

P2. NATIONAL



India's Strategy for Critical Minerals- LOHUM's lithium mining operations in Zimbabwe highlight India's efforts to secure critical minerals at their source and build wider mineral value chains.

P2 NATIONAL



Sagar India's Ocean Vessel - India's indigenous ocean research vessel strengthening deep-sea exploration, marine scientific research and the Blue Economy.

Manthan: Indigenous Research

P3. WORLD



Yanbu Port: Saudi Arabia's Red Sea Energy Gateway- Saudi Arabia's Red Sea energy gateway provides an alternative route for oil exports through the East-West pipeline, highlighting the strategic importance of energy chokepoints.

P3. WORLD



Russia-North Korea Road Bridge Across the Tumen River - The new Tumen River bridge strengthens cross-border connectivity while carrying wider economic, diplomatic and strategic significance.

P4. ECOLOGY



Orangutans: Wildlife Trafficking and Conservation- The rescue of five young orangutans in Odisha draws attention to international wildlife trafficking, the illegal exotic-pet trade and orangutan conservation.

P4. ECOLOGY



Red-Crowned Roofed Turtle - The conservation crisis at Haryana's Kajalheri reserve highlights the threats posed by pollution, habitat degradation, predation and human-induced mortality to Batagur kachuga.

Editor's Note

As The Hindu takes a break for Vinayaka Chathurthi, it gives us an opportunity to take a revision break of our own and revisit some of the important issues that have shaped current affairs in recent weeks.

On the National page, we turn to Samudra Manthan, India's latest addition to its ocean research capabilities and an important asset for the country's Blue Economy. We also examine India's overseas critical-mineral strategy through LOHUM's lithium mining operations in Zimbabwe and its implications for securing critical mineral resources.

The World page takes us through emerging oil chokepoints and the newly opened road bridge between Russia and North Korea, exploring its wider strategic and diplomatic significance.

On the Ecology page, we revisit the recent orangutan trafficking case and the conservation challenges surrounding India's red-crowned roofed turtles.

These may be recent headlines, but revisiting them strengthens recall and helps connect current affairs with the larger themes of UPSC preparation.

We hope this edition helps you put your recalling skills to their best use. Happy reading!

India's Overseas Strategy for Critical Minerals

Indian critical-minerals company LOHUM has commenced lithium mining operations in Zimbabwe and dispatched its first shipment of lithium ore to India. The operation marks the company's first overseas mining venture and highlights India's growing efforts to secure critical minerals directly at their source and strengthen its clean-energy supply chains.

Rare earth Minerals and Import Dependence

Zimbabwe: LOHUM has secured rights to 10 spodumene-bearing lithium mining blocks in Zimbabwe's Matabeleland South Province, covering about 1,100 hectares. The blocks are estimated to contain 30–40 million tonnes of ore.

Production: According to the company's stated target, the Zimbabwean blocks could support production of around 30,000 tonnes of lithium carbonate annually for 30 years. LOHUM also has an option to acquire up to 90 additional adjacent mining blocks.

Processing: LOHUM plans to develop processing capabilities in Zimbabwe rather than simply exporting raw ore. This reflects an approach that extends from mining and refining to advanced manufacturing and recycling.

Dependence: India currently has around 100% import dependence on lithium-ion batteries for electric vehicles, with about three-fourths of imports coming mainly from China. Access to overseas lithium resources is therefore strategically important for reducing supply-chain vulnerabilities.

Minerals: Lithium, nickel, cobalt, copper and rare earth elements are important inputs for electric vehicles, battery manufacturing, wind turbines, electricity networks and other clean-energy technologies. Securing these minerals at their source can help diversify supply chains and support India's clean-energy and electric-vehicle ecosystem.

Spodumene: Spodumene is a lithium aluminium silicate mineral with the chemical formula $\text{LiAlSi}_2\text{O}_6$ and belongs to the pyroxene family. It is an important lithium ore commonly found in lithium-bearing granite pegmatites and also occurs in gem varieties such as kunzite and hiddenite.

Sagar Manthan: India's Indigenous Ocean Research Vessel

Garden Reach Shipbuilders and Engineers (GRSE) has launched Sagar Manthan, an indigenous ocean research vessel being built for the National Centre for Polar and Ocean Research (NCPOR).



Why is it significant?

Design: The vessel is 89.5 metres long, 18.8 metres wide and has a gross tonnage of 5,900 tonnes, with a maximum speed of 14 knots at 90% maximum continuous rating. It is designed to operate in severe sea states and remote marine environments.

