Today's Prelims Topics

Polavaram dam Project

Context

A delegation from Odisha's Opposition party recently met the National Commission for Scheduled Tribes (NCST) Chairperson to raise concerns about the Polavaram Dam project's impact on **Tribal communities.**

About Polavaram Dam Project
● It is a multi-purpose project on the **Godavari River in Andhra Pradesh**.
● It will facilitate **inter-basin water transfer from the Godavari to the Krishna** through a link canal.
● The project has been accorded **National project status** by the Union Government of India (**As per the Andhra Pradesh Reorganisation Act, 2014).**
     ○ **Benefit:** 90% of the funding for the project will be given by the central government.
● It will submerge a portion of the **Papikonda National Park in Andhra Pradesh.**
● **Tribes facing displacement due to this project:** Koya, Konda Reddi and Konda Kamari.

Godavari River
● It is **India's 2nd longest river** after the Ganga. It is also called `Dakshina Ganga`.
● **Origin:** Brahmagiri Mountain at Trimbakeshwar, Nashik (Maharashtra).
● **Tributaries:**
     ○ **Left bank:** Purna, Pranhita, Indravati and Sabari.
     ○ **Right bank:** Pravara, Manjira and Maner.
● Its basin is bounded by **various Hills & Mountains:** Satmala hills, Ajanta range, Mahadeo hills and Eastern & Western Ghats.

Source:
● **The Hindu - Odisha Oppn. highlights concerns over impact of Polavaram Dam project**

Earthquake in Telangana

Context
A 5.3-magnitude earthquake struck Telangana's Mulugu district, originating 40 km below the ground in the Eturnagaram forest area.

More about Earthquake
- It is the **2nd-largest earthquake in the region in the last 55 years.**
- **Seismological Analysis:** The epicentre of the earthquake lies within the Godavari Fault System.
  - It is a major fault line in the Krishna-Godavari basin in Andhra Pradesh.
  - This basin contains **major hydrocarbon fields.**
  - It was formed by rifting along the eastern margin of the **Indian Craton in the early Mesozoic period.**

Basics of Earthquake
- An earthquake is the shaking of the surface of the Earth, resulting from the sudden release of energy in the Earth's lithosphere that creates **seismic waves.**
- It may be due to **faulting , folding, plate movement, volcanic eruptions and anthropogenic factors like dams and reservoirs.**
- **Seismic Waves:** Seismic waves are the waves of energy caused by the sudden breaking of rock within the earth. The two main types of waves are **body waves and surface waves.**
- **Body waves:**
  - **Primary waves (P-waves):** They are the fastest kind of seismic wave which can move through gaseous, solid rock and fluids, like water or the liquid layers of the earth. It is a **Longitudinal Wave.**
  - **Secondary waves (S-waves):** It can only move through solid rock and arrives at the surface with some time Lag. These are **Transverse waves.**
- **Surface Waves: 2 Types -** Love Waves (L-waves) & Rayleigh waves

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Key Concepts
- Earthquakes with a magnitude greater than 8 are classified as **Megaquakes**
- **Subduction Zone** is a spot where two of the planet's tectonic plates collide and one dives, or subducts, beneath the other.
- The point within Earth where faulting begins is the **focus, or hypocenter.**
- The point directly above the focus on the surface is the **epicenter.**
  - The **intensity of the earthquake is highest at the epicenter** and decreases with distance from the epicenter.
- **Richter scale** is the scale to measure the magnitude of energy released by an earthquake.
  - The number indicating magnitude ranges between **0 to 9**
- **Mercalli scale** is a seismic scale used for measuring the intensity of an earthquake.
  - The number indicating intensity ranges between **1 to 12**

Source:
- **The Hindu - 5.3-magnitude quake jolts Telangana's Mulugu**

Border dispute between Kyrgyzstan and Tajikistan

Context

Central Asian neighbours Kyrgyzstan and Tajikistan announced a border demarcation deal on the last contested frontier in the region, potentially ending decades of territorial disputes.

