Heatwaves across Europe

July 28, 2022

Manifest Pedagogy:

Recently Europe is witnessing very high temperatures due to heat waves. Natural as well as anthropogenic factors are responsible for it. But everybody has the right to live in safe temperatures. To get there, however, will require more than just air conditioning and individual solutions. It will require planned collaborative efforts at the international level to tackle the anthropogenic cause of heat waves.

In News: Heat waves are becoming increasingly intense, frequent and long lasting around the world because of climate change. The **world's first named heat wave 'Zoe'** hit Seville, Spain, pushing temperatures past 110 degrees Fahrenheit recently.

Placing it in Syllabus: Geography, Environment

Static Dimensions

- What is a Heat Wave?
- How do heat waves form?

Current Dimensions

- Background of the news
- Causes of Heat waves in Europe
- Implications of Heat Waves

Content

Background of the news-

- Few months ago, France experienced its hottest May on record, with record highs in some cities.
- Poland and other parts of Eastern Europe suffered a spell of extreme heat.
- Temperatures across Europe soared yet again from Spain

to the British Isles and spread east.

- Wildfires stoked by the heat are burning in many countries.
- On July 19, the UK recorded its highest temperature ever, going past 40 degrees Celsius for the first time, at London's Heathrow airport.
- Heat waves in Europe are increasing in frequency and intensity at a faster rate than almost any other part of the planet, including the Western United States.

What is a Heat Wave?

- A heat wave is a period of abnormally and uncomfortably hot and usually humid weather.
    - It is a condition of air temperature which becomes fatal to the human body when exposed.
- According to the World Meteorological Organisation, **a heat wave is when the daily maximum temperature for more than five consecutive days exceeds the average maximum temperature by 9 degrees Fahrenheit.**
- The India Meteorological Department (IMD) requires that temperatures should reach at least **40□ in the plains** and at least **30□ in the hilly regions**, and should reflect an increase of at least **5□-6□ above the normal temperature,** to be classified as a heatwave.
- According to a 2019 report of the Tata Centre for Development and the University of Chicago, **by 2100, annually, more than 1.5 million people will be likely** to die due to extreme heat caused by climate change.

Causes of Heat waves in Europe

- Global warming plays a role, as it does in heat waves around the world, because temperatures are on average about 1.1 degrees Celsius higher than they were in the late 19th century, before emissions of carbon dioxide and other heat-trapping gases became widespread.
- The scorching temperatures that reached into England and

Wales were caused in part by a region of upper level low-pressure air that has been stalled off the coast of Portugal for days.
    - It is known as a “cutoff low” in the parlance of atmospheric scientists, because it was cut off from a river of westerly winds, the mid-latitude jet stream, that circles the planet at high altitudes.
- Low-pressure zones tend to draw air toward them. In this case, the low-pressure zone has been steadily drawing air from North Africa toward it and into Europe.
- **Jet Streams**– Many European heat waves occurred when the jet stream had temporarily split in two, leaving an area of weak winds and high pressure air between the two branches that is conducive to the buildup of extreme heat.
- **Warming in the Arctic**, which is occurring much faster than other parts of the world, may play a role.
    - As the Arctic warms at a faster rate, the temperature differential between it and the equator decreases.
    - This leads to a decrease in summertime winds, which has the effect of making weather systems linger for longer.
- **Ocean Currents**– Changes in one of the world’s major ocean currents, the Atlantic Meridional Overturning Circulation, may affect Europe’s climate. A weakening of the current as the world warms would cause changes in atmospheric circulation leading to drier summers in Europe.

How do heat waves form?

- A heat wave is formed **when static high pressure is generated in the upper atmosphere over a region for several days up to several weeks.**
- This static high pressure generates a hot mass of air,

which is stagnant for many days and weeks, which results in the trapping of more heat that also reduces the convection currents.

- The high pressure acts as a barrier and forces the mass of air to sink to the surface of the land that prevents heat from rising.
- This hot mass of air accumulates only heat and humidity without any trace of precipitation that causes abnormally high temperatures.
- It is very often during the summer season, from May to November in the northern hemisphere.
- The seal keeps out convection currents that form clouds and eventually rain clouds, both of which would help the area affected cool off.
- Instead the result is a heat wave that has both high heat and high humidity near the ground and can last from days to weeks.

