

Heat and Cold Waves

An Overview

Heat and cold waves have been a part of extreme weather events, which cause enormous losses in terms of lives and human discomfort and ailments arising out of them. As per the assessment made by World Meteorological Organisation (WMO) for the year 2007, surface temperatures for the northern hemisphere were found to be the second warmest on record, at 0.63°C above the 30-year mean (1961-90) of $14.6^{\circ}\text{C}/58.3^{\circ}\text{F}$. The southern hemisphere temperature was 0.20°C higher than the 30-year average of $13.4^{\circ}\text{C}/56.1^{\circ}\text{F}$, making it the ninth warmest in the instrumental record since 1850. January 2007 was the warmest January in the global average temperature record at $12.7^{\circ}\text{C}/54.9^{\circ}\text{F}$, compared to the 1961-1990 January long-term average of $12.1^{\circ}\text{C}/53.8^{\circ}\text{F}$. Further, 2007 started with record-breaking temperature anomalies throughout the world. In parts of Europe, winter and spring ranked amongst the warmest ever recorded, with anomalies of more than 4°C above the long-term monthly averages for January and April.

Incidence of 2007 Heat Wave in South Asia

A heat wave is a hot period, which lasts from a few days to a few weeks, and which may be accompanied by high humidity. Severe heat waves could damage crop, and kill from hyperthermia. If accompanied by drought, heat waves can lead to wildfires.

As per the assessment made by IMD, the 2007 extreme heat waves in India were considered to be the fourth warmest year on record since 1901. In 2007, the annual average air temperature over India was 0.55°C above the averages between 1900 and 1961.¹ Further, as per the assessment, eight of the ten warmest years occurred in the decade 1997-2007. These warmest years were 2002, 2006, 2003, 2007, 1998, 2004, 1999, and 2001, in the order of warmness. The annual trend of maximum temperature anomalies is shown in Figure 7.1. The mean annual temperature anomaly over India

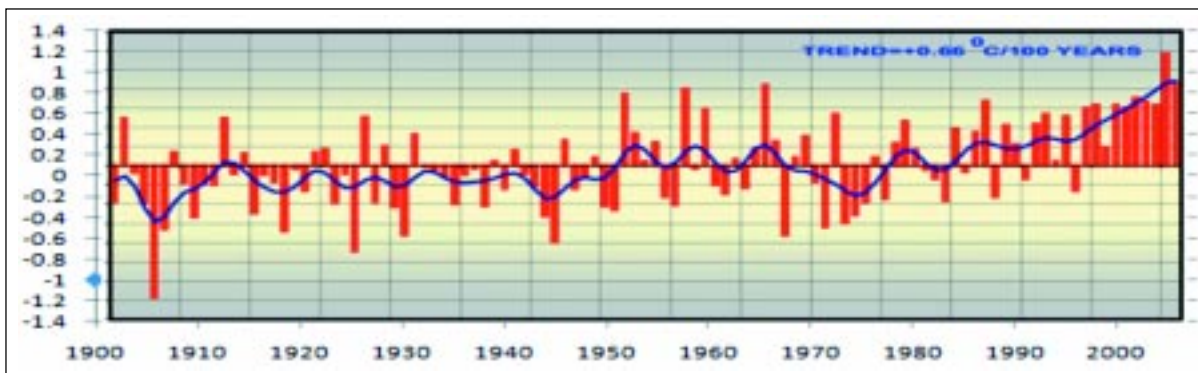


Figure 7.1: The annual trend of maximum temperature anomalies, 1900-2007¹

also showed the warming over most part of India (Figure 7.2); the maximum temperature anomalies were recorded having higher temperature over west Uttar Pradesh, Haryana, Punjab, Jammu and Kashmir and adjoining areas (Figure 7.3), the heat waves were generated in these places and killed many people.

