Giant Magnetoresistance (GMR)

❖ Context

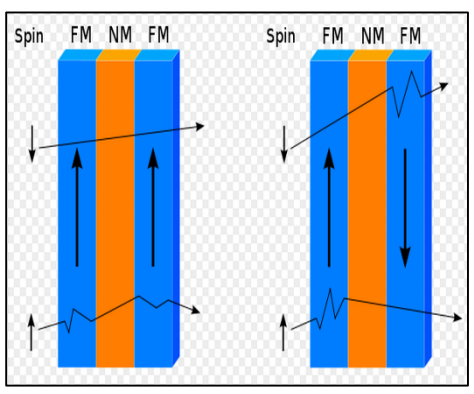
➢ Researchers in the UK, led by **Nobel laureate Andre Geim**, have discovered that graphene displays an anomalous **giant magnetoresistance (GMR) at room temperature**.

❖ Key Highlights

- GMR is the result of the electrical resistance of a conductor being affected by magnetic fields in adjacent materials.
- It is **used in harddisk drives** and **magnetoresistive RAM** in computers, biosensors, **automotive sensors**, **microelectromechanical systems,** & medical imagers.
- GMR-based devices are particularly used to sense magnetic fields.
- The new study has found that a graphene-based device, unlike conventional counterparts, wouldn't need to be cooled to a very low temperature to sense these fields.

❖ About GMR

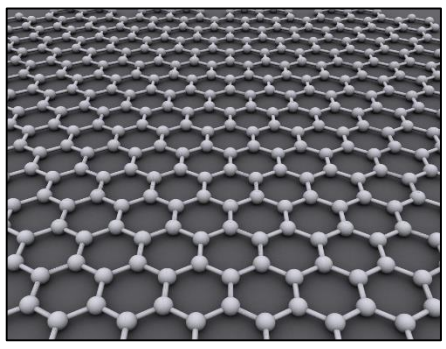
- Say a conductor is sandwiched between **two ferromagnetic materials (commonly, metals attracted to magnets, like iron)**.



- When the materials are magnetised in the same direction, the electrical resistance in the conductor is low.
- When the directions are opposite each other, the resistance increases. This is GMR.
- 'FM' stands for ferromagnetic material and 'NM' for non-magnetic material.
- The magnetoresistance observed in the graphene-based device was **"almost 100-times higher** than that observed in other known semimetals in this magnetic field range

❖ About Graphene

- Graphene is the **thinnest and strongest material** in the world and has **good chemical stability**, **high electrical conductivity** and a **large surface area** while being **transparent** and **lightweight.**



- It is **two-dimensional form** of crystalline carbon.
- It is made up of a single layer of carbon atoms arranged in a hexagonal pattern.
- It is part of graphite but has unique properties of its own.
- As per latest research, it **could replace indium and thereby bring down the cost of OLED** (organic light-emitting diode) screens in smartphones.
- **Applications:**
  - Electronic wearable devices,
  - Biomedical devices, sensors,
  - Fuel cells, semiconductors, field emission displays,
  - nanoelectrodes for inexpensive organic electronic devices such as organic photovoltaics (OPVs), liquid-crystal devices (LCDs), organic light-emitting diodes (OLEDs), supercapacitors.
- **Side Note :**
  - The India Innovation Center for Graphene (IICG) will be established in Thrissur, Kerala.
  - It will be a part of a joint venture between Pune-headquartered Centre for Materials for Electronics Technology (CMET), Digital University Kerala (DUK), Tata Steel Limited and other industries.

Lucy Mission

❖ Context

➢ Just a year into its twelve-year-long mission, **NASA's Lucy has already spotted some of the Jupiter Trojan asteroids it will be "visiting" later.**

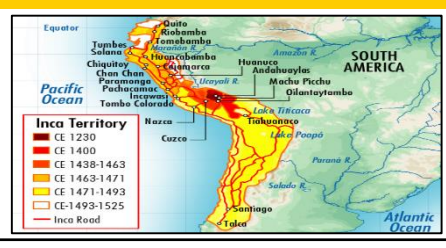
❖ Key Highlights

- Trojan asteroid, also called Trojan planet, any one of a number of asteroids that **occupy a stable Lagrangian point** in a planet's **orbit around the Sun.**
- The Trojan asteroids are believed to be formed from the same material that led to the **formation of planets nearly 4 billion years ago** when the solar system was formed.