Background of Border Dispute

● The conflict is over a **970 km-long border** shared by Kyrgyzstan and Tajikistan in Central Asia.
● **Cause**: Disputes over territorial claims and resource access (water, grazing land) in the densely populated **Ferghana Valley.**
● Borders were drawn during the Soviet era without considering ethnic and community alignments.
　　○ Approximately **30% of the border remains undefined**, leading to frequent clashes.

Kyrgyzstan-Tajikistan border disputes continue for 31 years

Borders drawn by the former Soviet Union regardless of ethnic, political, economic, and cultural factors caused critical issues between the newly independent Central Asian countries Kyrgyzstan and Tajikistan

BATKEN REGION

Has natural underground and water resources

Population of around 500,000

There are enclaves in **the Batken region,** with one belonging to **Tajikistan (Vorukh), the other to Uzbekistan (Shakhimardan, Sokh)**

FERGANA VALLEY

The valley, where these countries' borders intersect, is **the main factor in border disputes**

Fergana Valley includes **Fergana, Namangan, Andijan in Uzbekistan, Khujand in Tajikistan, Osh, Jalalabad, and Batken in Kyrgyzstan**

BORDER DISPUTE BETWEEN KYRGYZSTAN, TAJIKISTAN

Total border length **970 kilometers (602.7 miles)**

Only **503 km (312.5 mi)** of the border between Kyrgyzstan and Tajikistan is clear

150 conflicts recorded at the border in the **last 10 years**

RECENT BORDER CONFLICT

The conflict, which began **on Sept. 14** on the Kyrgyz-Tajik border, **lasted for 10 hours**

It was reported by the Kyrgyz side that **24 were killed and about 90 injured** in the incident

Kyrgyzstan declared a state of emergency in **the Batken region on Sept. 17**

The two countries established **a cease-fire on Sept. 16**

September 17, 2022

Facts

● **Longest border between any 2 countries in the world:**
　　○ **1st -** USA & Canada
　　○ **2nd -** Kazakhstan-Russia
　　○ **3rd -** Argentina-Chile
　　○ **6th - India & Bangladesh**
● India has **15,106.7 Km of land border and a coastline of 7,516.6 Km** including island territories.
● India shares its land border with **7 Countries:** Bangladesh (4,096 km), China (3,488 km), Pakistan (3,323 km), Nepal (1,751 km), Myanmar (1,643 km), Bhutan (699 km) & Afghanistan (106 km).
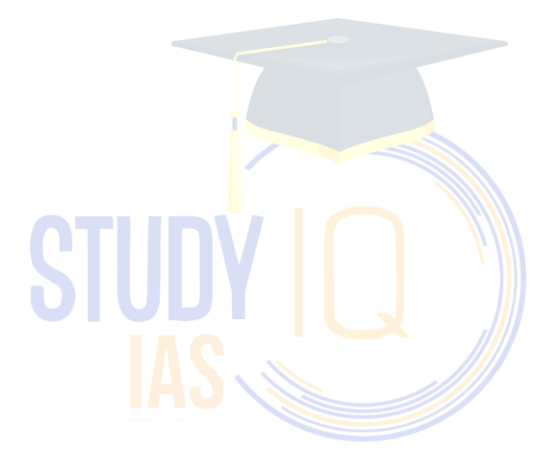
UPSC PYQ

Q. The longest border between any two countries in the world is between: **(2024)**
(a) Canada and the United States of America
(b) Chile and Argentina
(c) China and India
(d) Kazakhstan and Russian Federation

Answer: A

Source:
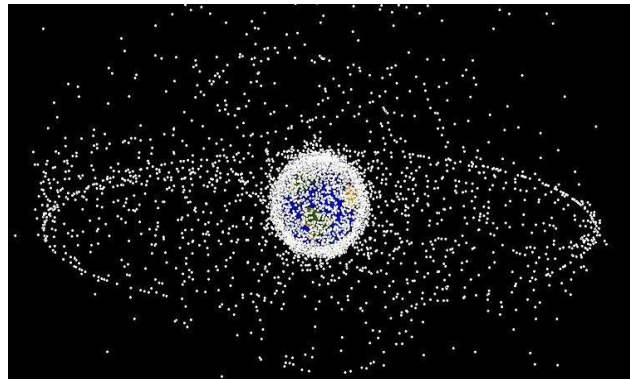● **The Hindu - The border length between Kyrgyzstan and Tajikistan**

Akal Takht

Context

Recently President of the Shiromani Akali Dal (SAD), received religious punishment from the Akal Takht, the supreme temporal seat of Sikhs.