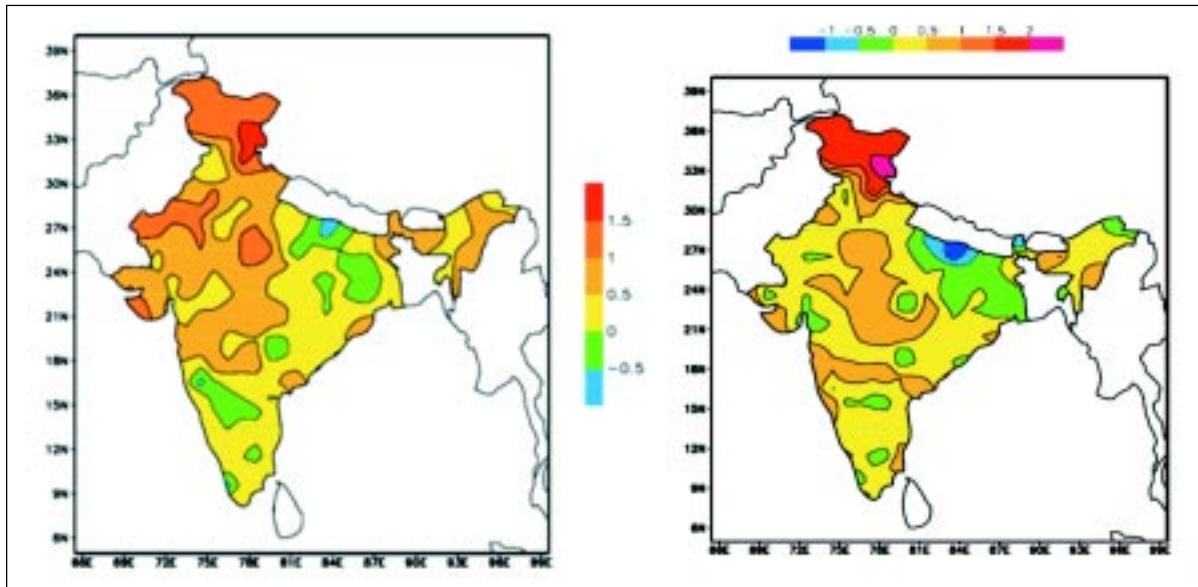


Figure 7.2 Annual mean temperature anomalies 2007 with respect to 1961-1990¹

Figure 7.3 Maximum temperature anomalies 2007 with respect to 1961-1990¹

More than 200 people were also killed in Pakistan. Some parts of the country experienced more than 50°C temperature during June 2007. The cause and timing of the heat

Heat Wave, India, 2007

In India, the heat waves during April to June 2007 led increasingly higher temperatures. The heat waves were observed over coastal Andhra and Telangana during May.² The western Himalayan region was also warmer than normal during the last week of March and April and the first week of May 2007. As per EM DAT data, these events claimed more than 72 lives. The heat wave raised the maximum temperature above 5-7°C over the northern and central parts of India during the first 10 days of June 2007, which killed 72 people (Table 7.1) during that period. The temperature anomalies of 2-10 June compared to the 1961 to 1990 average were higher over many parts of India¹ (Figure 7.4).

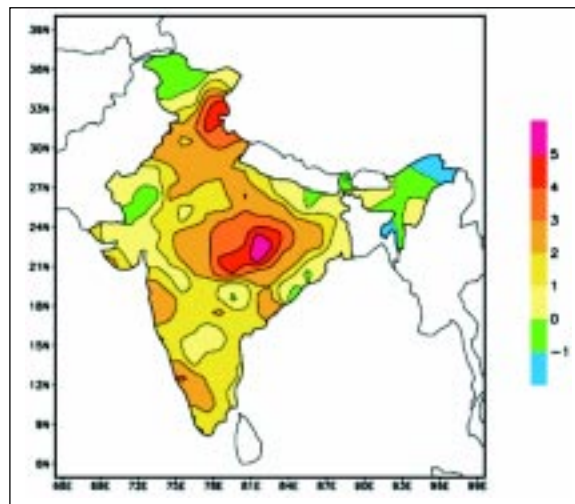


Figure 7.4: Maximum temperature anomalies (°C) of 2-10 June compared to 1961 to 1990 average¹

Table 7.1: Heat wave casualties in India, 2007¹

Type	Disaster	Country	Start	End	Killed
Extreme temperature	Heat wave	India	April 2007	June 2007	72

In 2007, many places over north-west India witnessed maximum extreme temperature to the tune of nearly 50°C. The monthly mean temperature over the western Himalayan and northern region was the highest in the last 100 years.¹ During May 2007, Sikkim and sub-Himalayan West Bengal, Bihar, and coastal Andhra Pradesh experienced temperatures more than 2°C than the average normal temperature (Figure 7.6b). The month of April also observed extreme heat. The northwestern and northern parts of India observed extreme heat in the month of April (Figure 7.6a). During the first fortnight of June 2007, a large population over many parts over India experienced heat waves (Figure 7.5).