❖ About Lucy Mission

- The Lucy Mission refers to a NASA mission to **study several Trojan asteroids near Jupiter.**
- The mission was named after the famous fossil, Australopithecus afarensis (nicknamed "Lucy"), as the Trojans are ancient fossils of the Solar System.
- The mission was **launched in 2021.**
- It is on an **epic 6-billion-kilometre-long journey** to study the Jupiter Trojan asteroids, and nearly one and a half years after it launched, it has finally caught a glimpse of the asteroids.
- The Lucy spacecraft used its **L'LORRI high-resolution camera** to capture the first views of the Jupiter Trojan asteroids between March 25 and March 27.
- Its main objectives are to study the physical and **chemical properties of the Trojans**, determine the origin and evolution of the Jovian system, and search for signs of life.
- It has recently captured the images of **Eurybates, Polymele, Leucus and Leucus asteroids.**

Inca Civilization



❖ Context

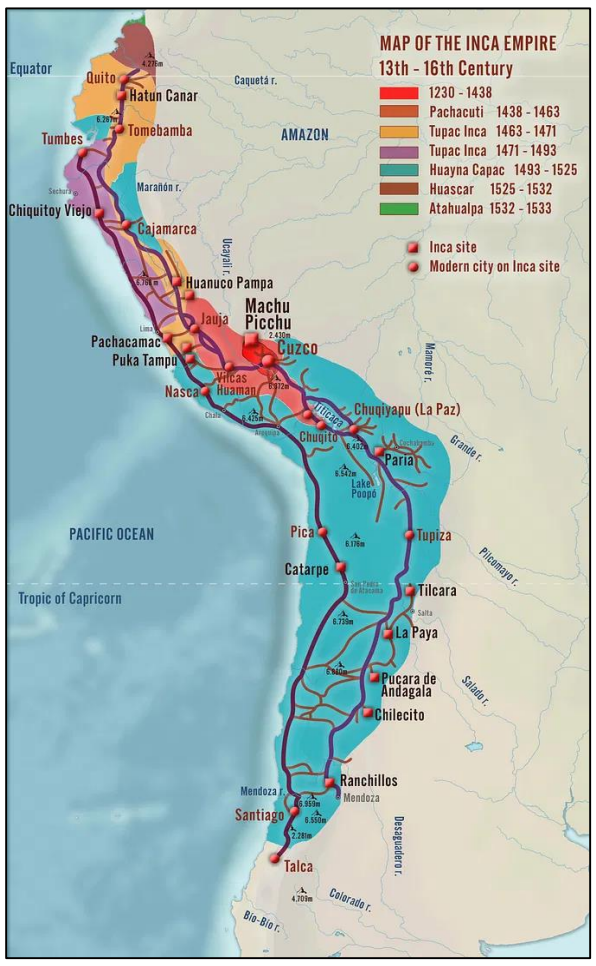
➢ Recently, archaeologists in the **Peruvian Andes** have discovered an Inca **bath complex built half a millennium ago.**

❖ Key Highlights

- They believe it may have **served the elite** of a vast empire larger than once dominated large areas of South America.
- The structure was **"more hierarchical, restricted and sacred space** within the Inca administrative centers, because instead of performing a utilitarian or hygienic function, they also served for religious functions and ancestor worship."

❖ About Inca Civilisation

- The Inca Civilization **flourished in ancient Peru betwe**en **c. 1400 and 1533 CE.**
- The Inca Empire eventually extended across **western South America from Quito in the north to Santiago in the south.**
- It was the largest empire ever seen in the Americas and the largest in the world at that time.
- Inca society was **highly stratified.**
- The emperor ruled with the aid of an aristocratic bureaucracy, exercising authority with harsh and often repressive controls.



- Inca technology and architecture were highly developed, although not strikingly original.
- Their irrigation systems, palaces, temples, and fortifications can still be seen throughout the Andes.
- The economy was based on agriculture.
- The Inca religion combined features of animism, fetishism, and the worship of nature gods.
- The Inca language Quechuais still spoken by around eight million people in the world.