About Akal Takht
- It is the **Supreme Governing Body of the Sikh community and one of the 5 takhts of Sikhism.**
    - **Other 4 are:** Keshgarh Sahib (Anandpur), Patna Sahib, Hazur Sahib and Damdama Sahib
- It is located opposite the **Harmandir Sahib in the Golden Temple complex.**
- The Takht sustained damage during **Operation Bluestar in 1984** but was later rebuilt by the Indian government and renamed **Sarkari Takht.**
- The Guru Granth Sahib is brought to the Akal Takht every evening and transferred to the Golden Temple each morning.
- **History:**
    - The Akal Takht was established by **Guru Hargobind in 1606** after the execution of his father, **Guru Arjan Dev, by the Mughals.**
    - It was created to address both the spiritual and temporal concerns of the Sikh community.
    - The Guru is said to have requested two swords, symbolising **miri (temporal power) and piri (spirituality).**
    - The sword representing miri was slightly shorter, **indicating the primacy of spiritual authority over temporal power.**

The Jathedar
- He is the top spokesperson of the Sikh community and resides at the Akal Takht.
- The position requires the individual to be baptized, well-versed in Sikh history and scriptures and free from moral flaws.
- **Appointment:**
    - Initially they were chosen by **Sarbat Khalsa assemblies.**
    - After-1925, they are appointed by the **Shiromani Gurdwara Parbandhak Committee (SGPC),** which manages Sikh shrines.
- Any person who identifies as a Sikh can be summoned to the Akal Takht, tried, and sentenced but Akal Takht's justice **applies only to those who voluntarily submit to its authority.**

Source:
- **Indian Express - Akal Takht, SAD, and the punishment to Sukhbir Singh Badal**

Space Debris Management

Context
India is taking significant steps toward ensuring the sustainable use of outer space by focusing on **Space Situational Awareness (SSA)** and debris mitigation.

About Space Debris
- Space debris, also known as **space junk**, refers to man-made objects that are **no longer operational and orbit Earth.**
- These objects include d**efunct satellites, spent rocket stages, fragments from spacecraft collisions and other discarded hardware** from past space missions.

Impacts of Space Debris
- **Threat to Operational Satellites:** Space debris can collide with operational satellites and spacecraft, causing damage or destruction. This can lead to the loss of critical communication, navigation, weather monitoring, and remote sensing services that rely on satellites.
- **Chain Reaction (Kessler Syndrome):** A major collision between large objects could trigger a chain reaction known as the Kessler Syndrome, where the resulting debris creates more collisions, leading to a self-sustaining cascade that significantly increases the amount of debris in orbit.
- **Risk to Human Spaceflight:** Space debris poses a risk to crewed spacecraft and astronauts on the International Space Station (ISS) and other future crewed missions. Even small debris fragments can cause severe damage to spacecraft hulls and vital systems.
- **Reduction of Orbital Slots:** The accumulation of space debris in specific orbital regions can limit the availability of desirable orbital slots for future missions.

