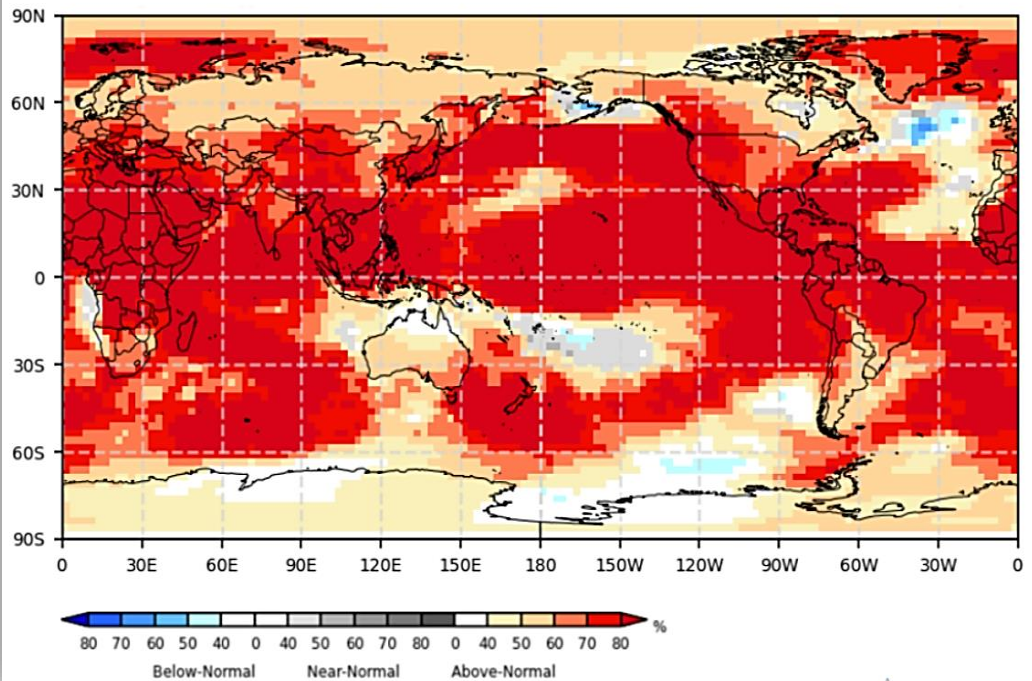




Probabilistic Multi-Model Ensemble Forecast, Issued May 2026, Source: WMO

Commentary

Amid the Super El Niño threat, baseline summer temperatures are escalating, driving long-term temperature rise due to relentless greenhouse gas emissions. Studies by global climate agencies show that since the 1980s, extreme heat events have become more frequent in India. The April 2026 heat wave across Northwest and Central India is not an isolated event; it reflects the increasing frequency, intensity, and duration of heat extremes in South Asia, substantiating global warming trends.

Major drivers instigating the heat are Climate Change and Global Warming, the urban heat island effect, and atmospheric circulation patterns. In the midst of this, India is losing prime dense natural forest. Forest cover has declined in biodiversity-rich areas like the

Western Ghats, Himalayan states, and the Andaman and Nicobar Islands.

The climatic insights include continental dryness, with low vegetation cover, thermal discomfort, localised temperature anomalies by 1.50C to 30C due to urbanisation processes and regional heat stagnation by persistent high-pressure systems over a wide area. It is affecting the vegetative cover and biodiversity.

Prolonged heat exposure is severely affecting human health in many ways. It also negatively affects infrastructure and the economy. The Environmental consequences are also severe.

The announcement of Super El Niño is expected to escalate the situation further. Very effective planning and implementation of several measures with utmost sincerity,

already documented by the IPCC report, may alter the situation.

NEWS

Field Visit Program to Pakur, Amrapara Watershed Areas, Jharkhand

On 6th and 7th May 2026, the IRBMS team conducted a field visit to the Pakur Watershed Project at Amrapara in Jharkhand. The main objective of the visit was to observe the progress of watershed development activities, assess the condition of water conservation structures, and review the overall implementation of the project. During the first



day, the team visited different locations under Micro Watersheds No. 1, 2, 3, 4, 6, and 7. Most of the project area consisted of hilly terrain with forests, rocky landscapes, and scattered agricultural fields. Farming in the region was mainly dependent on a single cropping season. Although the area is generally drought-prone, early rainfall had provided adequate soil moisture, creating favourable conditions for cultivation. Throughout the visit, the team inspected newly constructed farm ponds, re-excavated ponds, check dams, and recharge pits. Some newly constructed farm ponds were found to be located far from agricultural fields. At Baro Phahar, the forest restoration work

carried out by Mr Debendra Paharia was found to be highly successful. Active participation of local community members, especially women, was observed during the re-excavation of wells. The team also noticed significant improvement in forest cover at Simripara following the implementation of medbandi.



