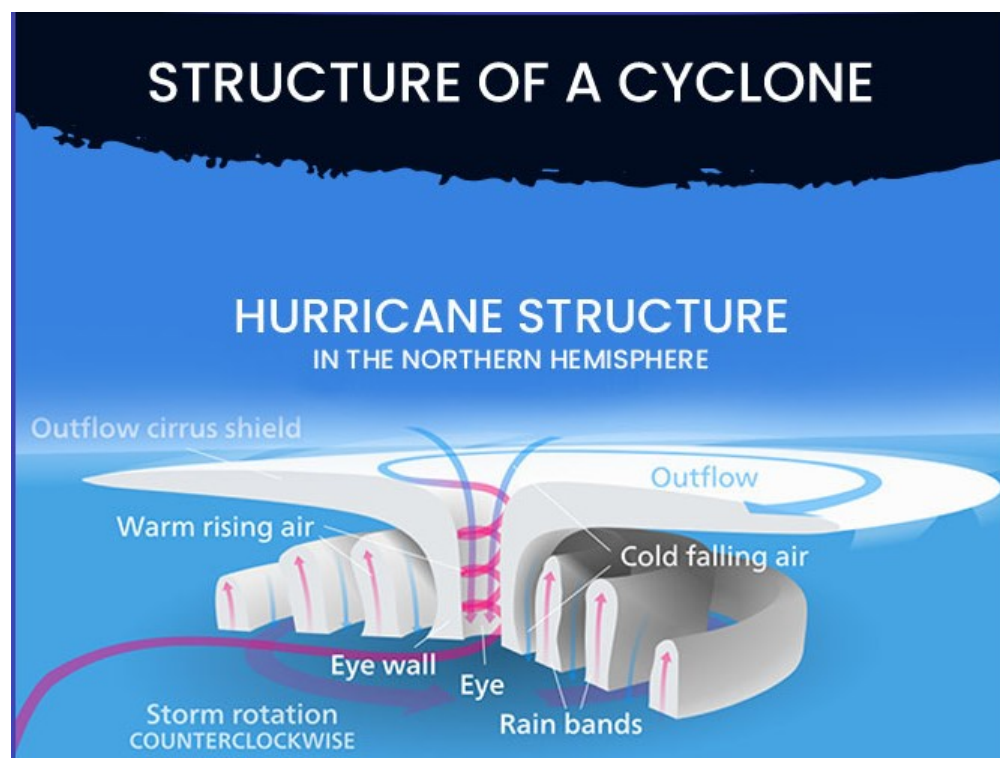


## UPSC Daily Current Affairs | Prelim Bits 02-12-2024

### Landfall of a cyclone

The India Meteorological Department (IMD) recently reported that Cyclone Fengal, tropical cyclone made landfall over Puducherry.

- **Formation of a cyclone** - Cyclones are large storms that form when water evaporates from the surface of a sea into the air.
- As it rises, the air cools and becomes saturated with vapor, eventually forming clouds.
- These clouds and the air circulation around them eventually start to rotate.
- The warmer the sea, the more powerful the cyclone will be. There are many requires for a cyclone to form.
- Once it is fully formed, all tropical cyclones (in the northern hemisphere) have a complex 3D structure.



- At this point it has 2 important features, among others - the eye and the eyewall.
- **Eye of a cyclone** - The eye is the small centre around which the cyclone rotates. It consists of cold air descending from the cyclone's top with warm air rising in a spiral around it.
- **Eyewall of a cyclone** - The eyewall consists of high thunderstorms that bring rain, lightning, and powerful winds.
- These storms may also have large cloud tops called a central dense overcast that obscure a view of the eye as seen from above.

- As long as the cyclone moves over water, it can draw more moisture from below to produce new clouds and rain events around it.
- But when the storm crosses over onto land, its ***moisture supply declines drastically*** and the cyclone weakens.
- **Landfall** - Landfall is the event of a ***tropical cyclone coming onto land*** after being over water.
- A tropical cyclone is said to have made landfall when the ***centre of the storm or its eye moves*** over the coast.

*A 'direct hit', refers to a situation where the core of high winds (or eyewall) comes ashore but the centre of the storm may remain offshore.*

- Landfalls can last for a few hours, with their exact duration ***depending on the speed of the winds and the size of the storm*** system.
- As because the strongest winds in a tropical cyclone are not located precisely at the centre, it is possible for a cyclone's strongest winds to be experienced over land even if landfall does not occur.