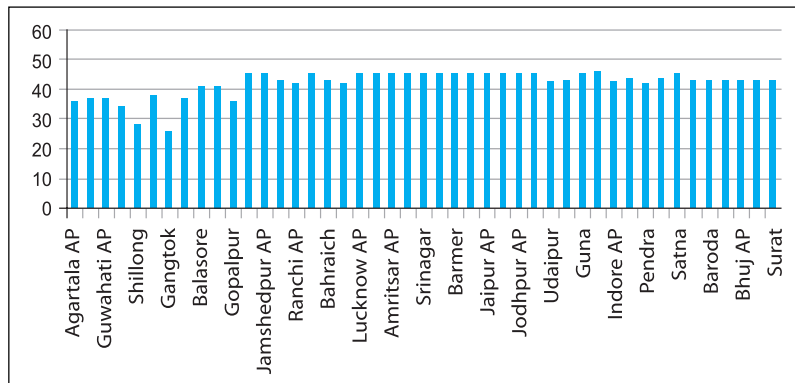


Figure 7.5: Extreme maximum temperature, 2007, India

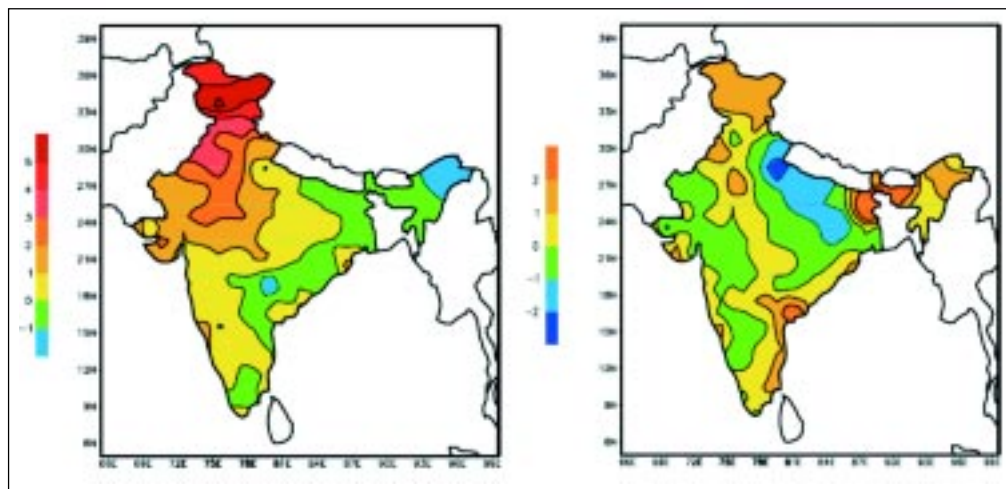


Figure 7.6a: Monthly mean temperature anomalies of April 2007

Figure 7.6b: Monthly mean temperature anomalies of May 2007

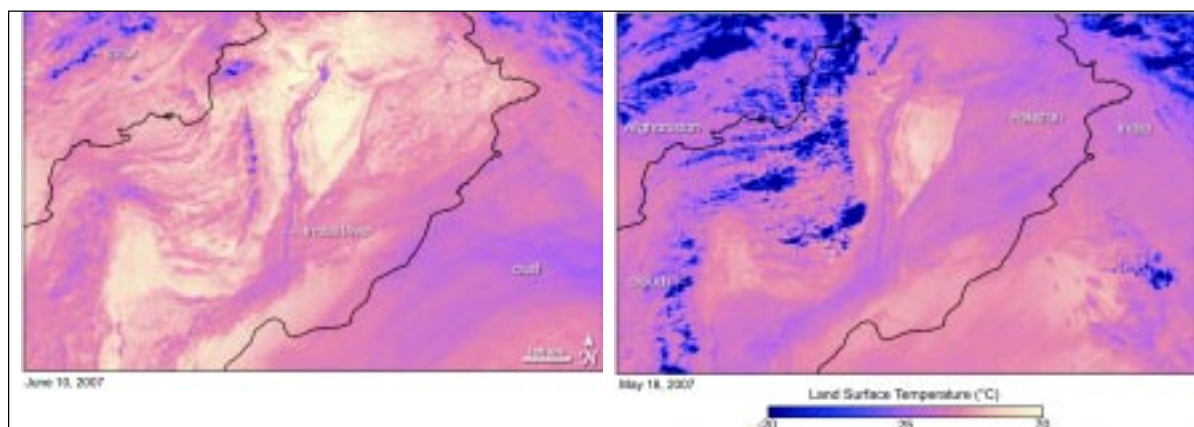
Heat Wave, Pakistan, 2007

As per a Relief Web report, the 2007 heat wave in Pakistan claimed 232 lives.^{3,4} In June, more than 70 people died in the Central province of Punjab. Temperature to the extent of 50°C was recorded over the North-West Frontier Province. The meteorological department registered a record maximum temperature of 52°C at Sibi.⁴ The casualties from heat wave in 2007 over Pakistan are depicted in Table 7.2.

Table 7.2: Heat wave casualties in Pakistan, 2007⁴

Type	Disaster	Country	Start	End	Killed
Extreme temperature	Heat wave	Pakistan	May 2007	June 2007	232

As shown in figures 7.6, Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured a top image of Pakistan showing the high temperature distribution over the central part of Pakistan

**Figure 1.6:** Land surface temperatures, June 10, May 18

Incidence of 2007 Cold Wave in South Asia

