

# Mercury Rising

Bangladesh is going through an intense bout of heatwave, the kind of which has not been seen in decades. This year has seen the hottest April in the country in 30 years. If things remain as they are, the heat will likely get worse in the coming years. What does it mean for us, and how do we deal with the rising temperatures? Three experts share their views on the matter with The Daily Star.

## Decades of heatwaves ahead



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Millions of Bangladeshis are currently suffering from a punishing heatwave, with temperatures unceasingly hovering around 40 degrees Celsius. The temperatures are significantly higher than the country's average maximum of 33 degrees during April. The heat wave has forced school closures, disrupted agriculture, and heightened the risk of heat stroke and other health complications.

Arguably, the prevailing heatwave in the country highlights concerns as climate change is spinning out of control. Heat waves are one of the most dangerous manifestations of climate change. It has thrown out any sense that heat vulnerability follows a pattern limited to peak summer months. The deadly heat waves would have been all but impossible without climate change. Instead, changing climatic patterns are accelerating the intensity, duration, and severity of heat waves. Besides, Bangladesh's geographical location in the tropical region amplifies the effects of climate change.

Although the country contributes only a tiny fraction of global carbon emissions 0.56 percent, by one count it is suffering disproportionately from their effects. Historical data reveals that the average daytime temperatures in Dhaka rose by approximately 2.75 degrees over the past two decades. This increase is much higher than the global average of around 1.2 degrees and already above the Paris Agreement's elusive goal of keeping the warming below 1.5 degrees. Experts predict that temperatures in Bangladesh will rise even more in the coming decades.

The primary reason for record heatwaves is a heat dome, which is a self-reinforcing, sprawling area of a persistent and strong high pressure system that traps hot air in the upper atmosphere. It is called a heat dome because the trapped air in the system acts like a lid on a boiling pot. As the high pressure forces the stationary air in the dome to sink, it gets compressed and heats up, pushing temperatures upwards. At the same time, the dome squeezes clouds away, giving the sun an unobstructed view of the ground, which then bakes in the sunlight. Consequently, heat energy quickly accumulates and temperatures rise. The heat dome leading to extreme temperatures with high humidity, without any precipitation or rainfall, can last for weeks and make cities like Dhaka an oven under the open sky.

Heatwaves are further exacerbated by the three-dimensional complexity of cities, disappearing lakes, and green spaces, among others, giving rise to the urban "heat island effect" that modifies some of the climatological factors in their immediate vicinity. With the loss of evaporative cooling normally provided by trees, lakes, and exposed soil, the gain of reradiated heat from the surfaces of high-rise buildings, narrow spaces between tall structures, dark surfaces, pavements, unshaded roads, sewers, air-conditioners, and industries that generate heat as a byproduct, the mean temperature of Dhaka and other cities in the country is on the rise. While the heat island effect does not produce dramatic temperature changes, over the years the cumulative effect is noticeable.

Another effect of climate change that augments heatwaves is balmy nights. During the last 50 years or so, overnight low temperatures during summer months worldwide have been warming at a rate nearly twice as fast as afternoon high temperatures, according to the state-run National Oceanic and Atmospheric Administration

(NOAA) of the US. The asymmetrical warming is because the greenhouse effect, responsible for global warming, operates round the clock, and nighttime temperatures are inherently more sensitive to climate forcing.

At this time of the year, *Kal Baishakhi* (nor'wester storms), a meteorological phenomenon characterised by rapid changes in weather, with strong winds, lightning, and thunderstorms accompanied by brief torrential rainfall, cools down the temperature considerably, thereby bringing relief from the scorching heat. However, the absence of *Kal Baishakhi*, another victim of climate change, is contributing to the oppressive heatwave.

In the 1980s, the duration of an April heatwave in Bangladesh was two to three days, and the

ourselves by converting sweat into water vapour around a constant body temperature not WBT of 37 degrees. If WBT is above 35 degrees, it will impede our body's ability to cool itself down, thus creating conditions for life-threatening heatstroke. Fortunately, the WBT of Dhaka with a high of 40 degrees Celsius and 45 percent humidity

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This April, Bangladesh has seen a record-breaking number of heatwave days—the highest in nearly eight decades.

