmen in Ahmedabad do not have proper cooling systems or shade; hence, it is even tougher for them to face such extreme heat. A lack of such basic facilities exaggerates their issues during a heatwave. It becomes a struggle for those businessmen to keep their business going and maintain health and well-being. Their struggles



Heatwave protection by tarpaulin in the local market, Ahmedabad, Gujarat, India. Photo: AIDMI.

require urgent attention and support with proper government initiatives and guidance for their well-being. A documentation study was conducted with the view that understanding their experiences can help in implementing effective relief measures to support these individuals in need. In this regard, 101 testimonials were collected from different marketplaces in the city of Ahmedabad, studying the challenges in the lives of informal businessmen amidst heatwaves. Though they are facing plummeting sales due to declining customer foot

traffic, they continue being exposed to the scorching sun rays and oppressive heat with their stall, working longer hours than usual with a hope in their eyes to have a moderate sale to cover their basic expenses with the little they earn. Their situation further gets worsened by the product spoilage, supply issue, inflation and health related problems. Many of these people couldn't afford even a makeshift for shade and liquids other than water required to keep them hydrated. Many women reported to have complications with their menstrual

cycles, while others also included being irritable, uneasy, having headaches, heart palpitations, indigestion, loss of appetite and other health problems. The municipal authorities further limit the businessmen from many of the market-places from peacefully operating their businesses at times, which add to their stress and challenges even more.

#### **What can be done for them?**

Many steps can be taken to lessen the sufferings of the street vendors in their business locations and at home, during these heat wave conditions. During the survey, many of them suggested providing arrangements for shading, drinking water facilities in the market, properly designated vending zones, arrangements for loans and immediate medical support in the market. Moreover, the NDMA can declare “Heatwave” as a disaster to help fund the distressed and marginalised community. This will provide much-needed relief and support to the people more seriously affected by the extreme heat. Another solution that could be

worked out includes provision for Cooling Carts by Trane Technologies under the UN Sustainable Development Goals 2030 (SDG 2030) for the street vendors. These carts could offer some shade and a cool place for the vendors to relax and rehydrate. During the extreme heat periods, creating some cooling shelters or a rest area for the vendors in the market further helps in protecting them from such hazards of heat. This can be further supported by collaboration with any local businesses or organisations to distribute relief supplies like umbrellas, water and electrolyte drinks for free to the people in need. Further innovative solutions such as electricity-free refrigerators made of baked clay by Mitticool will also assist vendors to store unsold vegetables for a few days without spending a single penny. Keeping their houses cool can be done through various technologies and mechanisms. The use of Modroofs that are made of waste cardboards and natural fibers can help in cooling and they are easy to install and dismantle. Growing

potted plants, creepers or trees on and over the roofs can also lower the indoor temperature. Painting the roofs white or painting the roofs and walls that are exposed to sunlight and heat with reflective paint can decrease the heat load. During a new construction of a building, consideration of the building orientation and cross ventilation is important. They can also use Air-lite ventilation and materials like Compressed Stabilised Earth Blocks and Mud & Lime mortar instead of cement, as it can also help majorly in cooling the indoor spaces. These materials are eco-friendly, easily available and cost-effective. Geothermal Installation using underground pipes in some cases can also be an option to keep their houses cool. Implementing heatwaves preparedness training programmes, and awareness programmes for informal businessmen for both the heatwave adaptation lessons and also making them aware of the available facilities under the Ahmedabad Heat Action Plan is important. ■



*Heatwave impacts on the informal businesses in Ahmedabad, Gujarat, India. Photos: AIDMI.*

# What Needs to Happen on Loss and Damage in 2024 to Address the Impacts of Extreme Heat?

By Teo Ormond-Skeaping, [Loss and Damage Collaboration's](#) Advocacy, Outreach and Communications Lead, UK

With the India Meteorological Department (IMD) predicting extreme heat across the country from April to June as the escalating climate crisis increases the frequency and intensity of heatwaves, this article looks at what needs to be done at the international level to ensure that developing countries like India, and the vulnerable communities within them, have what they need to address the loss and damage that extreme heat and other climate intensified events are causing.