Existing check dams at Buridoba and Jamkanali were found to have sufficient water storage. During the visit, the team observed a total of 21 completed farm ponds, 8 re-excavated ponds, 1 proposed pond, 3 check dams, and 1 recharge pit. The team also collected groundwater-related information from a piezometer installed at a household in Kadamtola. Water quality analysis of a nearby

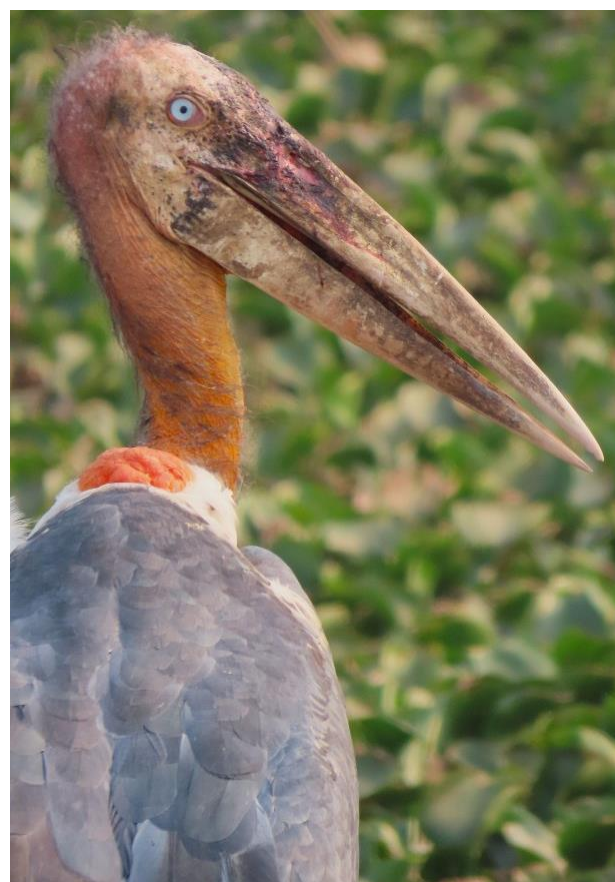


IRBMS

well showed a TDS value of 316 mg/L and a pH of 6.5. The well had a static water level of 29 feet below ground level with a water column depth of approximately 4 feet. On 7th May 2026, the IRBMS team visited the office to participate in a review meeting. The meeting focused on reviewing completed activities, identifying pending works, and preparing an implementation plan for the next financial year. Overall, the field visit provided valuable insights into the progress of watershed management activities. The project has contributed to improving water conservation, groundwater recharge, and forest restoration while encouraging active community participation. Proper planning and timely completion of the remaining works will further strengthen the long-term sustainability of the watershed programme.

Hargilas on top of hills of Garbage

Hargila, or Greater Adjutant birds, were widely available across Southeast Asia but have now



been labeled as threatened by the IUCN

(International Union for Conservation of Nature). The name of these towering scavenger birds owes its origin to their practice of swallowing bones. The birds are as high as a man and characterized by their long necks, very big, sharp bills, and look like a bigger version of a stork. Now they are found in



pockets – in the landfill areas on the heaps of garbage and live on the carcasses.

Presently, less than 1200 Hargila birds are estimated in the wild. A large number of them are found in Assam – in the Boragaon-Guwahati landfill, particularly in the Solid Waste Processing Plant of the Guwahati Municipal Corporation. This landfill is regarded as the birds' place because of the presence of several giant birds. Assam Government has taken conservation effort to save Hargilas with the help of Women-led-community initiatives in terms of protection of Greater Adjutant's nesting trees, awareness generation in public and reassuring their presence not as nuisances but as a token of pride for the local people.

Source: earthlynates.com

Multiple Climate Extremes Could Put 36% of Land Animal Habitats at Risk by 2085

Extreme heatwaves, increasing intensity and number of wildfires, droughts, floods – incidents of Climate change phenomena are increasingly affecting the wildlife and biodiversity. A recent study published on 09.12.2025 in Global Change Biology journal, warns that, around 36% of the habitats of terrestrial vertebrates such as amphibians, birds, mammals and reptiles may experience several extreme weather events by 2085. The researchers took the factor of species range exposure to extreme heat events (relative to temperatures during 1950–2005) and land use changes in species' preferred habitats into account in their study.

