

11 MARCH 2019

1. Belle II

In News:

- Belle II is a particle accelerator experiment located in Tsukuba, Japan, is a unique facility in the world. Here, electrons and positrons (anti-electrons) collide to produce B mesons in order to study the breakdown of symmetry in these decays.

About Belle II

- Belle II is the successor to the Belle experiment, and is currently being commissioned at the Super KEKB accelerator complex at KEK in Tsukuba, Ibaraki Prefecture, Japan.
- The Belle II detector was “rolled in” (moved into the collision point of SuperKEKB) in April 2017. Belle II started taking data in early 2018. Over its running period, Belle II is expected to collect around 50 times more data than its predecessor due mostly to a factor 40 increase in instantaneous luminosity provided by SuperKEKB over the original KEKB accelerator

Focus of Belle II

- The focus at Belle II is on B-mesons — particles that contain the B-quark, also known as the beauty or bottom quark.
- In particular, the focus is on the differences between the decay of the B-mesons and that of their antiparticles, the anti B-mesons.
- Particularly the focus is on the breakdown in the symmetry between matter and antimatter. This broken symmetry between matter and antimatter is one of the most fundamental questions in particle physics.

India's Contribution

- As an international collaboration involving 26 countries, Belle II has an Indian link — a team led by physicists and engineers from the Tata Institute of Fundamental Research, Mumbai, have built the fourth layer of the vertex detector.

2. Wetland of International Importance

In News: On January 30, the Indian Sundarban was accorded the status of ‘Wetland of International Importance’ under the Ramsar Convention.

About Sundarbans

- The Sundarbans comprises hundreds of islands and a network of rivers, tributaries and creeks in the delta of the Ganga and the Brahmaputra at the mouth of the Bay of Bengal in India and Bangladesh.
- Located on the southwestern part of the delta, the Indian Sundarban constitutes over 60% of the country's total mangrove forest area. It is the 27th Ramsar Site in India, and with an area of 4,23,000 hectares is now the largest protected wetland in the country.

About Wetlands & Ramsar Convention

- The Convention on Wetlands of International Importance, better known as the Ramsar Convention, is an international agreement promoting the conservation and wise use of wetlands. It is the only global treaty to focus on a single ecosystem.
- The convention was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. Traditionally viewed as a wasteland or breeding ground of disease, wetlands actually provide freshwater and food, and serve as nature's shock absorber.
- Wetlands, critical for biodiversity, are disappearing rapidly, with recent

Note



estimates showing that 64% or more of the world's wetlands have vanished since 1900.

- Major changes in land use for agriculture and grazing, water diversion for dams and canals and infrastructure development are considered to be some of the main causes of loss and degradation of wetlands.

Status of Wetland of International Importance ?

- The Indian Sundarban met four of the nine criteria required for the status of 'Wetland of International Importance' — presence of rare species and threatened ecological communities, biological diversity, significant and representative fish and fish spawning ground and migration path.
- The Indian Sundarban, also a UNESCO world heritage site, is home to the Royal Bengal Tiger.
- The Ramsar website points out that the Indian Sundarban is also home to a large number of "rare and globally threatened species, such as the critically endangered northern river terrapin (*Batagur baska*), the endangered Irrawaddy dolphin (*Orcaella brevirostris*), and the vulnerable fishing cat (*Prionailurus viverrinus*)."
- Two of the world's four horseshoe crab species, and eight of India's 12 species of kingfisher are also found here.

Will the status help?

- Environmentalists and forest officials say the Ramsar status will help to highlight conservation issues of the Sundarbans at the international level.
- The part of the Sundarban delta, which lies in Bangladesh, was accorded the status of a Ramsar site in 1992, and with Indian Sundarban getting it too, international cooperation between the two countries for the protection of this unique ecosystem will increase. This could lead to a better conservation strategy for flagship species such as the tiger and the northern river terrapin.

What are the threats?

- While the Indian Sundarban is a biodiverse preserve, over four million people live on its northern and northwestern periphery, putting pressure on the ecosystem. Concerns have been raised about natural ecosystems being changed for cultivation of shrimp, crab, molluscs and fish.
- The Ramsar Information Sheet lists fishing and harvesting of aquatic resources as a "high impact" actual threat to the wetland. The other threats are from dredging, oil and gas drilling, logging and wood harvesting, hunting and collecting terrestrial animals. Salinity has been categorised as a medium and tourism as a low impact actual threat in the region.
- Experts believe that while the Ramsar status may bring in international recognition to the Indian Sundarban, the wetland, which along with anthropogenic pressures, is also vulnerable to climate change and requires better management and conservation practices.

3. SWIFT

In News: RBI has been warning lenders on possible misuse of SWIFT; it has finally fined 36 banks for negligence.

Background

- SWIFT, short for Society for Worldwide Interbank Financial Telecommunications, and letters of undertaking are the two instruments allegedly manipulated by PNB employees to let diamond merchant Nirav Modichannel the money illegally.

About SWIFT

- The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is the global messaging software that enables financial entities to send and receive information about financial transactions in a secure, standardised and reliable environment.
- The messages are sent via an encrypted channel to ensure that transactions remain secure.

