



## Wet Bulb Temperature

**For Prelims:** Wet bulb temperature, Dry bulb temperature, Dew point temperature, Intergovernmental Panel on Climate Change, water vapour, Rising Sea level.

**For Mains:** Environmental Pollution & Degradation, Conservation, Wet bulb temperature, Impact of rising wet bulb temperature.

### Why in News?

Recently, [part 2 of the sixth assessment](#) report of [Intergovernmental Panel on Climate Change \(IPCC\)](#), emphasised on the trend in the '**Wet Bulb**' Temperature in South Asia.

- The trend will provide an index of the **impact of heat and humidity combined** — and its effect on health.

### WHAT IS WET-BULB TEMPERATURE

Photo: Piyaal Bhattacharjee

➤ Wet-bulb temperature is the lowest temperature to which air can be cooled by the evaporation of water into the air

➤ It is measured by factoring in heat and humidity levels

➤ Theoretically, if wet-bulb temperature reaches 35 degrees Celsius –its highest point– it means humans can no longer lose internal body heat by sweating and cool themselves

➤ This could potentially lead to heatstrokes



Wet-bulb days in Delhi each year at present | **63 days**

RCP 8.5 or business as usual scenario (2050) | **99 days**

RCP 8.5 or business as usual scenario (2100) | **131 days**

RCP 2.6 (stringent scenario where global temperature rise will be below 2°C by 2100) | **81 days**

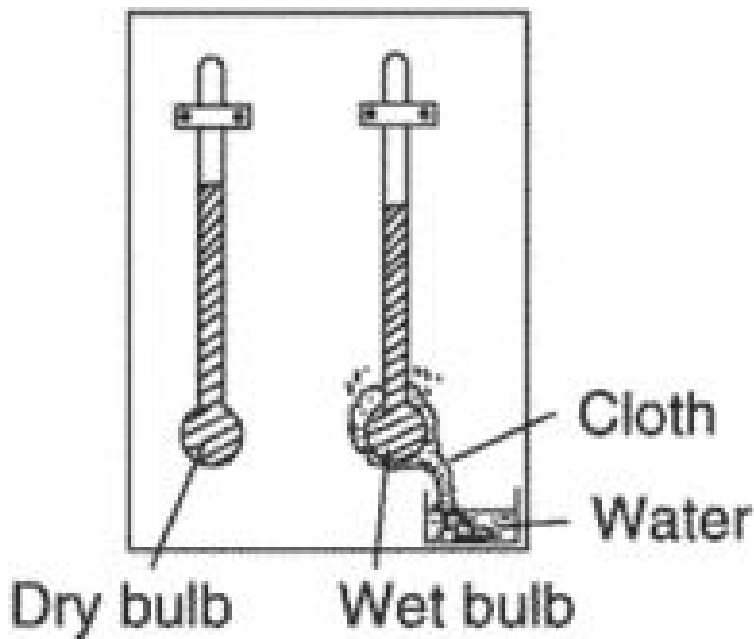
### What is the Wet Bulb Temperature?

- Wet bulb temperature is the **lowest temperature to which air can be cooled** by the evaporation of water into the air at a constant pressure.
- WBT is **a limit that considers heat and humidity beyond which humans can not tolerate high temperatures.**
- The Wet Bulb temperature is the **temperature of adiabatic saturation.** This is the

temperature **indicated by a moistened thermometer bulb exposed to the air flow.**

- An **adiabatic process** is one in which no heat is gained or lost by the system.

- Wet Bulb temperature **can be measured by using a thermometer with the bulb wrapped in wet muslin.**



- The **adiabatic evaporation of water** from the thermometer and the cooling effect is indicated by a "wet bulb temperature" lower than the "dry bulb temperature" in the air.
- The rate of evaporation from the wet bandage on the bulb, and the temperature difference between the dry bulb and wet bulb, **depends on the humidity of the air.**
  - The **evaporation is reduced when the air contains more water vapour.**
- The wet bulb temperature is **always lower than the dry bulb temperature** but will be identical with 100% relative humidity (the air is at the saturation line).
- A wet-bulb temperature of 31°C is exceedingly harmful to humans, while a temperature of 35°C is unsurvivable for more than 6 hours.

## What are Dew Point and Dry Bulb Temperatures?

### ▪ Dry Bulb Temperature:

- The Dry Bulb temperature, usually referred to as "air temperature", **is the air property that is most commonly used.** When people refer to the **temperature of the air they are normally referring to the dry bulb temperature.**
- The Dry Bulb Temperature refers basically **to the ambient air temperature.** It is called "Dry Bulb" because the **air temperature is indicated by a thermometer not affected by the moisture of the air.**
- Dry-bulb temperature **can be measured using a normal thermometer freely exposed to the air but shielded from radiation and moisture.**
- The dry-bulb temperature is an **indicator of heat content.**

### ▪ Dew Point Temperature:

- The Dew Point is the temperature where **water vapour starts to condense out of the air** (the temperature at which air becomes completely saturated).
  - **Above this temperature the moisture stays in the air.**
- If the dew-point temperature is close to the dry air temperature - **the relative humidity is high.**
- If the dew point is well below the dry air temperature - **the relative humidity is low.**
- The Dew Point temperature is **always lower than the Dry Bulb temperature and will be identical with 100% relative humidity** (the air is at the saturation line).

## How will this Trend Impact India?

- Lucknow and Patna, were among the cities predicted to **reach wet-bulb temperatures of 35°C if emissions continued to rise**, while **Bhubaneswar, Chennai, Mumbai, Indore, and Ahmedabad** are 'at risk' of reaching wet-bulb temperatures of 32°C-34°C with continued emissions.
- With continuing emissions, parts of central India including Vidarbha are at risk of exceeding **wet bulb temperatures of 32-34°C**.
- This will have consequences such as a **rise in [heat-wave](#) linked deaths or reduced productivity**.
- **Relying on artificial cooling** to cope with the growing heat would supercharge energy demand and **leave many people dangerously exposed to power failures**.
  - It would also abandon the most vulnerable members of society and doesn't help those who have to venture outside.

**[Source: TH](#)**

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