They projected nearly 30,000 species are under dominant threat of heatwaves or inappropriate land use and extreme heat could be the cause

of the extinction of more than 8000 species of vertebrates by the end of the century. The researchers studied different climate scenarios of thermal limits linked with different future social paths to project different probable climate futures. The scenarios are ranging from sustainable low warming to fossil-fueled high warming and emissions which have different impacts on temperature, food security, urban areas and health. The study



predicted that amphibians and reptiles will be exposed more to unsuitable conditions than the birds and mammals. Even in the most optimistic scenario of low warming, 23% of amphibians and 13% of reptiles probably face more challenges than in 2015 because of mixed effects of heat events and land use changes.

According to the researchers “The synergistic impact of climate and land use changes is most noticeable in the Sahel — Sudan, Chad and Mali, the Middle East — Afghanistan, Iraq and Saudi Arabia, and Brazil,”. In most adverse situation, in wide areas of Brazil, Bolivia, Paraguay, North Africa, the Middle East, India and Western Australia, most of the species will be under unsuitable climate conditions.

They also said that, 2019-2020 heat wave caused killing of 72,000 flying foxes in



Australia and 17 million vertebrates in Panatanal zone of Amazon region.

The researchers added that other additional stress issues like interspecific interactions, extreme climate events like wildfires, drought, anthropogenic pressures, may get influenced



by extreme heat waves as well as land use changes and have not been taken into analysis which may further increase loss of biodiversity.

Another study by scientists of several countries under the leadership of Potsdam Institute for Climate Impact Research (PIK) was published in Nature Ecology and Evolution journal. The aim of the study was to identify the gaps in conservation planning of different species in different geographical regions and mark the most vulnerable species against the risk of four weather events. The dataset studied over 794 core regions included around 34,000 terrestrial vertebrates (7605 amphibians, 10,562 mammals and 10,293 reptiles).

Among these four crucial threats, heatwaves are expected to have the widest impact. By 2050, around 74% of the areas within of the species' current geographic ranges could be exposed to heatwaves whereas approximately

16% could face wildfires, 8% droughts and 3% river floods. The Amazon Basin, Africa and Southeast Asia have been identified as major hotspots of loss of biodiversity.

The study expressed that the frequency of extreme wildfire events may scale up the species range to 25% by 2085. The hotspots of increased wildfire frequency are the species-rich areas of Amazon basin, southern Africa and south-east Asia. Under the high emission scenario, in mid-latitude, nearly 25% areas of 130 ecoregions will be under wildfires by 2050.

Droughts and river floods also may affect the species' range by 8% and 3% respectively. The study predicted strong escalation of floods solely in some localized areas in Central Africa, taiga and tundra by 2085.

Amphibian habitats are also expected to be particularly vulnerable because of their sensitivity to environmental changes by 2085.

Another major finding of the study is the growing risk of multiple extreme events occurring in the same or consecutive years which terrestrial vertebrates are expected to experience. The researchers pointed out that more than 50 per cent of the area for 22 ecoregions will be exposed to at least two types of events already by 2050 in mid-latitude regions and by 2085, this will be enhanced to



236 ecoregions. The analysis of the 2019–20 Australian fires found 27–40% higher declines in plants and animals when fires were preceded by drought underscoring the risk of multiple hazards.

Researchers also said that depending upon the adaptability, different species may be affected differently but species in limited geographic range are most vulnerable due to less flexibility to move to a safer place. As for example, the riffian skinks (*Chalcides Colosii*) were only found in forests in postfire years as they rely on open habitat. They said that because of this adaptability regions with regular flooding or moderate wildfire have more biodiversity.

The researchers added that native species face higher vulnerability than non- native species as found in 2011 Western Australian heatwave which caused decline of 60% of Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) population. These extreme weather events may also influence abrupt changes in taxonomic groups as 2011 Australian heatwave increased shrub and tree mortality causing changed habitat quality for many species.

Extreme weather events can also worsen other pressures such as habitat loss and disease, creating additional threats to biodiversity. The study highlights the need for the conservation strategies that consider multiple climate hazards together, rather than treating each extreme event separately. Protecting habitats, support ecosystem resilience and planning for changing climate conditions simultaneously are needs of the hour for the conservation wildlife in the coming decades.