## What is Loss and Damage?

The technical term given to the unavoids or unavoidable devastation that is being caused by higher global temperatures resulting from human-induced climate change is “loss and damage”. The “loss” of loss and damage refers to things that are lost permanently to the climate crisis. For example, the human and animal lives lost during a climate change intensified heatwave. The “damage” of loss and damage refers to things that have been affected by the climate crisis but can be restored. For example, the impacts to physical health and the loss of school and work days during climate change intensified periods of extreme heat. Whereas “Loss and Damage” (uppercase “L” and “D”) is used to describe the policies and plans that are used to address loss and damage, such as those that are negotiated at the United Nations Framework Convention on Climate Change (UNFCCC). For over 30 years, action on Loss and Damage has been obfuscated, delayed, and denied by

the developed countries most responsible for the climate crisis. However, a historic agreement to establish a Loss and Damage Fund was finally reached at COP27 in Egypt, and following a year-long process under a Transitional Committee, the Fund has now been operationalised.

## Averting, Minimising and Addressing Loss and Damage

To deal with loss and damage from climate change we need to take action across all three pillars of climate action. Mitigation is the first line of defence against future climate impacts and the best way to avoid (avert) loss and damage. By limiting global heating to 1.5°C above pre-industrial levels – which can be achieved by rapidly reducing carbon emissions through a just transition to a phase-out of fossil fuels – we will decrease the amount of loss and damage that will happen in the future. In the context of extreme heat, limiting warming to 1.5°C would stop the frequency and intensity of heatwaves reaching a point where hundreds of thousands of lives could be lost during a single extreme heat event in a world that is 2.5°C or warmer.

The second line of defence is adaptation, which involves preparing communities and infrastructure for climate impacts. In the case of extreme heat this could include reducing heat islands in cities through the introduction of trees and vegetation, ensuring that there are publicly accessible cool spaces, being prepared to take

lessons online when temperatures become too hot for children to come to school, and by helping people to diversify livelihoods to avoid working outside during extreme heat events. Adaptation, therefore helps reduce (minimise) the loss and damage being caused by the climate crisis.

However, not all loss and damage can be averted or minimised and therefore we also need to address loss and damage. In the context of heatwaves, addressing loss and damage could involve compensating for lost livestock, crops, and work days, as well as providing health care and mental health care for those impacted by extreme heat.

## What Needs to Happen on Loss and Damage in 2024?

In 2024, several significant Loss and Damage processes are underway within the UNFCCC climate negotiations. Here are three key areas where progress must be made to ensure that loss and damage caused by extreme heat can be addressed.

### 1. The full operationalisation of the Loss and Damage Fund and scaled-up pledges:

Although the Loss and Damage Fund was operationalised at COP28 and pledges totaling \$661 million USD were made, the Fund is still not able to release money when an extreme heat event causes loss and damage. With the operationalisation of the Loss and Damage Fund came the establishment of the Board of the Loss and Damage Fund. In 2024 the

Board is tasked with making the Fund fully operational. This will involve ensuring that the World Bank – which was selected as the interim host of the Funds secretariat after much push back from developing countries and civil society – is willing and able to host the Fund whilst meeting a criteria set in the COP28 decision which include ensuring that countries and communities on the front lines of the climate crisis have direct access to funds. Other tasks for the Board include deciding on access modalities – for example civil society has called for a small grants window accessible to grassroots organisations – resource allocation, and environmental and social safeguards. In order for the Loss and Damage Fund to become fully operational by COP29 so that it can disperse money shortly afterwards, the World Bank needs to agree to host the Fund and provide the hosting agreement and related documentation ready for the Board to approve and sign in mid August. We also need to see the pledges made at COP28 turned into contributions to the Fund and pledges hugely scaled up. Although very welcome, the \$661 million USD pledged at COP28 is just a drop in the ocean compared to what developing countries actually need to address loss and damage each year which is estimated to be \$400 billion USD a year throughout the 2020s. For example, in 2022 alone, the quantifiable economic cost in developing countries of extreme events like cyclones and floods was greater than \$100 billion. A number which does not include more difficult-to-quantify extreme events like heatwaves and related non-economic loss and damage such as the loss of education when schools are forced to close due to heatwaves.

It is also important to recognise that developing countries have indicated that they expect the Fund to be able to programme \$100 billion USD a year. With this in mind, the \$661 million USD pledged at COP28 would account for less than 1% of what developing countries expect (\$100 billion USD) and less than 0.2% of the actual needs of developing countries (\$400 billion USD). Therefore, to really address the loss and damage at the scale required by developing countries, the Fund will need to encourage contributions in the billions and not millions of dollars.

