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GENERAL STUDIES 1: GEOGRAPHY
TOPIC: HEAT WAVES

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Record-breaking March heat reminds us that adaptation cannot wait

Escalating Temperatures and Their Impact

- Temperatures are rising, with 2023 being the hottest year on record, followed by an even warmer 2024.
- 2025 has started with unprecedented warmth, including record heat in Delhi and Mumbai.
- Heatwaves are expected to intensify through spring and summer, with rising fatalities in India and worldwide.
- The increasing heat highlights the need to address it as a public health and environmental crisis.

Historical Perspective on Heat and Human Adaptation

- Human vulnerability to heat is not new; ancient philosophers believed humans couldn't survive in tropical climates.
- European explorers in the 15th century adapted to hot climates by using indigenous knowledge and labor.
- By the 18th century, scientific understanding evolved, with knowledge of body temperature regulation through sweating and cooling.
- Stories of extreme heat endurance highlighted both the limits and adaptability of the human body.

Urban Heat and Rising Death Tolls

- Urbanization and industrialization led to the "urban heat island" effect, where cities are warmer than surrounding areas.
- Deadly heatwaves have been recorded globally, with India experiencing extreme events like Calcutta reaching 40°C in 1905.
- In 1956, Alwar hit 50.6°C, and Phalodi set a record at 51.0°C in 2016.
- Heat-related deaths are increasing, with over 60,000 deaths reported in Europe in 2022 and 1,300 deaths in Odisha in 1998.
- Despite record heat in 2024, official death tolls were lower than independent estimates.



Global Warming and the Greenhouse Effect

- Heatwaves now serve as clear indicators of global warming, driven by the burning of fossil fuels.
- Average temperatures in 2024 were 1.5°C above pre-industrial levels.
- The rise in “wet-bulb temperatures” (heat plus humidity) is a major concern; when wet-bulb temperatures exceed 35°C, human cooling mechanisms fail.
- Scientists warn that even a wet-bulb temperature of 31°C can be dangerous for human survival.

Variability of Heat Exposure

- Heat exposure is not the same for everyone, even within the same city, depending on urban design, materials, and access to cooling.
- Studies show heat exposure can vary even within the same apartment complex.
- Reports of Delhi reaching 52.9°C were false; the actual temperature was 49.9°C.
- Records like Phalodi’s 51.0°C may be surpassed soon, showing the need for localized solutions to heat resilience.

Conclusion

- While humans have adapted to heat, the intensity of global warming could exceed natural limits.
- Some cities have developed heat action plans, and scientists are working on mitigation strategies.
- Reversing the greenhouse effect requires global action, including reducing fossil fuel consumption and investing in sustainable infrastructure.
- Decisive action and innovation are essential to prevent catastrophic heat-related outcomes.

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