A cold wave is an extreme cold weather condition, which can cause death and injury to humans and animals. A major cold wave was triggered in northern India and Bangladesh in 2007. Temperatures close to freezing point claimed many lives in India and Bangladesh. In Nepal, temperatures across the southern plains were reported as around 12°C below normal. On 14 February, Kathmandu received its first snowfall in 63 years.

Cold Wave in Bangladesh, 2007

In Bangladesh, the cold wave killed more than 20 people in December 2007. Most of them died within 48 hours. The country's lowest temperature of 8.6 degree was recorded at Rajshahi.⁵

In first week of January 2007, a severe cold wave swept through most parts of Bangladesh, especially the northern and northwestern districts, and affected thousands of vulnerable people ill-prepared to cope with cold conditions. According to local media sources, more than 100 cold-related deaths were reported.⁶

Many units of the Bangladesh Red Cross Society (BDRCS) and the Bangladesh delegation closely monitored the situation. Some of the branches of BDRCS distributed blankets and warm clothing from their own resources. As an immediate response to the growing emergency, the BDRCS and the Bangladesh delegation distributed approximately 8,700 blankets among the affected population.

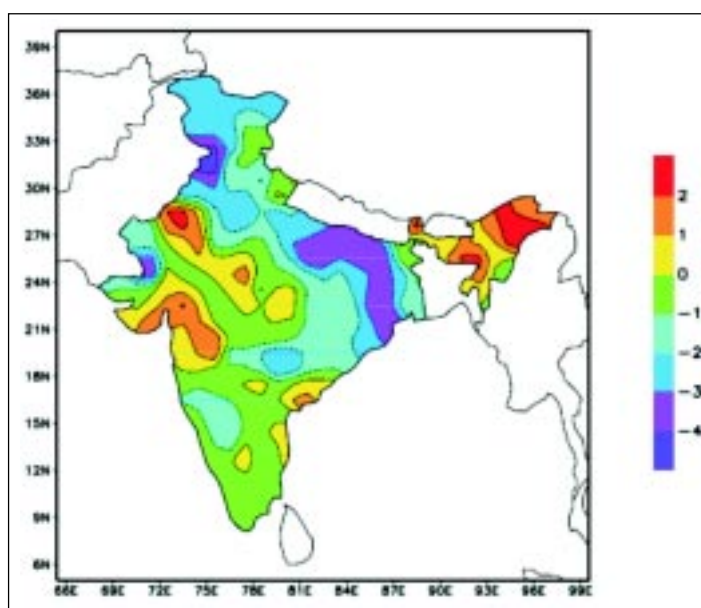
The disaster statistics of the cold wave are presented in Table 7.3.