## **2. A Loss and Damage sub-goal under the New Collective Quantified Goal on Climate Finance.**

The New Collective Quantified Goal on Climate Finance (NCQG) is set to be agreed at COP29 in 2024. This goal will supersede the US\$100 billion target agreed in 2009 at COP15 for mitigation and adaptation and should be informed by the needs and priorities of developing countries. To ensure that the Loss and Damage Fund is filled on a regular basis with the \$400 billion USD that developing countries need, Loss and Damage must be included in the NCQG in 2024 as a separate Loss and Damage finance sub-goal.

The US\$100 billion per year goal set in 2009 was not based on science or the actual needs of countries and communities on the front lines of the climate crisis and is therefore woefully inadequate. To ensure that finance is delivered at the scale of the needs of developing countries the NCQG must be guided by science – including the latest IPCC AR6 report – and the loss and damage needs of front-line communities, including those hit by extreme heat

events. A minimum of US \$400bn a year must therefore be considered for the Loss and Damage sub-goal of the NCQG and this amount must increase as the climate crisis escalates.

## **3. The full operationalisation of the Santiago network for Loss and Damage**

The Santiago Network was established at COP 25 in Madrid as part of the Warsaw International Mechanism for Loss and Damage (WIM) under the UNFCCC with the objective of “catalysing technical assistance of relevant organisations, bodies, networks and experts (OBNEs), for the implementation of relevant approaches for averting, minimise and addressing loss and damage at the local, national and regional level, in developing countries that are particularly vulnerable to the adverse effects of climate change.”

What that means in practice is that the SNLD is intended to ensure that countries and communities experiencing loss and damage – including those facing extreme heat – are able to access local and/or regional support to better understand what loss and damage they face, how it can be averted, minimised and addressed, and what funding, policies and action will be required.

In the case of heatwaves, this could include working with regional OBNEs to assess where loss and damage could occur during a heatwave, working with technical experts on policies to avert, minimise and address loss and damage that are context specific and taking into account the needs, priorities, and rights of impacted communities. It would also include working with the support of OBNEs to assess the loss

and damage costs of an extreme heat event to make a request for money from the Loss and Damage Fund.

In 2024, the newly established Advisory Board of the Santiago Network is working to fully operationalise the SNLD and to begin to respond to requests for technical assistance. To get the Santiago Network to deliver with the speed and efficiency the escalating climate crisis requires, the Advisory Board needs to ensure that a Director is appointed for the SNLD, and that the SNLD's secretariat can make use of regional and subregional UN offices in all UN geographical

regions so that no region is left behind, and they will also need to ensure that the \$48.5 million USD in Pledges made to the SNLD are delivered and that further pledges are forthcoming. To complement this, the Advisory Board also needs to review and approve the guidelines for managing funding provided for technical assistance.

### **Communities Impacted by Extreme Heat Cannot Wait Any Longer.**

Having faced 30 years of delays due to the delay tactics of developed countries, communities on the frontlines of the climate crisis— including those facing heatwaves—

have been left to pick up the bill for loss and damage caused by the climate crisis. Now that there is a Loss and Damage Fund and a Santiago Network for Loss and Damage in place, 2024 must be the year that urgently needed Loss and Damage finance and technical assistance finally reaches people on the ground. To meet the scale of the needs of developing countries, 2024 must also see an NCQG agreement that delivers the trillions needed in climate finance for the full spectrum of climate action, including a sub-goal on Loss and Damage. ■

## HEAT ACTION PLANS

# Extreme Heat in the Asia Pacific: Early Heat Action Plans and their Evaluation

*By Ankit Rathod, Tata Institute of Social Sciences, Mumbai, India*

The world witnessed a breaching of thresholds of all the climate indicators in the year 2023. The year was the warmest year on record at  $1.45 \pm 0.12^\circ\text{C}$  above the pre-industrial average (WMO, 2024). Consequentially, Heat waves have caused severe impacts across the globe. The extreme climate events have exacerbated the humanitarian crisis with 339 million people in need of Humanitarian Aid. The deaths from extreme heat events are projected to be comparable to the magnitude of all cancers or infectious diseases (GHO, 2024).