Source:

- *Effects of Future Climate Extreme Heat Events and Land Use Changes on Land Vertebrates,*

Reut Vardi, Gopal Murali, Gabriel Henrique de Oliveira Caetano, Uri Roll, Shai Meiri, *Global Change Biology*, Volume 31, Issue 12 e70625

- [downtoearth.org.in: multiple-extreme-weather-events-to-impact-36-land-animal-habitats-by-2085-study](https://downtoearth.org.in/multiple-extreme-weather-events-to-impact-36-land-animal-habitats-by-2085-study)

RIVERS OF INDIA

Krishna River (Part - 2)

Bhima River Basin

The Bhima River, an important river system of peninsular India, is a major left-bank tributary of the Krishna River. Originating at about 1,029 m above mean sea level in the Bhimashankar region of Maharashtra, it flows southeastwards for approximately 861 km before joining the Krishna River in Karnataka. Its drainage area is about 70,614 km², covering Maharashtra and Karnataka and partly Telangana. The basin forms part of the Deccan Plateau and Deccan Trap basaltic formations with varied terrains from the steep, dissected Western Ghats in the west to relatively gently low-relief & undulating Deccan plateaus following broad downstream valleys towards the east. The drainage is predominantly dendritic, with runoff and groundwater availability strongly influenced by variations in topography, geology, soils and rainfall.

The basin has a tropical monsoon climate. Rainfall is highly uneven, declining substantially from the high-rainfall Western Ghats in the west towards the semi-arid interior plateau in the east, with fluctuations in runoff, groundwater recharge and water availability. The major tributaries include the Ghod, Kukadi, Indrayani, Pavana, Mula, Mutha, Bhama, Nira, Sina, Man and Bori.



IRBMS

Numerous reservoirs, including Khadakwasla, Panshet, Varasgaon, Temghar, Mulshi, Pavana, Chaskaman, Dimbhe, Yedgaon and Ujjani, cater for irrigation, domestic and industrial water supply, drought management and seasonal flow regulation.

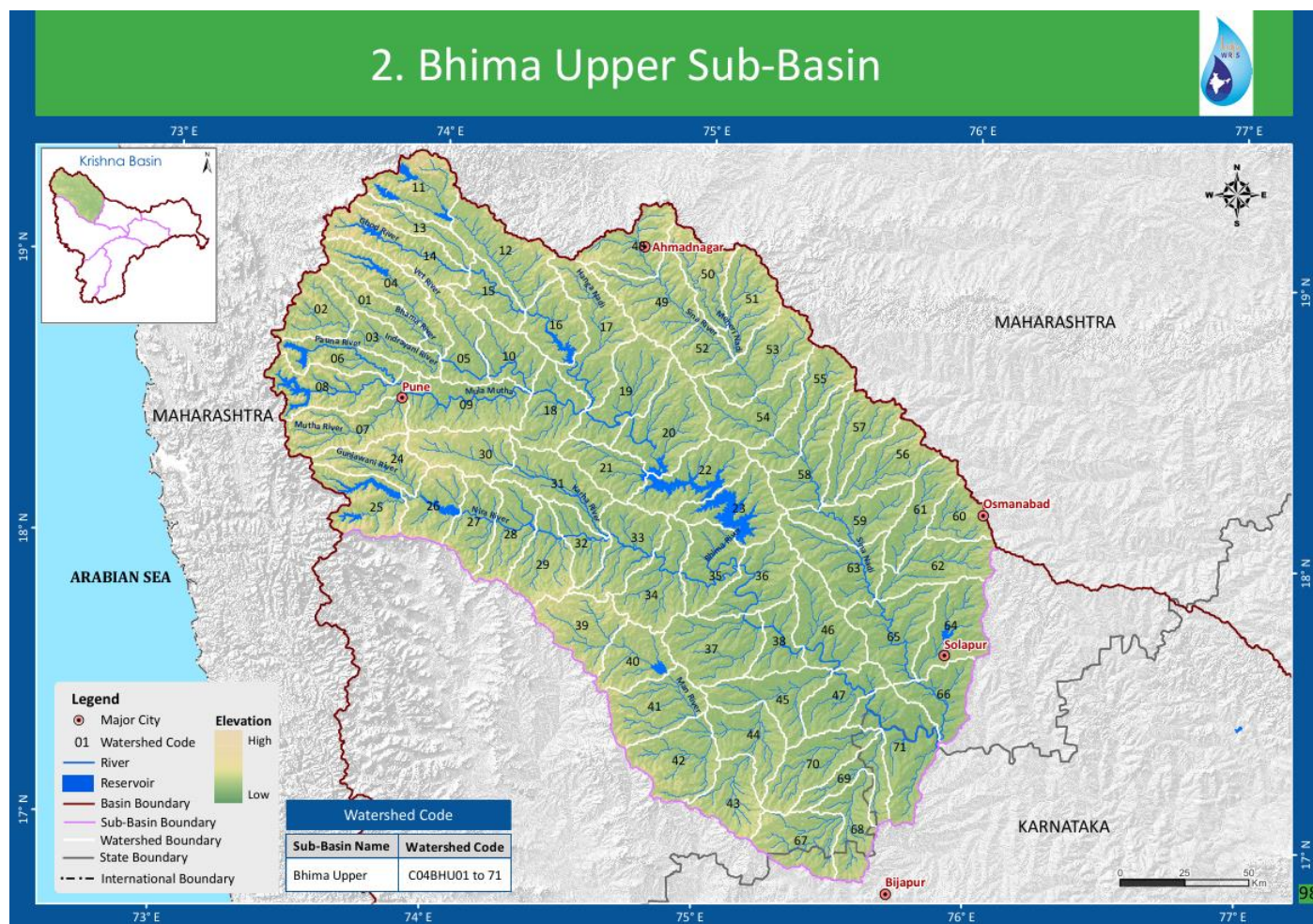
Agriculture is the principal land use in black and medium-black soils developed over basalt. Major crops include sugarcane, sorghum, wheat, maize, cotton, soybean, pulses and horticultural crops. Increasing urbanisation, particularly around Pune, along with industrial growth, intensive irrigation and increasing