Reach: Sagar Manthan will support research in the equatorial Indian Ocean, Bay of Bengal and Southern Ocean, including waters around Antarctica. The vessel can conduct swath multibeam and geophysical seismic surveys at depths of up to 6 km. Sub-bottom profilers, seismic equipment and other oceanographic instruments will enable detailed study of the seabed and underlying geological structures.

Sampling: Conductivity, Temperature and Depth (CTD) profiling and water sampling will help study the physical and biological properties of seawater. The vessel can also undertake biological sampling, seabed sampling using corers and grabs, and rock dredging.

Underwater: Sagar Manthan will be capable of launching and recovering Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs) being developed by the National Institute of Ocean Technology under the Deep Ocean Mission. It will also support deep-sea moorings and data-buoy operations for long-term oceanographic observations.

Atmosphere: An advanced Doppler weather radar will support atmospheric observations, while the vessel will undertake surface meteorological and current measurements and upper-air data collection.

WORLD

Yanbu Port: Saudi Arabia's Red Sea Energy Gateway

Saudi Arabia's East-West oil pipeline, which transports oil from the country's eastern oilfields to Yanbu on the Red Sea, was temporarily shut following drone strikes. The incident highlighted Yanbu's strategic importance as an alternative outlet for Saudi oil exports and its wider role in the country's energy and maritime trade network.

Why does it matter?

Location: Yanbu is a major Saudi port on the Red Sea, located on the country's western coast, north of Jeddah. It serves as an important trade and energy gateway for the economies of Saudi Arabia's Madina and Qassim regions.

History: The modern Yanbu Commercial Port was opened in 1965 during the reign of King Faisal. Historically, the local economy was associated with pilgrim trade and agricultural exports, particularly dates, but Yanbu later developed into an important industrial and petroleum centre.

Pipeline: The East-West oil pipeline, operated by Saudi Aramco, connects the Abqaiq oilfield in eastern Saudi Arabia with Yanbu on the Red Sea. The pipeline extends for about 1,200 km across the Arabian Peninsula.

Capacity: The pipeline system allows around 4 million barrels of oil per day, equivalent to about 4% of global supply, to be rerouted from Saudi Arabia's eastern fields to Yanbu for export through the Red Sea.

Alternative: Yanbu provides Saudi Arabia with an alternative export outlet away from its major oil-producing areas in the east. This reduces dependence on maritime routes through the Persian Gulf and provides greater flexibility in transporting oil to international markets.



Russia-North Korea Road Bridge Across the Tumen River

The first permanent road bridge directly linking Russia and North Korea has opened across the Tumen River, creating a new route for the movement of cargo and passengers between the two countries. While it is officially presented as a facility for trade, tourism and people-to-people exchanges, its construction also carries wider geopolitical and strategic significance amid strengthening Russia-North Korea relations.

Connectivity and Significance

Connectivity: The bridge provides the first permanent road connection between Russia and North Korea.

Infrastructure: The bridge is approximately one kilometre long and it can accommodate up to 300 vehicles and 2,323 people per day.

Background: Construction began in April 2025 following an agreement reached during Russian President Vladimir Putin's 2024 visit to North Korea. Although the two countries already have air and rail links, they previously lacked a permanent road connection.

Economy: Russia and North Korea describe the bridge as a symbol of friendship that will facilitate cross-border trade, tourism and the movement of people. The new road link is expected to strengthen economic connectivity between the two countries.

Strategy: The bridge has acquired wider strategic significance amid deepening Russia-North Korea relations following the outbreak of the Ukraine war. Vladimir Putin and Kim Jong Un have pledged mutual assistance in the event of aggression.

Tumen: The Tumen River forms part of North Korea's northeastern frontier with China and Russia, making it an important geographical link between the three countries.

PYQ Compass



Q. Will a grand axis of India, China and Russia challenge the unipolar supremacy of the US? Elaborate your views (GS II - 2005)

Orangutans: Wildlife Trafficking and Conservation

The rescue of five young orangutans from Balasore, Odisha, has highlighted the problem of international wildlife trafficking and the illegal exotic-pet trade. The case has also drawn attention to the conservation status of orangutans, their dependence on forest habitats, and the need to establish the origin of trafficked animals for their safe repatriation.



Conservation aspects of Orangutans

Habitat: Orangutans are great apes with distinctive reddish fur. They spend most of their lives in trees. Their long, powerful arms and grasping hands and feet help them move through tree branches.

Behaviour: Orangutans generally have a solitary lifestyle and feed mainly on wild fruits. They build nests in trees or vegetation for sleeping and resting, while adult males can weigh up to 200 pounds.