PHOTO: PRABIR DAS

temperatures were relatively mild, hovering around the mid-30s. Last year, the heatwave was intense, lingering for about a week and the highest temperature was 42.2 degrees recorded in Rajshahi in mid-April. The Union of Concerned Scientists warns that in the next few decades if greenhouse gas emissions continue to grow, we will see 20 to

30 degrees. Nevertheless, if the humidity becomes 70 percent, the WBT will reach the threshold value. Or if the temperature hits 50 degrees with 45 percent humidity, the WBT will be 35.2 degrees.

Tackling climate change is so much more than a technological challenge. Long-term strategies are necessary to address its impacts. Unfortunately, most strategies formulated by world leaders fail to strike at the roots of the problem: the harmful emissions of greenhouse gases. Their cruel idiocy in dealing with this extraordinarily complex problem is a band-aid solution. Moreover, since heatwaves are increasing at an alarming rate, their absurd policies and adaptation strategies will soon fall short of safeguarding people, as well as protecting the global infrastructure and the natural world.

The world is getting hotter, drier, wetter, and weirder. Decades of future heatwaves, wildfires, severe storms, floods, and long-lasting droughts are already baked into the system. Therefore, what we do now will determine whether we can slow global warming enough to avoid climate change's worst impacts. Indeed, with ethical discernment, collective action, and a shared dedication, we can cool down our planet and keep it inhabitable. But it will take time. In the meantime, we should better prepare ourselves for future heat waves and help the most vulnerable people enduring the ongoing blistering heat.

30 days of very intense heat waves.

Heatwaves raise the following question: what is the hottest temperature that humans can tolerate? The answer is a wet-bulb temperature (WBT) of 35 degrees Celsius. (The WBT takes into account both heat and humidity and hence, is not the same as the ambient air temperature.) Like most warm-blooded mammals, we cool

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Rapid urbanisation, soaring temperatures, and the urgent need for sustainable solutions—are what currently defines the city of Dhaka, the capital of Bangladesh. The recent temperature surge in the city has been unprecedented. In April, it witnessed its second-highest temperature ever recorded, at 40.2 degrees Celsius. The highest temperature in Dhaka's history remains 42.3 degrees Celsius, recorded in April 1960. Heatwaves during the dry month of Chaitra, the Bangla calendar month that coincides with the period of mid-March to mid-April, intensified the discomfort, urging for a rethink of the country's urban strategies.

The intense heat absorbed by building walls and roofs from direct sunlight exposure can significantly raise temperatures, especially for top-floor flats in multistorey buildings in a city like Dhaka. Inadequate shade

air conditioners absorb heat, release moisture, and maintain ecological balance. Striking the balance between urban growth and safeguarding green spaces is vital for Dhaka's resilience against extreme temperatures and ensuring a sustainable future.

The metro rail system has emerged as a popular mass transit solution for Dhaka. Its expansion promises efficient connectivity and reduced traffic congestion. Integrating metro lines with greenways and blue nodes can revolutionise urban mobility. Imagine a network where metro stations seamlessly blend with green corridors. These integrated greenways, adorned with trees, shrubs, and native plants, would offer respite from the concrete jungle. At strategic points, blue nodes, natural water bodies, or revitalised canals become urban oases. Imagine strolling along a tree-lined path

canyons.

Dhaka's roads are mostly categorised into primary, secondary, and tertiary levels. While tertiary roads mostly serve as residential access routes, primary and secondary roads can be strategically integrated with greenways. Transforming selected roads into greenways while preserving the alternative ones for vehicular access enhances

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thermal comfort. Even tertiary roads, transformed into partial or half greenways or fully orthodox pedestrian greenways, effectively moderate temperatures.