Asia witnessed a mean temperature of  $0.91^\circ\text{C}$  above the 1991-2020 reference period. Further, the Asia Pacific remained the most disaster-impacted region in 2023 with the increasing impact of heatwaves. It is to be noted that these impacts were disproportionate to the differentially

vulnerable people in the region (WMO, 2024). A major and prolonged heatwave affected much of Southeast Asia in April and May, extending as far west as Bangladesh and eastern India, and north to southern China. The most exceptional temperatures occurred in Thailand ( $44.6^\circ\text{C}$ ), Lao People's Democratic Republic ( $43.5^\circ\text{C}$ ), and Vietnam ( $44.2^\circ\text{C}$ ) (*ibid*).

The trends of the population being affected by extreme temperature events coupled with the development in the field of Early Warnings, forecasts and risk information has resulted in increasing trends of Anticipatory Actions in the region (APTWGAA, 2023). With countries developing their own heat index and correlating to the vulnerability maps to monitor the impact of heat on the people, numerous early heat action plans are

developed and designed contextualising the needs of the country. Very few early warning systems in South Asia confirm the need for better resource allocation to prioritise and combat heat-related impacts through preparedness and early actions (Kotharkar, 2021).

The collaboration of IFRC along with other international organisations and local governments has upscaled the forecast-based Financing to developing and implement customised local-level Early Action Plans. They have advocated for synergies between the departments of government viz: The meteorological, social welfare, finance, and disaster management along with other relevant departments to implement the Heatwave early action plans. In the Asia Pacific region, Australia through the Department of Health at



the local council level, Philippines through passing the legislation for declaration of the state of imminent disaster and Mexico utilising the established network of IFRC and local government have developed custom-tailored plans at the local level for effectively reducing the impacts of anticipated heat waves.

The evaluation of these plans is crucial for enhancing their reach and effectiveness further especially for the most vulnerable people. The key indicator to be considered while evaluating the effectiveness of the plan is the number of vulnerable people it covers. The accurate and reliable mapping of vulnerable populations and the overlapping maps of heatwaves correlated with the impact of heatwaves at what temperatures on those vulnerable people should be developed to provide boundaries to the coverage of the plan. As the vulnerability is different for different individuals, the coverage should demonstrate a wide range of Sex Age Disability Disaggregated Data (SADDD). Poverty being the key indicator for vulnerability along with the other capitals like social, human, natural and physical described by the Sustainable livelihoods framework of DFID should be acknowledged while developing the action plans. In the region, children going to school, females, expecting mothers, labourers especially women and elderly people, and migrants are considered a priority as they are more vulnerable to heat waves. Thus, to evaluate a Heatwave Early Action Plan there have to be evaluation toolkits which use surveys as a method to gather the above information as feedback and further enhance the reach of the Heatwave Early Action Plan towards the



Support the water cooler for school against extreme heat at Ahmedabad Municipal Corporation School. Photo: AIDMI.

vulnerable people. IFRC manual has a framework for the monitoring and evaluation of Forecast based Financing which provides feedback to improve and further localise the plans. This can be contextualised as per the requirements to reduce the anticipated impacts of heatwaves on people. ■

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# Extreme Heat and Building Resilience for Cotton Farmers in India

By Vishal Pathak, AIDMI, India

Crop insurance could help farmers manage the risks of an uncertain future. The government of India and state governments are taking several strong actions for farmers and farmers' organisations. More things can be done based on the progress and ground needs. Improvement in its coverage, affordability and effectiveness are some of the areas. The links between crop insurance and other risk reduction and adaptation measures, including government programmes and community-led initiatives, could also be better understood. Following are recent study<sup>6</sup> findings specific to extreme heat that have been done in key cotton-producing areas of India.

India is the world's largest cotton producer, accounting for nearly a quarter of global production. The cotton sector is crucial for India's economy and supports the livelihoods of approximately six million farmers. However, climate change – specifically more frequent periods of extreme heat – poses a

significant threat to the livelihoods of smallholder farmers, especially women, who depend on this crop, and it is a critical risk to the global textile supply chain.

India is the seventh most vulnerable country globally with respect to climate extremes (Eckstein et al. 2020). Heatwaves are becoming more frequent and are lasting longer, and this pattern is projected to continue (Mohanty and Wadhawan 2021).

Despite the introduction of BT cotton, pests and diseases still cause significant losses in cotton production (Madasamy et al. 2020), and these are exacerbated by unfavourable soil and climatic conditions, which will become worse over time due to the heatwaves, wildfires and drier conditions predicted (Forum for the Future et al. 2021).