Implications of Heat Waves

- **Health**– Exposure to heatwaves compromises the body's ability to regulate temperature and can result in a cascade of illnesses, including heat cramps, heat exhaustion, heatstroke, and hyperthermia. Extreme heat can lead to heat-related illness and death, particularly in elderly populations, the poor, outdoor workers, and in urban areas.
- **Urban heat island**– Heat waves exacerbate the urban heat island effects, amplifying temperatures in built environments, and resulting in poorer air quality due to the creation of ozone that negatively impacts health.
- **Water Stress**– Heatwaves, without concomitant increases in precipitation, can lead to water shortages and increased stress for plants, particularly in arid regions.
- **Ecological impact**– Over time deep permafrost warming and thawing could cause landslides and rock falls,

continuing the negative ecological impacts.
    - For example, the 2003 European heatwave resulted in a 10% loss in glacier mass in Europe, which was five-times more than the average annual loss.
    - Similar impacts were reported for the French Alps in 2019.
    - This has the effect of reducing plant growth, the basis of energy production and the food chain, with an overall drying-out of the landscape
- **Productivity**– Globally, 2% of total working hours is projected to be lost every year, either because it is too hot to work or because workers have to work at a slower pace.
- **Agriculture**– The agricultural sector, where 940 million people earn their livelihood, is set to be harder hit by hotter temperatures, pushing workers, crops and livestock past their physiological heat and drought tolerances. The concurrence of heat and drought events are causing crop production losses and tree mortality.
- **Energy Demand**– Increasing energy demand for cooling also comes as an extensive economic cost to residents, businesses, and governments.
- **Multiple impacts**– It affects the transmission of diseases, health service delivery, air quality, and critical social infrastructures such as energy, transport, and water.
- **Wildfires and Drought**– The Lancet report, 2021 showed that populations of 134 countries experienced an increase in exposure to wildfires with droughts becoming more widespread than ever before.

Way Forward

- **Paris Treaty**– Accelerated global efforts to meet the commitments of the Paris climate treaty.
- **Green Energy**– Switching from fossil fuels to cleaner and greener energy and transportation.

- **Energy efficiency**– Improving energy efficiency so buildings require less cooling in the first place
    - Eg-Berlin-based startup developing **biochar-based concrete admixes**, even promises to do so while sequestering carbon.
- **Green spaces**– The shade cast by trees helps to alleviate some of the absorption of heat by roads and paved areas. In addition, the trees release tiny amounts of water vapour from their leaves, which helps cool the air around them.
    - Planting more trees in places that would otherwise be occupied by heat-absorbing asphalt has the potential to reduce temperatures by **10% to 20%**
    - **Barcelona has around 1.4 million trees**, more than any other European city.
    - The Italian city of **Milan has a goal to plant three million new trees by 2030**
- **Cool places**– The Austrian capital, **Vienna**, is creating a network of **car-free 'cool straßen' (cool streets)** for the second consecutive summer. As well as banning cars, the cool straßen neighbourhoods will offer outdoor seating areas, and cooling mist sprays that dispense fine clouds of vapour which can lower ambient temperatures by several degrees.
- **Whitening surfaces**– Replacing the dark surfaces with lighter and more reflective materials, it will result in a comparatively cooler environment.
- **Early Warning Systems-** Death from heat waves can be prevented by installing improved early warning systems that communicate heatwave threats, recommend different preventative measures, and constrain disaster impacts.
- **Disaster adaptation strategies**– Effective disaster adaptation strategies and more robust disaster management policies are required in heatwave zones to lessen the impact of heatwaves.
    - Effective implementation of the **Sendai Framework for Disaster Risk Reduction 2015-30** with the State

playing a leading role and sharing responsibility with other stakeholders is now the need of the hour.

Mould your thoughts

1. “Europe’s not ready for a hotter world”. Discuss the factors responsible for recent heat waves experienced in Europe and its impact. Suggest mitigating measures to be taken to tackle the issue. (250 Words)

Approach to the answer-

- Define what is heat wave and gravity of situation
- Factors responsible
- Implications of Heat wave
- Mitigating measures
- Way Forward and Conclusion