pollution, agricultural runoff, soil erosion, wetland degradation, forest loss and changing rainfall patterns. The basin therefore requires integrated management of surface water and groundwater, efficient irrigation, watershed conservation, pollution control, ecosystem restoration and systematic monitoring.

Bhima River Basin is divided into the Upper Bhima Basin and Lower Bhima Basin.

Upper Bhima River Basin

The Upper Bhima River Basin, the upstream



groundwater drafting are creating pressure on water resources. Other environmental concerns include wastewater and industrial

portion of the Bhima sub-basin, lies predominantly in Maharashtra (98.4%), spanning parts of Pune, Solapur, Ahmednagar,

Satara, Sangli, Beed and Osmanabad districts with a population density of 373/km² (2011). The Upper Bhima Basin, covering an area of approximately 45,000 km², shares 17.9% of the total Krishna Basin area. The basin exhibits substantial variation in relief, slope and drainage characteristics. Approximately 25% comprises hilly and dissected terrain, 55% plateau areas and 20% plains and valley-fill areas. The catchment is located between 16.5° - 19.5° latitude and 73.0° - 76.5° longitude. The elevation ranges from 414 meters in the east to 1458 meters in the Western Ghats mountains.

The geology is dominated by multi-layered Deccan Trap basaltic lava flows, with groundwater occurring mainly within weathered, jointed and fractured zones; alluvial deposits are locally present along major river valleys. With the western highland areas receiving substantially more precipitation than the eastern plateau, average annual rainfall ranges from 450 mm to 2500 mm, with approximately 85% of its annual rainfall during the Southwest Monsoon. Intense monsoon storms frequently generate rapid runoff and soil erosion, while the eastern areas experience chronic water scarcity. These conditions make groundwater recharge and storage highly dependent on local geology, weathering, topography and rainfall.

The tributary system of Upper Bhima comprises Mula, Mutha, Pavana, Indrayani, Bhama, Ghod, Kukadi, Mina and Hanga rivers. Major reservoirs are Khadakwasla, Panshet, Varasgaon, Temghar, Mulshi, Pavana, Askhed, Chaskaman, Dimbhe, Yedgaon, Pimpalgaon Joga, Visapur and Ghod, which play an important role in irrigation, urban water supply and regulation of seasonal flows.

Groundwater is particularly important because of the basin's seasonal rainfall and high agricultural and domestic demand. GSDA (Groundwater Surveys and Development Agency) has divided the basin into 68 sub-watersheds for groundwater assessment and maintains a monitoring network comprising 321 groundwater-monitoring sites, including 236 observation wells and 85 piezometers, together with 50 water-quality monitoring sites. The cited GSDA assessment also identifies 13 of 15 talukas as drought-prone.