## References

1. [The Indian Express | Landfall of a cyclone](#)
2. [The Hindu | What is landfall?](#)

## One Nation One Subscription (ONOS) initiative

*The Union Cabinet recently approved the One Nation One Subscription (ONOS) initiative.*

- ONOS is a ***central sector scheme*** to ***consolidate researchers' subscriptions*** to prominent academic journals and other similar publications.
- **Ministry** - Ministry of Education.
- It gives centralized access to research articles and journal publication for ***government higher education institutions and research and development (R&D) laboratories*** of the central and state government.
- It is designed to help students and academicians access the latest research articles and journals, including those in Tier 2 and 3 cities.
- The initiative originates from the ***National Education Policy (NEP) 2020***.
- **Payment** - It will provide access to journal articles to all individuals in India for one "centrally negotiated payment", replaces individual institutional journal subscriptions.
- It offers a fully digital platform coordinated by the ***Information and Library Network (INFLIBNET)***, an autonomous inter-university centre of the UGC.

*India spent around Rs. 1,500 crore on subscription for electronic and print journals in 2018 and Rs. 995 crore on journal subscriptions in 2022.*

- **Accessibility** - It provides access to nearly 13,000 e-journals from 30 renowned international publishers.
- The funds will be available for **3 calendar years**, starting from next year and going on till the end of 2027.
- The ONOS initiative is also expected to include concessions on fees that authors have to pay to have their work published in open access journals.

## References

1. [The Hindu | What is the 'One Nation One Subscription' initiative?](#)
2. [Hindustan Times | One Nation One Subscription](#)

## Twisted bilayer tungsten diselenide (tWSe<sub>2</sub>)

*The researchers recently explored superconductivity in twisted bilayer tungsten diselenide (tWSe<sub>2</sub>).*

- **Moire Pattern** - Even though the 2 layers of a moire material have the same arrangement of atoms, the misalignment caused by small twist produces a completely different pattern when seen from the top.
- This is called the moire pattern.
- **Super conductivity in moire material** - In moire materials, the moire pattern gives rise to new behaviours that are not present in the individual 2D materials alone.
- This is because the twist ***leads to the formation of flat bands*** in the electronic structure of the material.
- The electronic structure of a material describes how electrons in the material behave. The energy bands are a way to visualize the energy the electrons possess and how fast they move within the material.
- In moire materials, because the ***bands are flat***, the electrons experience very little variation in energy. As a result, the electrons move slowly and are said to be heavy.
- These slower-moving electrons are more likely to interact with each other, creating strong electron-electron interactions that aren't seen in typical materials.
- These interactions can lead to the ***formation of Cooper pairs***, where two electrons pair up across a short distance and move around as a single unit.
- This pairing is central to the phenomenon of superconductivity.
- Their coordinated movement helps them avoid scattering, a process where electrons collide with atoms or impurities in the material and deviate from their path, causing electrical resistance.
- On the other hand, Cooper pairs can travel through the material without scattering, leading to ***zero resistance and energy loss***, and thus superconductivity.

## Recent Findings

- The superconductivity is explored in a moire material created by stacking 2 layers of tungsten diselenide, a semiconductor, and rotating one layer by a small angle.
- The researchers used tWSe<sub>2</sub> with a twist angle of 3.65° to form a moire material.

- Then they examined how the electrons behaved when the material's electronic states were half-filled, a configuration strongly associated with superconductivity in moire materials.
- They also examined the behaviour of the electrons when the energy gap between the sublattices within the material is small, since this influences the superconducting properties.

*Sublattices are smaller grids of groups of atoms within the material.*

- **Features - Temperature** - The researchers found that tWSe<sub>2</sub> was a robust conductor with a transition temperature of around -272.93° C.

*The transition temperature is the critical value below which a material enters the superconducting state, exhibiting zero electrical resistance. Conventional superconductors transition at around -250° C.*

- **Insulating property** - The superconductivity in tWSe<sub>2</sub> occurs precisely when the electronic states are half-filled.
- The team also found that the moire material could transition to ***an insulating (non-conducting)*** state by altering the electronic properties of the material.
- **Coherence Length** - The material had a coherence length ***about 10-times longer than other moire materials***, meaning that its superconducting state is not fragile.
- For tWSe<sub>2</sub>, superconductivity is driven by electron-electron interactions and half-band filling, while graphene-based systems depend on flat bands and electron-lattice interactions.
- As a result, while graphene-based systems become superconducting at higher temperatures, tWSe<sub>2</sub> is more stable.

