

Preparing for a Cold wave and the world's extreme coldest places

A cold wave is a localized seasonal phenomenon prevalent in the country. Cold wave (CW) conditions generally occur in India from November to March. The present winter season of India 2023-2024 is set to break all records, with Delhi, Punjab, recording its lowest minimum temperature. Indian Meteorological Department's baseline data points suggest that there has been a 1.6-fold increase in cold wave days in India in the last decade. The **Climate Hazards and Vulnerability Atlas of India (IMD)** for the 13 most hazardous meteorological events have revealed that nearly 16% of the districts and 24% of the population in India have high to very high vulnerability to cold waves.

What is the Cold Wave?

The cold wave is a rapid fall in temperature within 24 hours. When the minimum temperature is 10 degrees Celsius or below and is 4.5 degrees Celsius (C) less than normal for two consecutive days in the plains.

India's Core Cold Wave Zones:

It covers Punjab, Himachal Pradesh, Uttarakhand, Delhi, Haryana, Rajasthan, Uttar Pradesh, Gujarat, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand, West Bengal, Odisha and Telangana.

Causes of Cold Wave in India:

- Absence of Cloud Cover in the Region
- Snowfall in the upper Himalayas has blown cold winds towards the region.
- **Subsidence of Cold Air over the Region:** Subsidence is the downward movement of cold and dry air closer to the surface.

- **La Nina:** Prevailing **La Nina** conditions in the Pacific Ocean. La Nina is the abnormally cooler sea surface temperatures reported along the equatorial Pacific Ocean and it is known to favour cold waves.
- **Western Disturbances:** Western disturbances are weather systems that **originate in the Mediterranean Sea and move eastward**, bringing cold winds, precipitation and cloud cover to the northwest regions of India. These disturbances can lead to a drop in temperature and cause cold wave conditions.

The world's extreme coldest places on Earth:

According to Weather.com, Oymyakon, Russia has winter temperatures that average minus 58 degrees Fahrenheit (minus 50 degrees Celsius).

- i. **Vostok Station, Antarctica-** Vostok Station is home to around 25 to 30 people during the continent's summer months. According to a 2018 study, temperatures on the ice sheet can reach minus 144.



Source:<https://www.treehugger.com/coldest-places-in-the-world-to-live-869363>

- ii. **Verkhoyansk, Russia:** According to the 2010 census, 1,311 people live in Verkhoyansk, Russia, deep in the Siberian

wilderness. According to the National Oceanic and Atmospheric Administration, the average temperature during Verkhoyansk's coldest month, January, is minus 44.

- iii. **Oymyakon, Russia:** Located 390 miles away in northeast Russia, Oymyakon recorded its lowest-ever temperature of minus 90 degrees on February 6, 1933. The two towns are officially tied for the Guinness World Record for the lowest temperature in an inhabited place in the Northern Hemisphere.



- iv. **Yakutsk, Russia:** More than 300,000 people are estimated to inhabit Yakutsk. The lowest temperature ever recorded in Yakutsk was minus 83.9 on February 5, 1891.



- v. **Snag, Canada:** The title of the coldest city in Canada belongs to Snag, a village in the Yukon Territory. The city's mean January temperature is minus 13.9 and the mean July temperature is 57.4 degrees.
- vi. **Utqiagvik, Alaska:** It is the northernmost city in the U.S., located 1,300 miles south of the North Pole and 320 miles north of the Arctic Circle. The city of 4,467, is built on permafrost that is up to 1,300 feet deep in places. The sun sets at the end of November and does not reappear until the end of January.
- vii. **International Falls - Minnesota, US:** Population: 6,424 (minus 45 degrees, recorded Low –minus 71.2 degrees 1926).
- viii. **Fraser, Colorado:** Fraser sits at 8,574 feet in Colorado's Rocky Mountains and is home to an estimated 1,400 people, one of the coldest winters in the USA.
- ix. **Hell, Norway:** home to about 1,580 people, Hell freezes over—literally—a third of the year, from December through March.
- x. **Ulaanbaatar, Mongolia:** Population: 1 million-plus, Famous as the coldest national capital in the world (minus 20 degrees, Recoded Low minus 63 degrees, 1947)
- xi. **Dras - Srinagar, India:** Population: 1,201 (minus 26 degrees)

Vulnerability:

The cold weather in modern society has several effects, most dramatically on the general population mortality rate. Human health impacts from cold waves include mortality from ischaemic heart disease and

cerebrovascular disease both of which increase in cold weather. Living in a cold house can affect health at any age. Adolescents who live in a cold house have a five-fold increased risk of multiple health problems (Dear and McMichael, 2011). Although the extra deaths in elderly people are caused mainly by cardiovascular and respiratory disease.

The extreme winter & cold waves can cause livestock and wildlife, through direct exposure to cold temperatures, impacts on vegetation, and impacts on the built environment and infrastructure, which can depend on elements that become brittle and lose function in cold temperatures.

Risk Reduction measures (India):

To reduce impacts related to cold waves, countries have used national alerting parameters for cold wave warnings or cold weather plans, which help, prevent major avoidable effects on health (HIP, 2021).

In India, the **National Disaster Management Authority (NDMA), GoI** has prepared national guidelines for the preparation of the Action Plan for Prevention and Management of Cold Wave and Frost in the year 2021. The guideline has been prepared through a consultative process, which involved stakeholders from state disaster management authorities, central ministries/ departments, experts and non-government agencies. These guidelines aim to facilitate the stakeholders to prepare their Cold Wave Action Plans (CWAPs) by providing insights into various aspects related to cold wave risk reduction.

The Indian Meteorological Department, Ministry of Earth Science, GoI provides inputs on cold wave warnings. The organisation is responsible

for generating and disseminating impact-based forecasts and issuing risk-based warnings for cold wave events.

(Shri Ranjan Kumar Borah),
Sr. Consultant - International Cooperation, NDMA

Sources:

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