Agriculture remains a major land use, with irrigated areas supporting sugarcane, cereals, pulses, vegetables and horticultural crops. However, expansion of the Pune Metropolitan Region, industrial development, increasing water demand, groundwater extraction and land-use conversion have intensified pressure on natural resources. The Mula-Mutha system is particularly important because of its association with Pune and its surrounding urban areas.

In a more focused Land-use/land-cover study for comparative analysis in the Upper Bhima Sub-basin, the Centre of Studies in Resources Engineering, Indian Institute of Technology Bombay, further demonstrates the scale of this transformation discussed above in an Area of Interest (AoI) of 11,259.60 km² within a latitudinal extent of 18° 17'N to 19° 24'N and longitudinal extent of 73° 20'E to 74° 43'E. In this context, the Upper Bhima Catchment area has been divided into three major adjoining sub-basins—Mula-Mutha (approx. 2,918.20 km²), Bhima (approx. 3,806.20 km²) and Ghod (approx. 4,535.20 km²)—representing highly urbanised, semi-urbanised and relatively less urbanised settings, respectively. Between 1980 and 2009, the Bhima sub-basin experienced a marked increase in built-up land (0.40% to



2.50%) and agricultural land (3.69% to 10.29%), while water bodies increased from 0.34% to 0.78%. During the same period, forest cover declined from 2.02% to 1.27% and wasteland from 26.88% to 18.50%. Across three sub-basins, the overall trend indicates expansion of built-up areas, agriculture and water infrastructure alongside reduction of forests and wastelands, with the most pronounced urban transformation occurring in the Mula-Mutha sub-basin.

The Upper Bhima Basin is therefore a significant area for integrated watershed and water-resource assessment, owing to its contrasting physiography, basaltic geology, highly variable monsoon rainfall, groundwater dependence, extensive reservoir network, agricultural intensity and rapid urbanisation. These characteristics may be studied in detail for GIS and remote-sensing based assessment of drainage characteristics, land-use/land-cover change, soil erosion, runoff, groundwater potential, watershed prioritization and environmental management.

Source:

- Understanding the water cycle in the Krishna basin: *Remote sensing-based modelling of the Upper Bhima sub-catchment*-www.futurewater.eu
- gsda.maharashtra.gov.in
- *Identify Areas to Improve Agricultural Water Productivity in Upper Bhima Catchment of South India*, Kaushal K. Garg, A. Gaur-cgspace.cgiar.org
- wrd.maharashtra.gov.in
- Ministry of Jal Shakti. (2023). National Water Policy and Integrated Water Resources Management Reports. Government of India.
- Central Pollution Control Board (CPCB). (2023). River Stretches for Restoration of Water Quality
- Ministry of Environment, Forest and Climate Change, Government of India.
- Ministry of Water Resources, Govt. of India
- Krishna Basin. - Watershed Atlas of India
- The Hindu
- Central Water Commission. (2023). *Water Resources Information System (WRIS): Krishna Basin*. Ministry of Jal Shakti, Government of India

(to be continued...)

Special Feature

India's Rising Heat: April 2026 Heatwave

Indian summer is changing its nature –with extreme heat and early onset of heat waves, long-lasting diurnal temperatures extending its duration into the night over a large part of the country. The record high daytime temperature is not a problem anymore. In combination with increasing humidity, warmer nights, growing city boundaries, decreasing urban forests and vegetation, conversion of waterbodies and low-lying areas into built areas etc, extreme heat regime creates a difficult situation totally unhealthy for human health, environment and economies.

Several parts of northern, central and western India suffered from abnormally high temperatures and heatwaves between April 24 and 28, 2026. The temperature of Banda, in Uttar Pradesh, soared up to 47.60 °C, while Delhi, Lucknow and Ahmedabad touched 44 – 45°C or more. Even in nighttime, the temperature remained around 30°C in many areas, without giving hardly any relief from extreme heat.