Key SSA initiatives
- **Project NETRA:**
  - It is an early warning system in space to detect debris and other hazards to Indian satellites.
  - Once operational, it will give India its own capability in Space Situational Awareness (SSA) like the other space powers.
  - NETRA can spot, track and catalogue objects as small as 10 cm, up to a range of 3,400 km and equal to a space orbit of around 2,000 km.
- **ISRO's System for Safe and Sustainable Space Operations Management (IS4OM):**
  - IS4OM is an initiative by ISRO focused on ensuring safe and sustainable operations in space.
  - **Functions:** Monitoring Orbital Decay, Space Debris Management & Collaboration with International Entities
- **Inter-Agency Space Debris Coordination Committee (IADC):**
  - It is an inter-governmental forum established in 1993 aimed at coordinating efforts to address space debris issues.
  - **Functions:**
    - **Information Exchange:** Facilitating communication among member space agencies regarding space debris research and mitigation strategies.
    - **Debris Mitigation Guidelines:** Developing recommendations for managing space debris, which include:
    - Limiting debris released during normal operations.
    - Minimising potential on-orbit breakups.
    - Planning for post-mission disposal of spacecraft.
  - **Members of IADC:** NASA (USA), ESA (European Space Agency), ISRO (India), CNSA (China National Space Administration), JAXA (Japan Aerospace Exploration Agency)
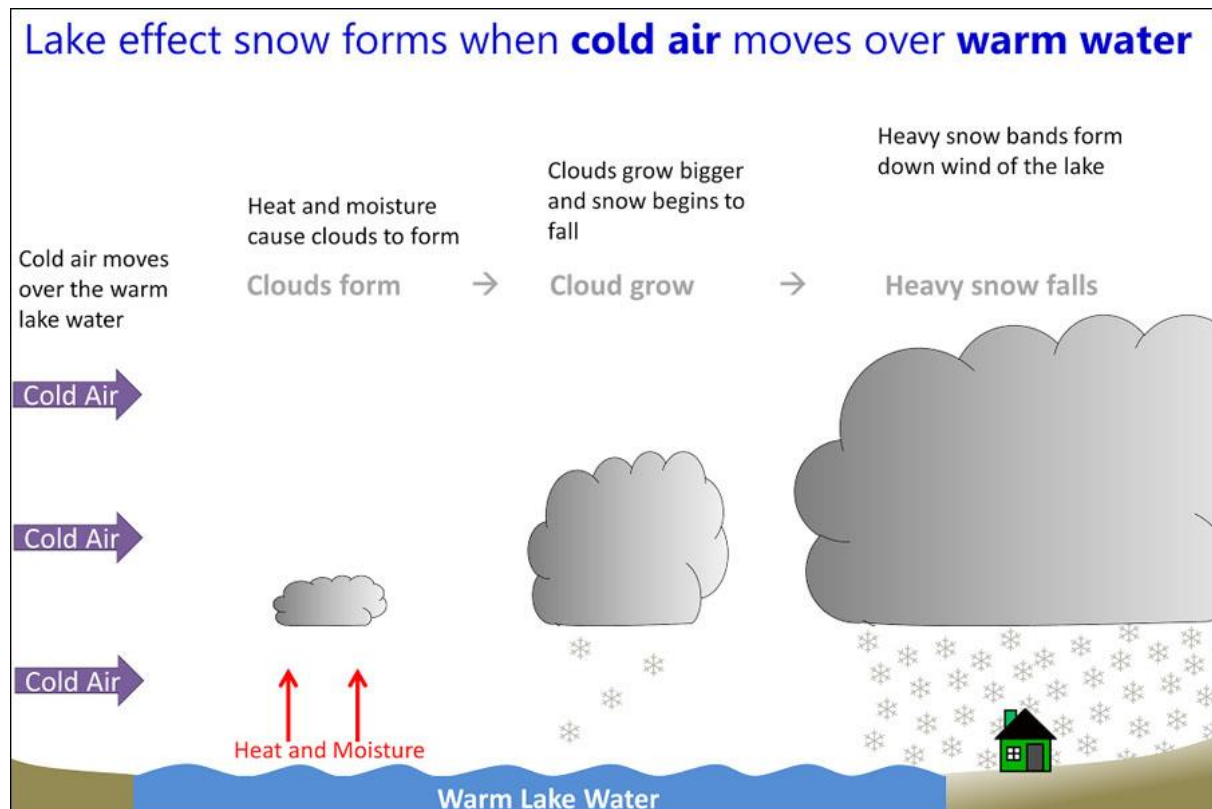**Source: PIB - Space Debris Management**

Lake Effect Snow

Context

Several states in the USA such as New York, Pennsylvania, Ohio and Michigan are witnessing snowfall due to the 'Lake Effect Snow.'

About Lake Effect Snow

- It is a localized weather phenomenon characterized by **heavy snowfall near large bodies of water,** commonly observed around the **Great Lakes in North America** during the colder months.
- **Mechanism:**
  - Cold air (generally originating from Canada) moves over the warmer surface of the lakes.
  - The lower layer of air is warmed by the lake, gaining moisture as it rises through the colder atmosphere above.
  - This warm, moist air ascends, and as it cools rapidly, the moisture condenses to form clouds.
  - These clouds then develop into a narrow band, leading to intense snowfall, often accumulating 2-3 inches or more per hour.