## Reference

[The Hindu | New moire superconductor](#)

## Girnar Wildlife Sanctuary

*As per the Centre for Environmental Planning and Technology (CEPT) data the vegetation of Girnar Wildlife Sanctuary had declined from 2000 to 2020.*

- Girnar National Park and wildlife sanctuary is located in ***Junagadh, Gujarat.***
- It is also known as ***Sasan Gir.***
- **Established in** -1965.
- The sanctuary was established to conserve the endangered Asiatic lion, which was once wiped out from other parts of Asia due to indiscriminate hunting.
- The Gujarat government declared 180 square km of the sacred Girnar forests as a Wildlife Sanctuary in 2008.

- It spans the rugged terrain of the ***Girnar hills***, which are a part of the Saurashtra region and also a part of the Khathiar-Gir dry deciduous forests ecoregion.
- It is home to ***Asiatic Lions*** and the only place in the world after Africa where these species live in the hilly and forested area of the park.
- **Vegetation** - Mostly consists of
  - **Deciduous** - It sheds their leaves seasonally, usually in the dry season.
  - **Thorny scrubland** - It is found in areas with low water availability and these plants have fewer leaves.
- These vegetation are classified ***under open forest***.
- **Flora** - Includes variety of plant species, avian species, insect species, animal species and reptile species.
- It also filled with several trees, climbers, twiners, creepers, parasite and many other varieties of flower plants.
- **Fauna** - Includes Asiatic lions, spotted deer, Sambar, Chousinghas, Chinkaras, leopards, and Indian golden jackals.
- 179 Birds Species, 33 Reptiles species, 30 Mammals species are available.

### Recent Findings

- The study revealed that 94% vegetation of the total area in 2000, has dipped to 83% in 2020 over 2 decades.
- It revealed that settlements were increased from 2000 to 2020 near the dense forest which was converted to open forest during the same period of time.

### Asiatic Lions

- **Scientific name** - Panthera leo persica.
- **Habitat** - Gir National Park and Wildlife Sanctuary is the only abode of the Asiatic lion.
- **Distribution** - State of West Bengal in east and Rewa in Madhya Pradesh, in central India.
- **Conservation status**
  - Wildlife (Protection) Act 1972 - Schedule I.
  - CITES - Appendix I.
  - IUCN - Endangered.
- ***World Wide Fund for Nature India (WWF)*** strengthen the efforts of Gir towards managing the conflict and poaching.



## References

1. [The Indian Express| Girnar Wildlife Sanctuary](#)
2. [GNP| Girnar Wildlife Sanctuary](#)
3. [WWF| Girnar Wildlife Sanctuary](#)

## Moinuddin Chishti

Recently, an Ajmer court has admitted a petition that a Shiva temple lie under the Sharif dargah shrine of Khwaja Moinuddin Chishti in Rajasthan.

- Moinuddin Chishti is the **Persian-origin** Sunni Muslim philosopher and religious scholar.
- **Born in** - 1<sup>st</sup> February 1141 CE, in Sistan, a province in Persia (Iran).
- He is said to have been a **descendent of Prophet Muhammad**.
- He is known as Muinuddin, Muiniiddin, and Mu'in al-din.
- He is also known as '**Gharib Nawaaz**' and 'Benefactor of the poor'.
- In his spiritual journey Harooni became a mentor to Moinuddin and he led him to rigorous spiritual discipline.
- He was initiated into the *Chishti silsila (chain of spiritual descent)*.

*The Chishti order was founded in the 10<sup>th</sup> century by Abu Ishaq Shami in the town of Chisht near Herat.*

- He came to the Indian subcontinent in the 13<sup>th</sup> century and settled in Ajmer, Rajasthan.
- He founded and spread the **Chishti Order of Sunni Islam** in the Indian subcontinent.
- The Chishti Order emphasised the doctrine of the unity of being with God and members of the order were also pacifists.
- His famous dictum was "**Sulh-i-Kul**" (Peace with all).
- His disciples spread the Chishti order in the Indian Subcontinent.

Disciples	Year	Contributions
Qutbuddin Bakhtiyar Kaki	1173-1235	Established the Chishti order base in Delhi.
Baba Fariduddin	1173-1265	Spread the Chishti order's teachings in Punjab.
Hamiduddin Nagauri	1192-1274	Served as a spiritual leader in Nagaur.
Nizamuddin Auliya	1238-1325	His teachings and shrine in Delhi.
Chirag Dehalvi	1274-1356	He spread Moinuddin teachings after his death.

- **Died on** - 15<sup>th</sup> March 1236 in Ajmer.
- The shrine was built by **Mughal King Humayun** in honour of this saint.

*The Urs festival is an annual festival held at Ajmer in Rajasthan which*

*commemorates the death anniversary of Sufi saint Moinuddin Chishti.*

## **References**

1. [The Indian Express| Moinuddin Chishti](#)
2. [KMCLU| Moinuddin Chishti](#)