Outside Dhaka, cities following similar development trajectories should reevaluate their strategies. Preservation should take precedence over relentless construction. While development is important and inevitable, it should be harnessed for climatic advantage. Incorporating blue and green networks during planning ensures a sustainable future. Reducing reliance on air coolers and promoting natural ventilation by keeping windows open enhances comfort. Transforming hard surfaces into softscapes, such as porous pavements, improves the microclimate. These materials allow for evapotranspiration, cooling the surroundings. Cool pavements, including PICP, can tremendously reduce daytime TA and MRT.

Edifices can contribute significantly to temperature reduction. Green roofs act as insulators, absorbing excess heat and providing additional green space. Vertical green walls enhance aesthetics, improve air quality, and reduce heat absorption. Urbanisation does not need to come at the cost of green spaces; rather, it should harmonise with them.

With the support of the UK-based Wellcome Trust, Griffith University, the University of Sydney, BMT, and BUET jointly conducted a three-year research project on the escalating heat exposure at garment factories in Bangladesh and its impact on workers. Workers at RMG factories endure physical discomfort from excessive heat exposure exacerbated by global warming, significantly reducing their productivity. This reduction is projected to reach five percent of the workers' total work hours by 2030.

Bangladesh is predicted to experience an increase of temperature by two degrees Celsius by 2050, which will lead to more frequent heatwaves, posing challenges for RMG factories. Increased reliance on air conditioners, as well as coal and gas for power generation, exacerbate the situation. However, proactive measures can reduce temperatures by two to three degrees through natural heat control methods, preserving work hours and minimising worker discomfort. A pilot project implementing climate change heat reduction recommendations can pave the way for sustainable solutions.

Dhaka thrives as a city of possibilities, a place where progress aligns with nature, ensuring comfort, resilience, and well-being for all. Its destiny hinges on all urbanites' collective commitment to sustainable urbanisation. Let Dhaka be a city where progress coexists harmoniously with nature, a beacon of sustainable urban living, ensuring comfort, resilience, and well-being for all.

with glimpses of shimmering water, a harmonious blend of nature and infrastructure.

These authors conducted several studies on the plausible impact of integrated greenways in ameliorating street canyon microclimates of residential Dhaka, ensuring pedestrian thermal comfort for the urbanites, between 2016 and 2023. These studies revealed that

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Dhaka's street canyons are thermally uncomfortable for pedestrians with raised air temperature (TA), mean radiant temperature (MRT), reduced relative humidity (RH), and wind speed (WS) during hot summer days. The authors steered field investigation in 13 points of eight street canyons for bare (no tree) and green or greenway (large green trees on either side of the roads) canyons. The field investigation showed that the greenway identical street canyons showed lower TA by 0.73-1.34 degrees and higher RH up to 0.44-1.58 percent than the bare

exacerbates this issue, leading to prolonged air conditioner use for comfort, resulting in higher energy consumption. The escalating demand for cooling devices has surged in Dhaka due to rising temperatures, which have increased by around three degrees Celsius over the past two decades, according to the Institute of Planning and Development (IPD).

This overuse of air conditioners has led to increased energy consumption both at the household and national levels. Studies have highlighted that a significant portion of electricity consumption in residential buildings is attributed to cooling purposes, with the latter noting that 38 percent of consumption is for cooling comfort provided by electric fans. According to a World Bank analysis in 2010, the majority of urban households in Dhaka consumed between 100 and 400 kWh of power per month, with wealthier households using over 400 kWh primarily due to increased air conditioner usage. This is ironic as air conditioners contribute to global warming.

Dhaka has been transforming into a city of roads, flyovers, and high-rises. Unfortunately, this development has come at the cost of widespread tree loss. Trees, crucial for heat mitigation, are being uprooted during road and flyover construction. Foliage gives way to concrete, and the microclimate within the city diverges significantly from rural surroundings. Dhaka's outdoor temperature registers 1-1.5 degrees higher than the adjacent regions. While development is essential for progress, preserving trees is equally critical. These natural