Lawbreakers to Lawmakers?

❖ Context

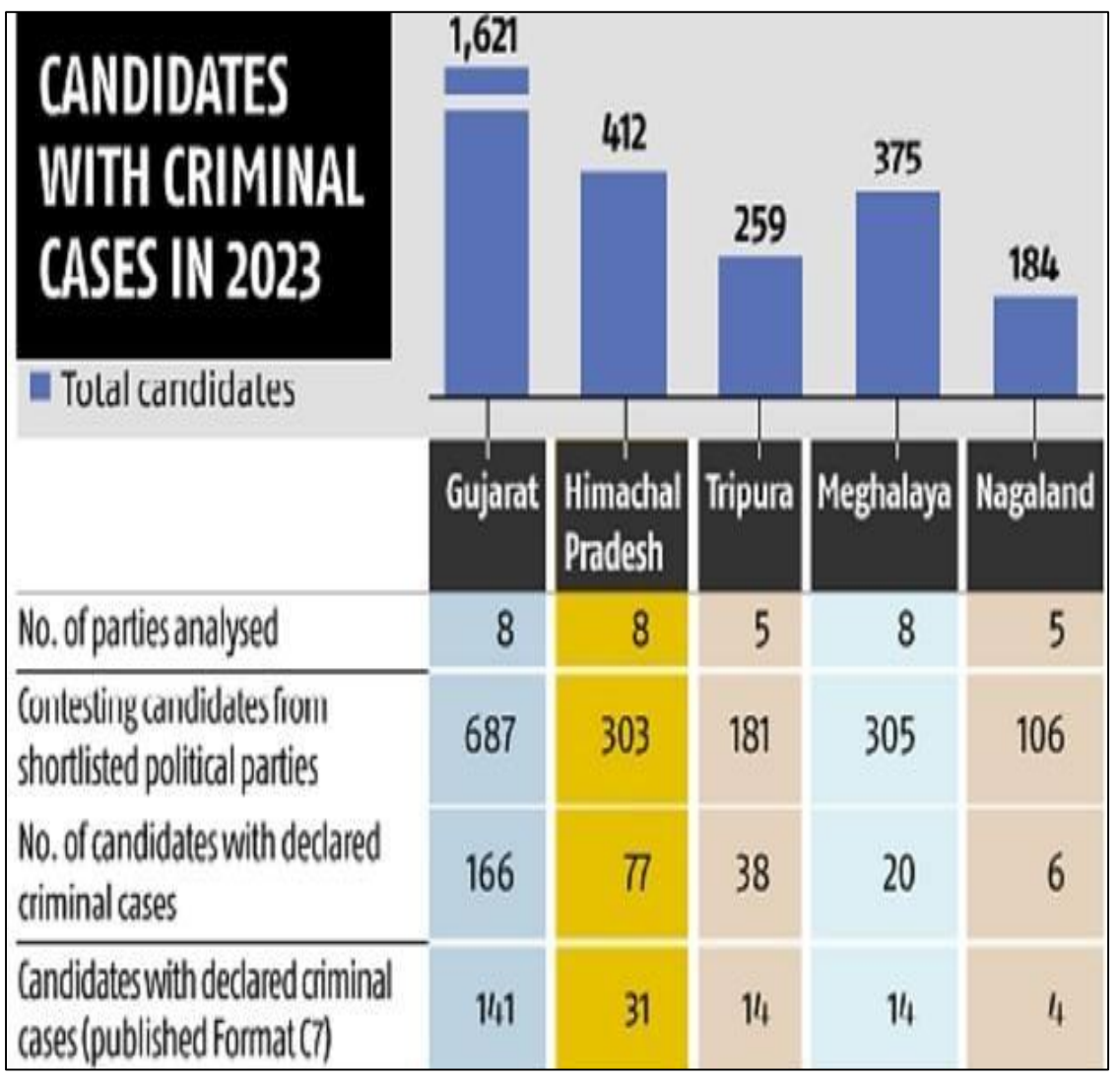
➢ Despite directive, the analysis by a watchdog group reveals that a significant portion of political parties have failed to comply and continue to nominate candidates with criminal backgrounds.

❖ What does the order say?