Species: Three orangutan species are widely recognised: **the Bornean orangutan, the Sumatran orangutan and the Tapanuli orangutan.** The Tapanuli orangutan was recognised as a separate species in November 2017 and has no more than 800 individuals.

Differences: Sumatran orangutans have longer facial hair and are reported to form closer social bonds, while Bornean orangutans are more likely to descend to the ground. Flanged males of orangutans have prominent cheek pads and a throat sac used for loud long calls.

Population: Current estimates place the Bornean orangutan population at about 104,700 and the Sumatran orangutan population at about 13,846. Population declines have affected both species.

Threat: Orangutans are classified as **Critically Endangered**, and the rescued animals are suspected to be victims of international wildlife trafficking.

Conservation: Orangutan conservation is closely linked to the protection of their natural habitats in Indonesia and Malaysia.

Red-Crowned Roofed Turtle

The Shri Guru Gorakhnath Community Reserve at Kajalheri village in Haryana's Fatehabad district is facing a serious conservation crisis due to untreated sewage, habitat neglect, stray dogs, cattle and inadequate fencing. The reserve supports an estimated 150–200 turtles, and the situation highlights the wider conservation challenges faced by the critically endangered red-crowned roofed turtle, historically distributed across the Ganga river basin

Red-crowned roofed turtles

Species: The red-crowned roofed turtle (Batagur kachuga), often called the "**Jewel of the Ganga**", is known for its striking colouration, particularly in males before winter, when the head develops red, yellow, white and blue markings and the crown becomes vividly red.

Taxonomy: It is one of the three large freshwater turtle species of the genus Batagur found in India, and all three are listed as Critically Endangered on the IUCN Red List.

Protection: The species receives the highest level of statutory protection under Schedule I of the Wild Life (Protection) Act, 1972, and is also listed in Appendix I of CITES due to threats from hunting and illegal trade.

Range: Historically, the red-crowned roofed turtle was widely distributed across the Ganga river basin, occupying major rivers and tributaries across an area of about 400,000 sq km.

Decline: Intensive hunting of adult turtles and collection of eggs resulted in an estimated 80% population decline and a major contraction of its historical range.

Threats: The species faces threats from harvesting of adults and eggs, illegal trade, habitat degradation, sand mining, erratic water releases from upstream dams and agriculture on nesting banks.

PYQ Compass



Q. Which one of the following makes a tool with a stick to scrape insects from a hole in a tree or a log of wood? (2023)

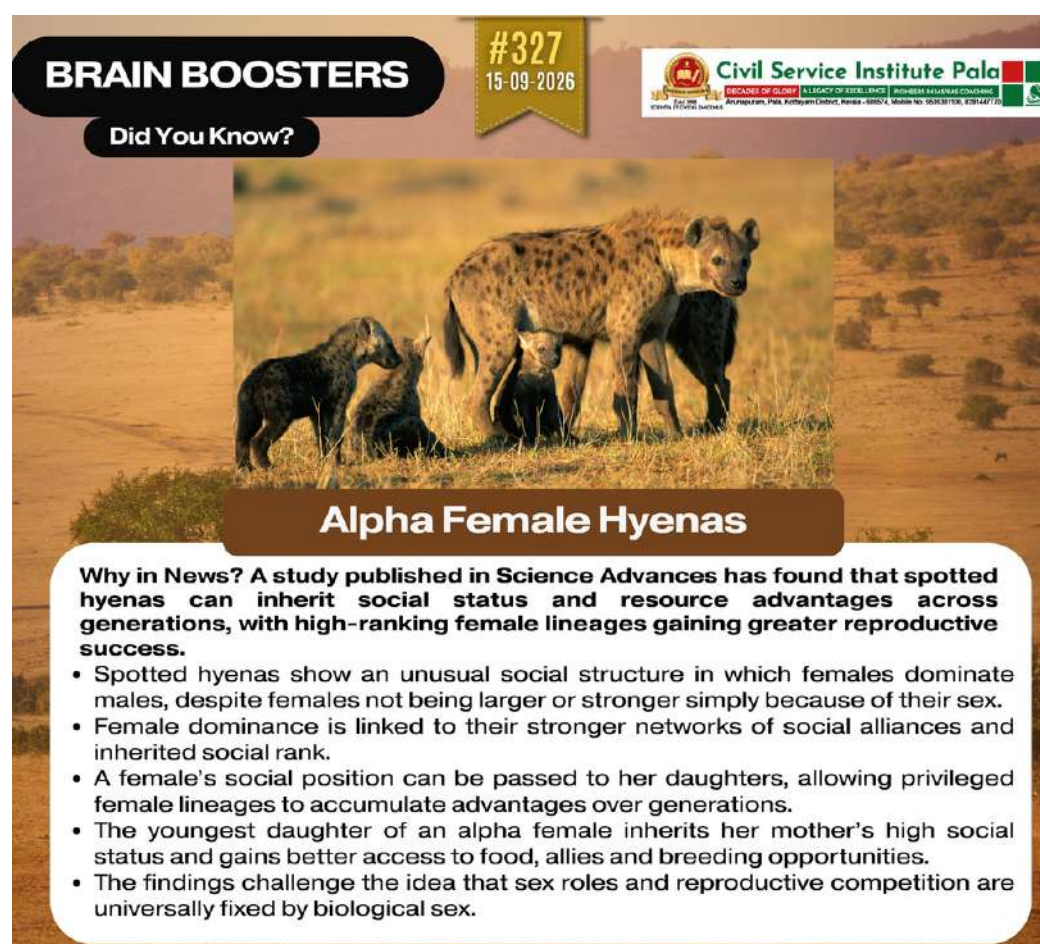
- a) Fishing cat
- b) Orangutan
- c) Otter
- d) Sloth bear