We surveyed 360 cotton farmers from the Gujarat and Maharashtra states of India. Small farmers were

chosen from the major cotton-producing regions. Many households have experienced a hotter, drier climate over the past five years. Most respondents reported experiencing longer dry spells (72%), higher average temperatures (64%), greater number of days with extreme heat (64%) and reduced number of rainy days (69%).

- Over the past five years, farmers have perceived higher average temperatures, lengthier dry spells and a greater number of days of extreme heat.
- For farmers, extreme weather events like erratic rainfall and heatwaves are becoming more frequent, occurring every one to three years.
- The most frequent extreme weather events were heatwaves, which were experienced yearly or every one to three years by nearly 90% of respondents, and erratic rainfall, which was reported to happen every year or every one to three years by more than 80% of respondents.

Climate change presents clear threats to farmers' livelihoods, especially women. This is evident from the perceived loss of income related to the increased frequency of climate-related challenges like heatwaves and erratic rainfall. Evidence from this study confirms the high impact of heatwaves on small farmers, and the uptick in frequency of extreme events. ■



Cotton farmer working on her field in Polarpar village, Jasdán, Gujarat. Photo: AIDMI.

<sup>6</sup> Guarín, A, Blackmore, E, Pathak, V, Nicolini, G, Morell-Ducós, J and Kelly, L (2024) Building resilience for cotton farmers in India: evidence from Gujarat and Maharashtra. IIED, London. Published by IIED (September 2024). <https://www.iied.org/sites/default/files/pdfs/2024-09/22481IIED.pdf>.

## CONCLUSION

# How Should We Evaluate the Extreme Heat Projects: Focus on Inclusion, Democracy, and Extinction!

By Mihir R. Bhatt, AIDMI, India

AIDMI asked some of the extreme heat affected small businesses in cities and small farmers in rural areas in India about how any extreme heat project or programme must be evaluated. It took some time to explain what AIDMI meant by such evaluation and also what AIDMI team members were looking for. But it was not impossible to explain and get their minds racing, and ideas started coming out for the AIDMI team to capture, consolidate and cluster around three key themes: inclusion, democracy, and extinction.

The replies that AIDMI received from affected small businesses and small farmers are thought-provoking for those who design, develop, and evaluate extreme heat projects and programmes as well as for those who plan, manage, and conduct evaluations.

Firstly, several affected individuals in urban and rural settings informed the AIDMI team that extreme heat mitigation or adaptation projects must be evaluated for how they have addressed the inequality of cooling measures that are being taken. The ongoing cooling measures underline and reinforce the inequality and in many cases make those protected from extreme heat more protected and those exposed more vulnerable to extreme heat. For example, those who have air conditioners have more energy-efficient air conditioners but those who do not have air conditioners do not even get a fan or a canvas cloth for shade against the mid-summer heat glare. Similarly, those who have adequate cool drinking water more regularly, often



*An elderly woman in Varanasi sells vegetables facing the challenges faced by vulnerable workers due to extreme heat in 2024 summer. Photo: AIDMI.*

even have fruit juice but those who do not have easily available drinking water, struggle to access water at home or on the street. So the evaluation process must evaluate to what degree and how the project or programme has included those who are excluded from the extreme heat cooling measures. AIDMI's cooling work has found that women, casual labourers, migrants, minorities, and *tribals* are most often excluded from extreme heat-cooling measures. And this exclusion is system-wide.

Secondly, the evaluation must focus on how to make extreme heat governance more democratic throughout the project. That refers to what degree do the affected citizens have a direct say in planning, managing, evaluating, or financing cooling measures at the local level? What say do the street vendors have on the street shed set up? Who can decide the locations of cooling sheds for construction workers with the local authority? Why are those who lost income or assets not on the panels of extreme heat insurance authorities? Why are children not

invited to plan the opening of their schools after a heated summer vacation? Each of these groups have the right to cooling measures. The evaluation must see to what degree the project has supported these citizens to be central to the project decisions.

Thirdly, the most important feedback was that any evaluation must measure the success of projects or programmes by how that project or programme has set in its cooling adaptation and mitigating process that is faster than the pace at which extreme heat is accelerating. Any cooling project or programme, must overtake the global heating rate.

These are the three key demands from the affected population of small businesses in cities and small farmers in rural villages - inequality, democracy, and avoiding extinction. Evaluation can no longer focus on achievements of the objectives, targets, results of the project or a programme alone, because we all are rushing towards extinction much faster than we recognise. ■

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