Lake effect snow forms when **cold air** moves over **warm water**

Source:

- **Indian Express - Lake effect Snow**

Top court directs States to provide facts and figures on illegal sand-mining
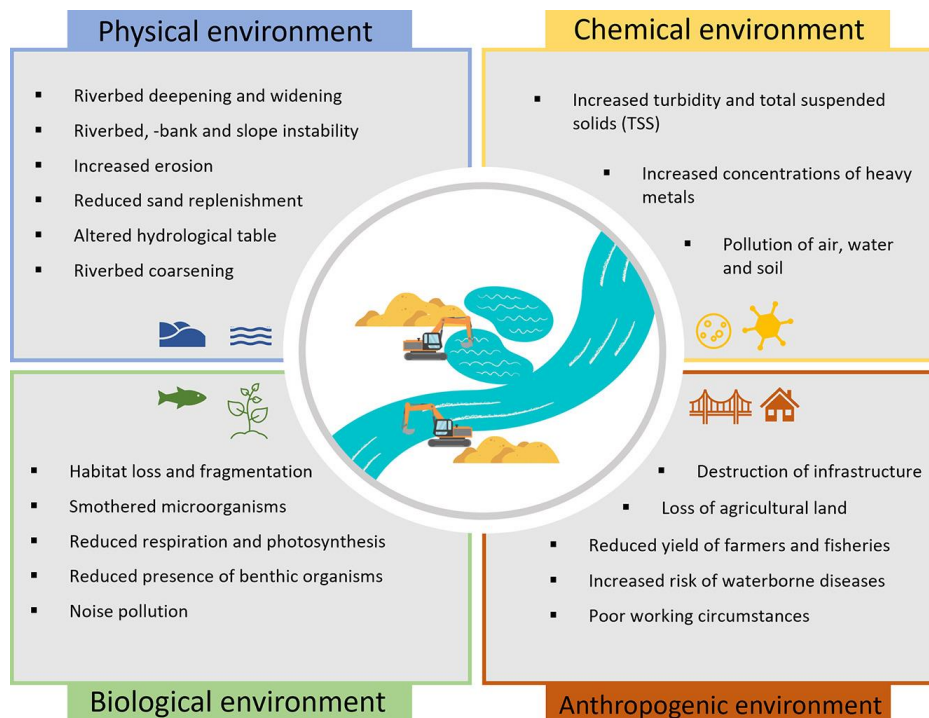
Context

The Supreme Court asked the 5 states (Tamil Nadu, Maharashtra, Andhra Pradesh, Punjab and Madhya Pradesh) to present **facts and figures** on the extent of sand-mining.

About Sand Mining

- Sand mining is the extraction of sand from various sources, such as rivers, beaches, and seabeds, for use in construction, manufacturing, and other industries.
- It is a **minor mineral under Section 3(e) of the MMDR Act**.

Effects of Illegal Sand Mining

Minor Minerals

- According to MMDR Act, 1957 "Minor Minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other Central Govt notified mineral.
- The Center has the power to notify "minor minerals" under MMDR Act, 1957.
  - India has 86 minor minerals out of which 31 were added in 2015.
- The power to frame laws for minor minerals is entirely delegated to **State Govts.**
- Andhra Pradesh tops in the value of minor minerals produced in India followed by Gujarat, Maharashtra, Rajasthan and UP.

Major Minerals

- Major minerals are those which are specified in the first schedule of the MMDR Act 1957
  - The common major minerals are Lignite, Coal, Uranium, iron ore, gold etc.
- There is no **official definition for "major minerals"** in the MMDR Act. Hence, whatever is not declared as a "minor mineral" may be treated as a major mineral.
- The power to frame law for major minerals is dealt with by the **Ministry of Mines under the Union Government.**

UPSC PYQ
Which of the following is/are the possible consequences/s of heavy sand mining in riverbeds?
1. Decreased salinity in the river
2. Pollution of groundwater
3. Lowering of the water table
Select the correct answer using the code given below: **(2018)**
(a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3
Answer: B

Source:
● **The Hindu - Top court directs five States to provide facts and figures on illegal sand-mining**

Study flags agroforestry threat to frogs

Context
A recent study by NCF-India and BEAG found that agroforestry practices, such as orchards and paddy fields, harm endemic frog species in Maharashtra's Western Ghats.

