Dubai Flood

Why in news?

Recently a storm hit Oman and UAE, with UAE experiencing its heaviest rainfall in 75 years, raising questions about the role of cloud seeding in this unusual weather event.

Why Dubai experienced heavy rainfall?

- **Strong low pressure system**-A low-pressure system in the upper atmosphere, combined with low pressure at the surface, acted like a pressure "squeeze" on the air.
- **Heavy thunderstorm**-This intensified squeeze, along with the contrast between warmer ground-level temperatures and colder temperatures higher up, created the conditions for the powerful thunderstorm.
- **Climate change-** Rising global temperatures, driven by human-led climate change, are leading to more extreme weather events worldwide, including intense rainfall.
- **Mesoscale convective system**- It is a series of medium-sized thunderstorms caused by massive thunderclouds, formed as heat draws moisture up into the atmosphere which can create large amounts of rain.
- **Rapid urbanisation**- In a recent study, Sharjahthe capital of the third-largest emirate in the U.A.E., found that the city's rapid growth over the past half century had made it vulnerable to flooding at far lower levels of rain than before.
- **Cloud seeding**- There were speculations about cloud seeding contributing to the rainfall, however the metrology department clarified that no cloud-seeding operations were dispatched before or during the turbulent weather episode.

What is cloud seeding?

- **Cloud seeding-** It is a weather modification technique that improves a cloud's ability to produce rain or snow, it can be done from ground based generators or aircraft.
- **Origin**- It was started in 1946 in USA by using silver iodide and dry ice (solid carbon dioxide) to improve the creation of ice crystals in clouds.

Cloud seeding a technique used to enhance precipitation by dispersing substances into the air has been part of the UAE's efforts to combat water scarcity since 1982.

- **UAE approach**- The country experiences less than 100 mm of annual rainfall, which is significantly low, this scarcity is exacerbated by high evaporation rates and a low groundwater recharge rate hence UAE adopts cloud seeding.

- **Seeding agents**- Salts like silver iodide, potassium iodide, sodium chloride, or dry ice (solid carbon dioxide), they are released into the targeted clouds. These seeding particles facilitate the formation of larger water droplets thereby augmenting rainfall.
- **Working mechanism** – A tiny ice nuclei is introduced into certain types of subfreezing clouds, these nuclei provides a base for snowflakes to form which grow and fall from the clouds back to the surface of the Earth.
- **Hygroscopic cloud seeding** – It disperses ***salt particles*** to speeds up droplet coalescence in liquid clouds to produce of large droplets to start precipitation.
- **Glaciogenic cloud seeding** – It disperses ***ice nuclei*** to trigger ice production in super cooled clouds, leading to precipitation.

Applications	Challenges
• It can create more winter snowfall and provide relief to drought stricken areas and support agriculture. • It enhances the natural water supply to communities. • It lessens hailstorms by reordering water vapour in clouds to breakdown large hailstones • It is used to tackle air pollution.	• The chemicals used in seeding can cause potential side effects to living organisms. • It can change climatic patterns of the earth. • It involves huge costs and logistics preparations. • There is no way to ensure the exact area or duration of rainfall.

- **Early stage targeting**- Cloud seeding is most effective when clouds are in their developmental stages, but in Dubai the cloud has already developed into severe thunderstorms hence it's not a reason for recent Dubai flood.

What are the consequences of heavy Dubai flood?

- **Heavy rainfall**- *Al Ain*, a city in UAE bordering Oman recorded 10 inches of rainfall, the largest ever in a 24-hour period since records started in 1949.
- **Disrupt daily life**- Heavy downpours have caused flooded homes, power outages, and emergency responses, Dubai Airport, the world's second busiest, was brought to a standstill following the rainfall.
- **Infrastructure damages-** The roads were collapsed, residential communities were hit by heavy flooding and many householders reported leaks from roofs, doors and windows.

Quick facts

Cloud seeding in India
• **CPCB**- Central Pollution Control Board has mulled the use of cloud seeding to tackle Delhi's air pollution. • **CAIPEEX phase-4**- Cloud Aerosol Interaction and Precipitation Enhancement Experiment was a scientific investigation conducted in Solapur city by IITM to investigate the efficacy of hygroscopic seeding in deep convective clouds and to develop a cloud seeding protocol. • **Varshadhare project**- It is a cloud seeding project in Karnataka government to enhance the amount of precipitation from the clouds to generate more rain.

References

1. Business Standard- Explained Dubai rainfall
2. The Hindu- The storm that led to Dubai flood