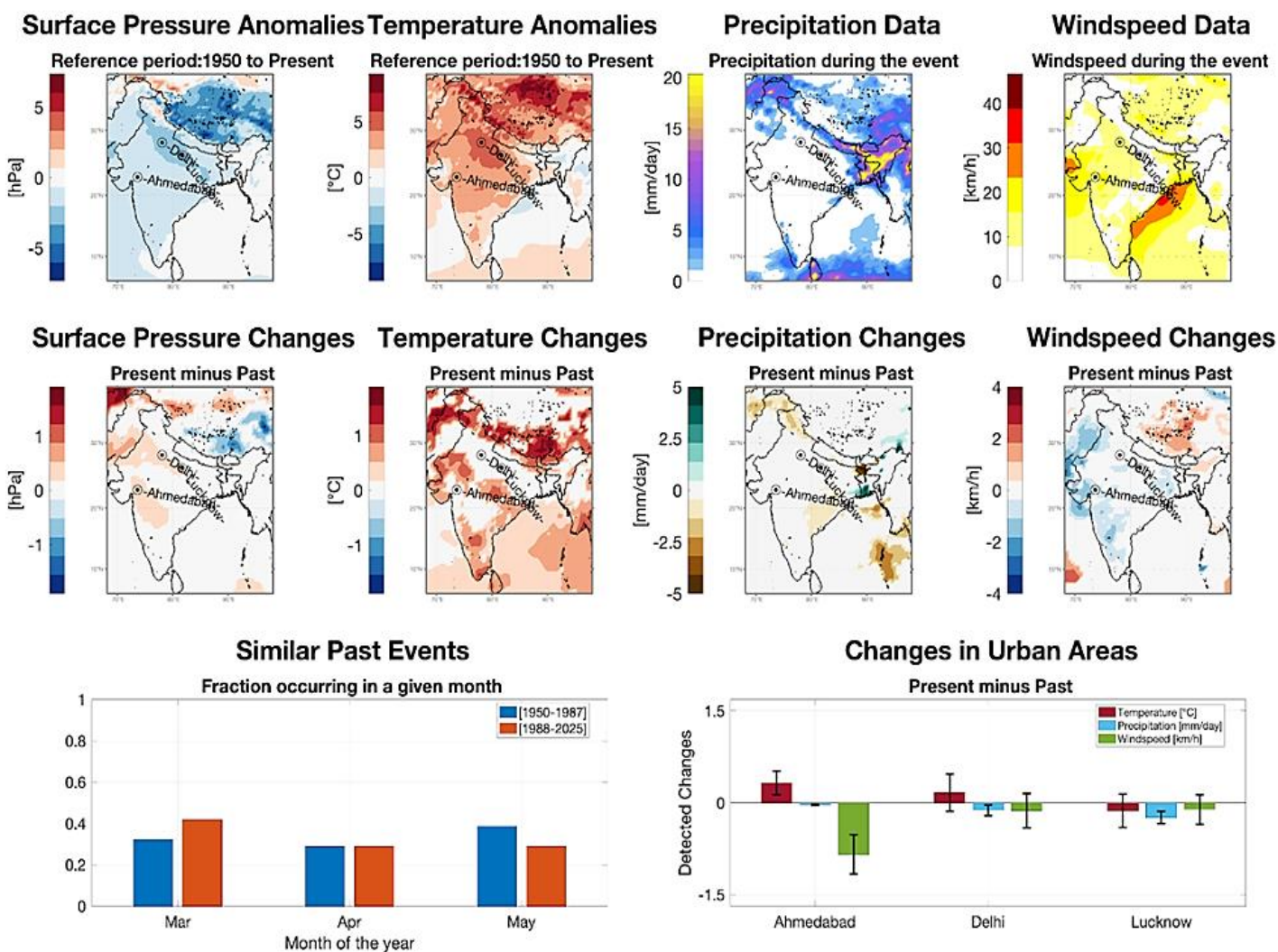
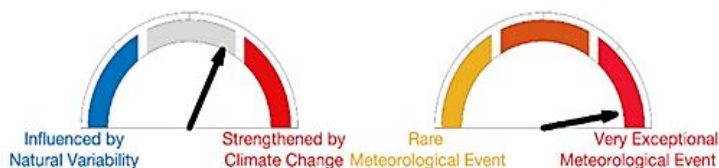
Role of Climate Change

The Institut Pierre Simon Laplace (IPSL), a French research institute specialised in climate, environmental and planetary studies,

hosted ClimaMeter, a rapid framework to understand extreme weather events in a changing climate by analysing the conditions of similar past weather events. According to ClimaMeter, the meteorological conditions

29-Apr-2026CNRS-IPSL (ERA5+GFS Data)

ClimaMeter for India Early Heatwave 24-Apr-2026 to 28-Apr-2026



that created the April 2026 heatwave were 2°C warmer in comparison to its past similar events. This analysis signifies the additional warning of human-induced climate change phenomena, with a very limited role of natural climate variability in the event. It is estimated that 43.94 million people and around US\$341.13 billion in economic activities were exposed to this extreme heat event. Moreover, atmospheric as well as surface conditions like deep penetration of northwesterly hot winds from the Rajasthan desert and Sindh regions in northern and central India and the absence of strong weather control systems, scanty rainfall and dry conditions all decreased evaporative cooling and escalated the situation by holding more solar energy and heat continuously in the landmass and the air around it. It explains the role of climate change in making already severe weather phenomena into more extreme events, bringing more people under its impact.