- The **Election Commission of India (ECI)** has made it mandatory for political parties to provide detailed information about candidates with pending criminal cases on their websites.
- This includes the **nature of the offence, whether charges have been framed,** the court concerned, case number, and reasons for their selection.
- Political parties must publish this information in one local **vernacular daily** and one national newspaper, as well as on their official social media platforms.
- Failure to comply will be **considered contempt of the Supreme Court** and the ECI.

❖ What does the report say?

- An analysis by the **Association for Democratic Reforms** found that only **66% of candidates** with criminal cases had complied with the orders, while 34% had not.
- The watchdog also noted that the orders have not **been effective in dissuading** parties from giving tickets to candidates with criminal backgrounds instead of **selecting clean, credible, and honest candidates.**



News in Between the Lines

Overseas Citizenship of India

❖ Context

- Recently an actor and activist Chetan Kumar claimed that the Union government has cancelled his **Overseas Citizenship of India (OCI) card.**

❖ About Overseas Citizenship of India:

- Overseas Citizenship of India (OCI) is a type of travel document that enables foreign nationals of **Indian origin to stay and work in India indefinitely.**
- The OCI cardholders are granted many of the same rights and privileges as Indian citizens, with the exception of certain political and governmental rights.
- The OCI program was introduced by the Indian government in 2005 to facilitate **travel and work for people of Indian origin** who hold foreign citizenship.
- The program allows them to visit India without the need for a visa, work in India, and own property in the country.
- To be eligible for OCI, a person must be of Indian origin or have been a citizen of India at some point in time.
- In addition, they must not hold citizenship of **Pakistan, Bangladesh or any other country that may be specified by the Indian government.**
- They must also have a valid passport and be able to provide documentation proving their Indian heritage.
- OCI cardholders are entitled to a range of benefits in India, including the **ability to work, study, and conduct business without the need for a separate visa.**
- They also have access to certain health and education services, and can apply for a driver's license or **PAN (Permanent Account Number) card.**
- It's important to note that while OCI cardholders **are not Indian citizens**, they are subject to **certain Indian laws and regulations**, and must abide by the same rules and regulations as Indian citizens.

R21 Malaria vaccine

❖ Context

- Recently, a new malaria vaccine **has been developed and appears** to be called a 'world-changer' by scientists.
- Called the **R21/Matrix-M**, this malaria vaccine has become the first to exceed the World Health Organisation's target of 75 per cent efficacy.

❖ Key Highlights

- Malaria vaccine development has long been hampered by the parasite's complex structure and lifecycle.
- It is **developed by Oxford University** and has received its first approval in Ghana as the African country intensifies its fight against the disease that claims a child's life every minute.
- The initiative is one of many aimed at combating the mosquito-borne disease that kills more than 600,000 people annually, mostly children in Africa.
- The vaccine has been approved for use in children aged 5-36 months, the age group at highest risk of death from malaria.

Garuda Aerospace

❖ Context

- Chennai-based drone startup Garuda Aerospace became the first company to receive the government's **agri-drone subsidy** for agricultural drones.

❖ Key Highlights:

- The Garuda Kisan drones approved by the Directorate General of Civil Aviation would help **farmers to manage and monitor the health of crops** as well as detect and identify areas that require water or fertiliser.

- Besides that, they can also be used to spray pesticides and fertilizers on crops, cutting down on manual labour and increasing efficiency.
- The subsidy offered by the Centre is part of the initiatives launched by the Government to support the drone industry.