Social Inheritance and Female Dominance in Spotted Hyenas

A study published in Science Advances has found that spotted hyenas can inherit social status and resource advantages across generations, with high-ranking female lineages achieving greater reproductive success. The findings highlight how social relationships, alliances and inherited rank can shape access to resources and reproduction alongside genetic inheritance.

Social Inheritance patterns

- **Dominance:** Spotted hyenas have an unusual social structure in which females dominate males. Female dominance is associated with stronger social alliances and inherited social rank rather than simply differences in body size or physical strength.
- **Inheritance:** Spotted hyenas live in a matrilineal society where social relationships and rank are strongly organised through female lineages. The youngest daughter of an alpha female inherits her mother's high social status and gains advantages in food, nutrition, alliances and breeding opportunities.
- **Advantages:** Better access to resources can improve nutrition, growth and survival, while strong social alliances provide additional benefits. These advantages can accumulate across generations and allow a few elite female lineages to produce disproportionately more descendants.
- **Competition:** Competition for social dominance is stronger among females than males. Females may compete intensely with one another, including through attacks on the cubs of other females, while males often remain close to high-ranking females and seek to establish relationships with them.
- **Paradigm:** The findings challenge the traditional Darwin-Bateman paradigm, which generally predicts greater reproductive competition among males because males can potentially father more offspring while females bear greater reproductive costs through pregnancy and lactation.



What Was the Latest Research?

- **Evidence:** Researchers studied eight resident spotted-hyena clans in Tanzania's Ngorongoro Crater using 29 years of data covering eight generations and 2,743 wild hyenas. DNA obtained from material associated with faecal samples was also used to establish paternity and reproductive relationships.
- **Lineage:** In the Lemala clan, researchers reconstructed a 30-year genealogical tree and found that almost all living members descended from a single founding female lineage. This concentration of reproduction provided evidence for examining how inherited social rank can create persistent advantages for particular female lineages.
- **Significance:** The study shows that social structures can influence evolutionary outcomes by affecting access to resources, survival and reproductive success. It also demonstrates that inheritance can involve socially transmitted advantages alongside genetic inheritance and highlights the value of long-term studies for identifying patterns that emerge across generations.

Spotted hyenas demonstrate how social inheritance can shape reproductive success and evolutionary outcomes. Their matrilineal social structure allows rank, relationships and resource advantages to persist across generations, showing that competition and social hierarchy are not always determined solely by biological sex or genetic inheritance.

PYQ Compass



Q. Consider the following statements: (2025)

- I. India has joined the Minerals Security Partnership as a member.
- II. India is a resource-rich country in all the 30 critical minerals that it has identified.
- III. The Parliament in 2023 has amended the Mines and Minerals (Development and Regulation) Act, 1957 empowering the Central Government to exclusively auction mining lease and composite license for certain critical minerals.

Which of the statements given above are correct?