This rising, prolonged heat pattern is explicit in long-term trend analysis also. In the Core Heatwave Zone of India covering Delhi, Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar, Odisha, Telangana and some parts of Maharashtra, the IMD (India Meteorological Department) data shows that heatwave frequency and duration have risen by around 0.1 day per decade since 1961 and the total duration by around 0.44 days per decade. So, the worry is not only the sporadic extreme temperature but the increasing continuity of heat.

In urban areas, the situation is more challenging. After a hot day, the dense city areas cool down, releasing heat gradually. But with the trend of temperature rising along with increasing concrete buildings, asphalt roads, decreasing trees, bushes, water bodies, and low-lying areas to accommodate excess

rainwater, increasing vehicles, and air-conditioning machines, the urban areas become warmer than their surroundings. Recent studies show that urban heat island intensity may be about 2°C to 10°C with its maximum impact at night. Hence, urban areas fail to get natural cooling, depriving human bodies of the ability to recover from daytime heat. The recovery time is progressively decreasing. Recent assessment reflects that 35 states out of 36 States and Union Territories have been experiencing increasing nighttime temperatures.

Humidity also plays a big role in changing heat patterns. In the presence of more moisture in the air, the sweat of the human body evaporates less, reducing the ability to cool down. A recent study shows that the average relative humidity of India has soared from 67.1% in the 2015-2019 period to 71.2% in 2020-2024. Thus, even if the temperature is not extreme, people suffer from highly unsafe levels of heat stress.

Impact on Health, Urban Settlements and Livelihoods

The resultant effects of prolonged heat exposure act gravely on people's health. Dehydration, heat stroke, heat cramps, and electrolyte imbalances have become very common. Disturbed sleep during warm nights may increase the risks of cardiovascular, renal, and respiratory stress and result in less physiological recovery, putting the human body under cumulative heat stress. Prevailing illness may become unmanageable. Children, old people, pregnant women, and persons with chronic illnesses become more vulnerable. It is found that in Lucknow, heat-related illnesses increased by 30% to 40% in April 2026. The



whole heat event is putting pressure on health services and infrastructure.

The impact is falling on the day-to-day life of people and the economic arena, from more demand of electricity to agriculture and food production. Agriculture may suffer from high temperatures due to drying up of soil moisture, increased irrigation needs, drying water bodies leading to less yield, crop loss, high prices of crops, inflation, and highly vulnerable food security.

Preparedness

The Ahmedabad Heat Action Plan, embedded with early warning systems and a public awareness programme designed by India after the 2010 dangerous heat wave occurred in Ahmedabad, is an example of the use of coordinated warnings, public health measures, monitoring and network communication to lessen heat-related illness. Along with this, heat preparedness and strong implementation with trustworthy local data and infrastructure should also be an inevitable part of the programme to address this challenge.

Hospitals should be equipped with heat-response protocols, uninterrupted electricity and water supply indoors, and arrangements for drinking water, shaded areas and safe duty timing for the outdoor health personnel.

Urban areas need appropriate long-lasting heat-risk planning and implementation with construction of heat-resilient buildings, protecting existing vegetation cover and effort to grow more green cover with broad-leaf plants, saving water bodies, building more shaded areas for living, working and resting, etc.

Monitoring of heat-related illnesses and loss of life should be documented properly to understand the depth of the danger and needs of the situation. Communication at the local level regarding temperature, humidity, water availability, demography, health facilities, and types of work people engaged in with exposure to heat are very important.

It is very clear that the 2026 heatwave cautions that extreme heat is not a single temporary uncomfortable event. But its pattern gives a comprehensive picture of a bigger environmental, health and development problem. The question is no longer the rise of mercury in thermometers. It is more about the intensity and duration of the lasting heat, the amount of humidity present in the air, fall of temperature at night, retention of heat by concretes and asphalt in the cities, and the vulnerability of local people. So, India has to prepare and implement climate change adaptation schemes at every level of planning for safe livelihoods and communities.

Source:

- deccanherald.com
- thegjms.org
- outlookbusiness.com
- newindianexpress.com
- climameter.org

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Published by Girija Sankar Chattopadhyay, IRBMS, and
Advisor: Sujit Choudhury.
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