6. Arabian Sea, a cyclone shy water body, is converting into a cyclone hotbed. Analyse the reasons behind this trend. (150 words) 10

Approach:

- Highlight the recent surge in frequency of high intensity cyclones in the Arabian sea.
- Bring out the factors that have led to frequent occurrences of cyclones in the Arabian sea.
- Conclude the answer appropriately.

Answer:

The Arabian Sea has comparatively been less prone to cyclonic storms due to its cold sea surface temperature and higher air pressure than the Bay of Bengal. In comparison with an average of one severe cyclone every four-five years in the Arabian sea, it has recently started receiving tropical cyclones of high intensity more frequently.

For instance, since 2019, India has recorded five cyclones in the Arabian sea. Recently, an extremely severe cyclone, **Tauktae,** made landfall on the west coast. It is the third consecutive cyclone after **Vayu** in 2019 and **Nisarga i**n 2020, and the most severe one the Arabian sea has recorded since 1902.

Reasons behind recent increase in frequency of cyclones over Arabian Sea:

- **Increased carbon emissions** have led to warming up of Arabian Sea waters. With an increase of 1.2-1.4 degrees Celsius between 1982 and 2018, it has had the fastest warming rate among tropical oceans. Unlike the Bay of Bengal, Arabian Sea receives very less fresh water from the rivers which is preventing the cooling effect. Also, the **more enclosed nature of the sea** is promoting more evaporation and cloud formation activities leading to more cyclones.
- **Anthropogenic emissions of aerosols** have increased sixfold since the 1930s, leading to a weakening of the southwesterly lower-level and easterly upper-level winds that define the monsoonal circulation over the Arabian Sea. Previously, tropical cyclones in the Arabian Sea were restricted to Gujarat. In the past decade though, Kerala and Karnataka have also become more vulnerable to cyclones.
- **Positive Indian Ocean Dipole** brings warmer-than-average Sea Surface Temperatures to the Arabian Sea and cooler-than-average Sea Surface Temperatures near Indonesia. The current positive IOD event is the **strongest** in at least 60 years and has boosted SSTs.
- **Wind shear** is generally relatively stronger in the Arabian Sea preventing cyclones from developing vertically. But with increased carbon dioxide in the atmosphere this wind shear is weakening in the Arabian Sea thereby supporting formation of cyclones.
- **El-Nino modoki** conditions witnessed in recent years, change the atmospheric circulation over the north Indian Ocean and create conditions which are conducive for cyclogenesis in the Arabian Sea.

The **rapid intensification of cyclones near Arabian Sea needs to be closely monitored** at higher resolution and accuracy. To mitigate risks and hazards associated, **improving the Indian Ocean Observing System (IndOOS)** and incorporating the **global warming signals in the weather models** can go a long way.

7. Despite the Peninsular India being a stable land mass and a region of slight seismicity, it has witnessed several earthquakes. Discuss with examples. (150 words) 10

Approach:

- Provide facts/reasons to justify the statement in question.
- Explain various factors believed to be the reason behind occurrence of major earthquakes in peninsular India.
- Conclude accordingly.

Answer:

Peninsular India is considered as one of the largest **Precambrian Shield** areas of the world. This Shield area was described as a stable land mass associated with low or no seismicity similar to the