Table 7.3: Cold wave casualties in India, 2007^{8,7}

Type	Disaster	Country	Location	Start	End	Killed	Source
Extreme Temperature	Cold wave	Bangladesh	-	December	December	20	Ban-Today
Extreme Temperature	Cold wave	Bangladesh	Northern North western districts	January	January	>100	IFRC

Cold Wave in India, 2007

In early 2007, cold wave killed two in Jaunpur in the north Indian state of Uttar Pradesh. The cold wave continued throughout January. Cold waves in most part of north India resulted in temperatures dropping to less than 3-5°C of the average temperature, which claimed more than 90 people lives, especially in Uttar Pradesh.⁷ The temperature anomalies shown in Figure 7.7 highlighted the cold wave condition throughout northern India. The cold wave also prevailed in Jammu and Kashmir from 11 March to 14 March 2007. As per EMDAT data, sixty-six people were killed from the extreme cold waves. Further, from second week of December 2007, north India was in the grip of a cold wave. Large areas over north India recorded temperatures below normal. Forty-seven people were killed by the cold wave in Uttar Pradesh (Table 1.3), where cities recorded temperatures between 0 and 5°C in 2007 (Figure 7.8). The disaster statistics from the cold wave are presented in Table 7.4 (Source: EMDAT data)

**Figure 7.7:** Minimum temperature anomalies (°C) of 4-9 January compared to 1961 to 1990 average¹

Further, from second week of December 2007, north India was in the grip of a cold wave. Large areas over north India recorded temperatures below normal. Forty-seven people were killed by the cold wave in Uttar Pradesh (Table 1.3), where cities recorded temperatures between 0 and 5°C in 2007 (Figure 7.8). The disaster statistics from the cold wave are presented in Table 7.4 (Source: EMDAT data)

Table 7.4: Cold wave casualties in India, 2007^{8,4}

Type	Disaster	Country	Location	Start	End	Killed	Source
Extreme Temperature	Cold wave	India	Jammu and Kashmir	March 11. 2007	March 14. 2007	66	EMDAT
Extreme Temperature	Cold wave	India	Uttar Pradesh	December 2007	December 2007	47	EMDAT
Extreme Temperature	Cold wave	India	Uttar Pradesh & its Vicinity	January 2007	January 2007	>90	REDIFF WEB

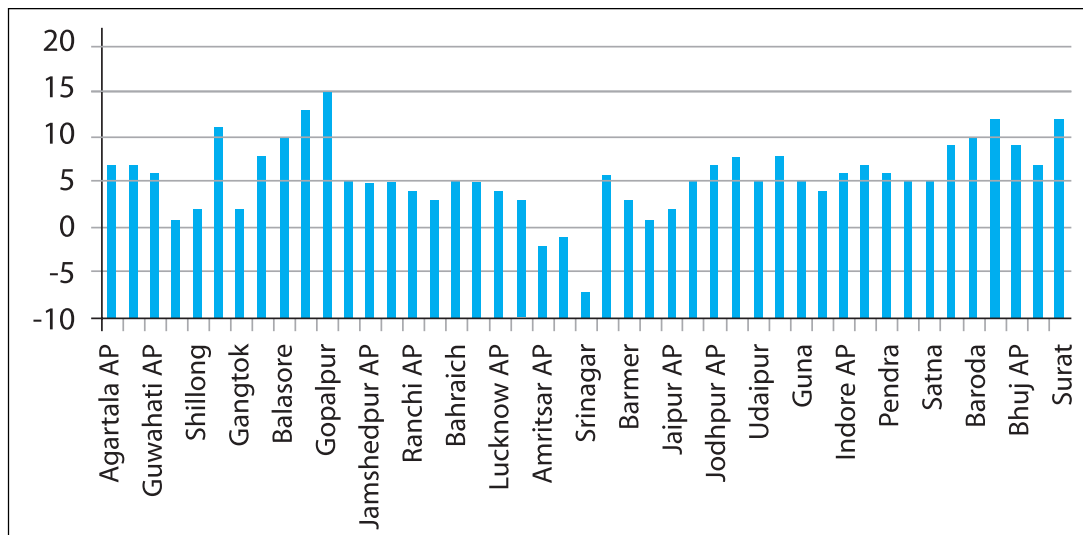


Figure 7.8: Extreme minimum temperature, 2007, India



Figure 7.9: Demand of woollen clothes in Jammu, 2007



Figure 7.10: Cold wave protection north India, 2007

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