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- Brussels-headquartered SWIFT was formed in 1973 by a group of seven banks, and it went live four years later. It replaced Telex, the then existing system used to send financial messages, which was prone to human error.
- Under SWIFT, the automated messages in standard format drastically reduced the room for error.
- Now, SWIFT is trusted by over 11,000 financial institutions – banks, brokerages, mutual fund firms, and securities dealers – in more than 200 countries.
- A unique identification code of between eight and 11 characters is provided to every bank branch to make wire transfers. If a customer wants to transfer money from the home branch to an international account, both the bank account details and the SWIFT code of the recipient's home branch are required to authorise the transaction.

Nirav Modi Case

- Typically, clearing a SWIFT transaction involves three people: a maker, checker, and verifier. The maker initiates the transaction, and inputs from the checker and verifier are used to authorise it. These act as additional layers of security to minimise frauds.
- In PNB's case, LoUs were issued via SWIFT in favour of Nirav Modi. An LoU is a bank guarantee from PNB (or any other bank) on the basis of which the overseas banks grant loans.
- The PNB employees reportedly shared the SWIFT password with Modi's aide, allowing fraudulent authorisation of transactions.

4. Cloud Seeding

In News: Karnataka Rural Development and Panchayat Raj Department pushed a tender call for cloud seeding operations to enhance rainfall during the monsoons of 2019 and 2020. The project is expected to cost 50 crore each year.

What is Cloud Seeding?

- Cloud seeding is an artificial way of inducing moisture in the clouds to cause rainfall. It is a form of weather modification that changes the amount or type of precipitation that falls from clouds by dispersing substances into the air that serve as nuclei around which ice crystals are formed.
- The most common use of this technique is to increase precipitation (rain or snow), but hail and fog suppression are also within the domain of possible uses.
- The most common chemicals used for cloud seeding include Silver Iodide (AgI), Potassium Iodide (KI) and dry ice (solid Carbon Dioxide (CO₂)). Liquid Propane (C₃H₈) expands into a gas at low pressures and has also been used with promising results. After rigorous research, the use of materials that absorb moisture from the air (hygroscopic), such as table salt, is becoming more popular.

Type of clouds

- Only certain kind of clouds can be seeded and it needs to have enough nuclei to process cloud seeding and thunder cloud development.

5. NASA orbiter spots water molecules moving around the dayside of moon

In News:

NASA's Lunar Reconnaissance Orbiter (LRO), have observed water molecules moving around the dayside of the moon, an advance that could help us learn about accessibility of water that can be used by humans in future lunar missions.

Note



In Brief:

Measurements from the Lyman Alpha Mapping Project (LAMP) instrument aboard the LRO of the sparse layer of molecules temporarily stuck to the surface helped characterise lunar hydration changes over the course of a day.

Up until the last decade, scientists thought the Moon was arid, with any water existing mainly as pockets of ice in permanently shaded craters near the poles.

More recently, scientists have identified surface water in sparse populations of molecules bound to the lunar soil. The amount varies based on the time of day. This water is more common at higher latitudes and tends to hop around as the surface heats up.

Results

These results aid in understanding the lunar water cycle and will ultimately help us learn about accessibility of water that can be used by humans in future missions to the Moon.

Lunar water can potentially be used by humans to make fuel or to use for radiation shielding or thermal management; if these materials do not need to be launched from Earth, that makes these future missions more affordable, Hendrix said in a statement.

Water molecules remain tightly bound to the regolith until surface temperatures peak near lunar noon.

6. The mysterious disappearance of F103

In News:

A Royal Bengal tigress, F03, that strayed out of north-central Assam's Orang National Park 16 months ago, had set off one of the biggest operations in the State to trap the big cat. For more than a year, the tigress outsmarted some of the country's best feline experts and made the Assam Forest Department spend a fortune in the effort.

But she has virtually fallen off the radar since killing a pig in Darrang district's Borgora Tea Estate on December 4 last year.

Her last kill was about 3 km south-west of Borobazar's Simlagui in the adjoining Udalguri district where she had preyed on a cow to trigger a "wild cat chase". The 78.81 sq km Orang, about 110 km north-east of Guwahati, is a tiger reserve as well as a prime one-horned rhino habitat.

F03's last few kills – all pigs – were in that direction, indicating she might have returned to Orang from where she had strayed out of. The park is another 3 km beyond the tea estate and across the river Dhansiri.

Too old for cattle?

F03's first kill outside Orang was on November 11, 2017. Her strike did not cause a flutter in the area dominated by the Bodo community. Officials attributed this to an age-old belief that the big cats are occasional guests nature sends for satisfying hunger.

A year later, around the same time Avni the tigress was gunned down in Maharashtra and angry villagers crushed an alleged man-eater under a tractor in Uttar Pradesh, F03 failed to kill a cow in a village between Borobazar and the tea estate.

The tigress could not plant her teeth on the cow and only managed to scratch her. That could have made her feel she was too old for cattle as she began preying on pigs, invariably those that were tied up.

Note

A wild tiger's life span is an average of 20 years.

Forest officials do not rule out the possibility of the tigress having crossed the Brahmaputra on the southern edge of Orang and taken refuge in Kaziranga National Park on the other banks. During winter, when water levels in the Brahmaputra fall, tigers, rhinos, elephants, and deer too use the sandbars to move between the wildlife preserves.



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