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

Ans : C

India has become 14th member of the Mineral Security Partnership (MSP) in June 2023. The other member countries are United States, Australia, Canada, Finland, France, Germany, Italy, Japan, Norway, the Republic of Korea, Sweden, the United Kingdom and the European Commission. MSP seeks to bolster critical minerals supply chains to support economic prosperity and climate objectives. Hence, statement 1 is correct. India's Ministry of Mines identified a list of 30 critical minerals in November 2022. However, India has not yet proven domestic reserves for all 30 and remains dependent on imports for many such as lithium, cobalt, nickel, and vanadium. Hence, statement 2 is not correct. The MMDR Amendment Act, 2023 has empowered the Central Government to exclusively auction Mining Leases (ML) and Composite Licences (CL)(prospecting licence-cum-mining lease) in respect of any 'critical and strategic mineral' specified in Part D of the First Schedule of the MMDR Act. Hence, statement 3 is correct.

Q. Consider the following pairs : (2025)

Country Resource-rich in

- I. Botswana : Diamond
- II. Chile : Lithium
- III. Indonesia : Nickel

In how many of the above rows is the given information correctly matched?

- (a) Only one
- (b) Only two
- (c) All the three
- (d) None

Ans : C

Botswana is one of the largest producers of diamond, and its 30 percent gross domestic product and 80 percent of exports depend on the gem. Major lithium reserves are concentrated in South America's 'Lithium Triangle'—encompassing parts of Bolivia, Argentina, and Chile. Chile is the world's biggest supplier of copper and the second biggest producer of lithium.

Indonesia is home to the world's largest nickel reserves, accounting for nearly 30 per cent of the global supply and is the world's largest producer of nickel.

PYQ Compass



Q. Which one of the following makes a tool with a stick to scrape insects from a hole in a tree or a log of wood? (2023)

- a) Fishing cat
- b) Orangutan
- c) Otter
- d) Sloth bear

Ans : b

Orangutans are known to use tools in the wild. They have been observed using sticks to scrape insects from tree hollows or logs. This behavior is a form of tool use and demonstrates their high level of intelligence and problem solving ability.

Q. Consider the following statements: (2019)

1. Some species of turtles are herbivores.
2. Some species of fish are herbivores.
3. Some species of marine mammals are herbivores.
4. Some species of snakes are viviparous.

Which of the statements given above are correct?

- a) 1 and 3 only
- b) 2, 3 and 4 only
- c) 2 and 4 only
- d) 1, 2, 3 and 4

Ans : d

Some species of turtles are herbivores: This is correct. While many turtle species are omnivores or carnivores, there are several herbivorous species, such as the green sea turtle, which primarily feeds on seagrass and algae. 2. Some species of fish are herbivores: This is also correct. Many fish species, such as parrotfish and certain species of surgeonfish, primarily feed on plant material like algae. 3. Some species of marine mammals are herbivores: Correct. For example, the manatee and the dugong are herbivorous marine mammals that feed on seagrasses. 4. Some species of snakes are viviparous: Correct as well. Viviparity (giving birth to live young) occurs in some species of snakes, such as boas and garter snakes, as opposed to laying eggs (oviparity), which is common in other species.

All the statements are correct, so the answer is d) 1, 2, 3 and 4.

PRACTICE QUESTIONS

Q. The Tumen River connects the geographical neighbourhood of:
A. Russia, North Korea and China
B. Russia, Japan and South Korea
C. China, Mongolia and Kazakhstan
D. North Korea, Japan and China

Answer: A. Russia, North Korea and China

- The Tumen River forms part of the northeastern boundary of North Korea with China and Russia, making it a geographical link between the three countries.
- It originates on Mount Paektu along the China–North Korea border and flows generally eastward before reaching the Sea of Japan (East Sea).
- Its lower course forms an important geographical corridor, which also gives strategic significance to infrastructure such as the Russia–North Korea road bridge built across the river.

Q. Batagur kachuga refers to:
A. Indian softshell turtle
B. Red-crowned roofed turtle
C. Indian peacock turtle
D. Tapanuli orangutan

Ans : b

Batagur kachuga is the scientific name of the red-crowned roofed turtle, a highly threatened freshwater turtle historically found across the Ganga river basin. It is classified as Critically Endangered and receives protection under Schedule I of the Wild Life (Protection) Act, 1972. It is also listed in Appendix I of CITES.

Q. Sagar Manthan is particularly relevant to India's marine mineral exploration because it can support the study of:
A. Petroleum reserves exclusively in shallow coastal waters
B. Manganese nodules and polymetallic sulphides in deep-sea environments
C. Coal deposits beneath river beds
D. Uranium deposits in Himalayan glaciers

Ans : b

Sagar Manthan is an indigenous ocean research vessel being developed under the Deep Ocean Mission. Its deep-water survey capabilities can support the exploration of marine mineral resources, particularly manganese nodules and polymetallic sulphides in the Indian Ocean region.