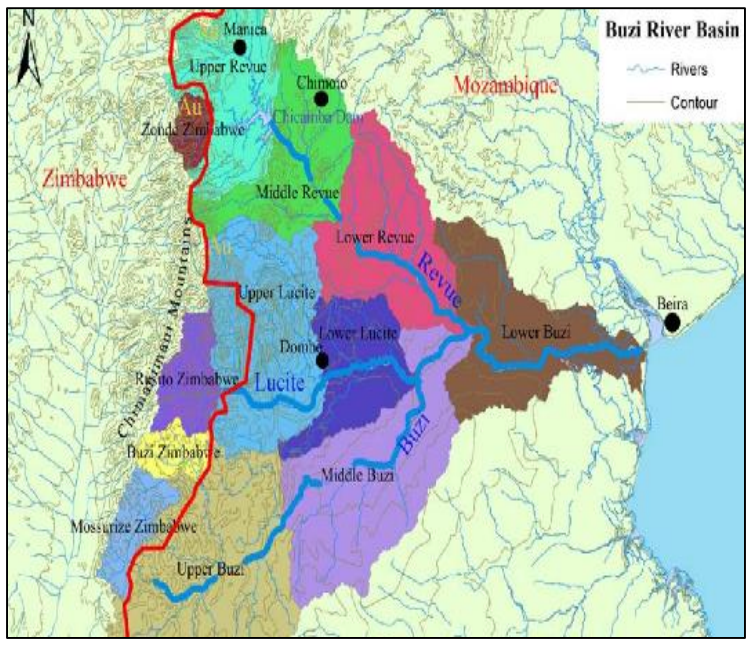
Buzi Bridge in Mozambique

❖ Context

- Recently, the Buzi Bridge in Mozambique, built by India as part of the 132KM **Tica-Buzi-Nova-Sofala Road project**, was virtually inaugurated by External Affairs Minister.

❖ About Buzi River:

- The Buzi River originates in the **Eastern Highlands (or Manica Highlands)** on the border of Mozambique and Zimbabwe, and flows eastward through the Manica and Sofala provinces of Mozambique.

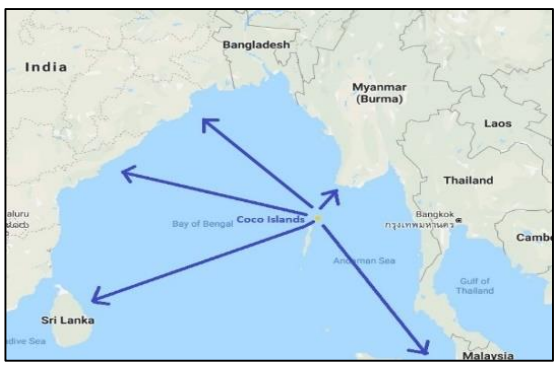


- It empties to the **Mozambique Channel west** of Beira, forming a large estuary with the Pungwe River.
- The Buzi River is 374 kilometres (232 mi) long, with a drainage basin 31,000 square kilometres (12,000 sq mi) in size.
- The **Revué river is the main northern tributary**, and its headwaters are in the Eastern Highlands near Machipanda.
- The **Lucite River**, known upstream in Zimbabwe as the Rusitu or Lusitu, is the central tributary, joining the Buzi above the Revué.
- The Mossurize River joins the Buzi from the southwest, above the Lucite.

Coco Islands

❖ Context

- India is keeping a close watch and monitoring reports of Chinese infrastructure build-up in Myanmar's Great Coco Islands in the Bay of Bengal.



❖ About Coco Islands:

- It is a small island located **approximately 400 km (250 miles) southwest of Yangon,** and is part of the **Ayeyarwady Region of Myanmar.**
- Coco Island is known for its beautiful beaches and clear waters, which make it a popular destination for diving and snorkeling.
- It is also home to a **small fishing community.**

Pralay Missiles

❖ Context

- Recently, India is going to **buy 250 more Pralay ballistic missiles** for the services to strengthen them on the northern borders, further boosting the firepower of the defence forces.

❖ Key Highlights

- Pralay' is **India's first conventional quasi-ballistic** (**Largely ballistic+Low trajectory**) missile and is an answer to any conventional missile attack from northern or western borders.
- It is developed by the DRDO.
- Pralay is powered with a **solid propellant rocket motor** and other new technologies.
- The missile guidance system includes **state-of-the-art navigation and integrated avionics**.
- **Range: 150KM to 500KM**
- It is capable of carrying a conventional warhead of about **350 kg to 700 kg,** which gives it a deadly punitive capability.
- It is a **derivative of the Prahaar missile programme**, which was first tested in 2011.
- The missile has been developed in a way that it is able to **defeat the interceptor missiles** and also has the **ability to change its path** after covering a certain range mid-air.
- India's Pralay missile **can be compared to China's Dong Feng 12** and the **Russian Iskander missile** that has been used in the ongoing war with Ukraine.

MCQ Quiz
Daily Current Affairs
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