Key Findings of the study
- The study was conducted in 4 plateaus: **Devi Hasol, Devache Gothane, Gaonkhadi and Bakale during the monsoon of 2022.**
- Amphibian diversity was found lowest in paddy fields, while abundance was least in orchards compared to undisturbed plateaus.
- Conversion of plateaus into mango and cashew orchards reduces critical frog habitats.
- Researchers have recommended measures like frog-friendly agroforestry, retaining water bodies and providing incentives to landowners.

Source:
- **The Hindu - Study flags agroforestry threat to frogs**

News in Shorts

Amazon launches new AI models

- Amazon has introduced a range of artificial intelligence foundational models at its flagship annual event **Amazon Web Services (AWS) re: Invent** called Nova, which will allow for text, image and video generation
- It also introduced image-generation model **Nova Canvas** and video generating model **Nova Reel.**
- Nova Reel software allows users to make six-second videos that can be useful for companies to display their products on their website or marketplace.

Source:
- **The Hindu - Amazon launches new AI models**

Syrian Troops Launch Counteroffensive Against Militants in Hama

- Hama is a strategically significant city in **central Syria.**
- **Significance:**
  - Protects Damascus, the capital and seat of President Bashar al-Assad's government.
  - Holds historical and political importance, including its role in Syria's civil war and prior conflicts.

Source:
- **The Hindu - After setbacks, Syrian troops launch offensive against militants in Hama**

Sandstone pillars of Mauryan Era

- The Kumhrar archaeological site in Patna, Bihar, is gaining renewed attention as the Archaeological Survey of India (ASI) reopens the **Mauryan-era 80-pillar hall.**
- The hall is linked to **Emperor Ashoka (268–232 BCE)** and is believed to have hosted the Third Buddhist Council to unify the Buddhist Sangha.
- It highlights the prominence of **Pataliputra (modern-day Patna) as the seat of the Mauryan empire.**
- **About Mauryan Era Pillars:**
  - They are monolithic, tall, lustrous, well-proportioned, free-standing structures with tapering shafts.
  - They are made of **sandstone**.
  - **E.g.** Sarnath (Lion Capital), Rampurva (BullCapital, Prayag -Prashasti (Allahabad Pillar) etc.

Source:
- **Indian Express- Under layers of soil, 80 pillars and a slice of Patna's Mauryan-era past**

Editorial Summary

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Bangladesh is Unlike Pakistan

Context

The recent unrest in Bangladesh, particularly involving the International Society for Krishna Consciousness (ISKCON), has highlighted the country's ongoing struggles with communal harmony and the challenges of maintaining its legacy of tolerance.

About Bangladesh

- Bangladesh is the world's **eighth-most populous** nation with nearly 180 million people and the **35th-largest economy**.
- It is the **second-largest exporter of ready-made garments (RMG).**
- It is **home to Bangladesh Rural Advancement Committee (BRAC)** – the world's largest NGO– and Grameen Bank (founded by Nobel Laureate Prof. Muhammad Yunus, a pioneer of microfinance).
- The country's identity is rooted in **Bengali nationalism**, emphasizing **linguistic and cultural distinctiveness over religious uniformity**.
- Bangladesh's constitution uniquely **balances secular principles with Islam** as the state religion.
  - A Supreme Court judgment in 2016 reinforced that this recognition does not undermine the state's secular obligations.
- **All religious communities** are entitled to **equal protection under the law.**

How is Bangladesh Different From Pakistan?

Aspects	Bangladesh	Pakistan
Foundation and Identity	- Founded on **Bengali nationalism**, emphasizing cultural and linguistic unity over religious identity. - The 1971 Liberation War was a struggle to assert its distinct **Bengali identity** against the **communal policies** of Pakistan. - While Islam is the state religion, Bangladesh's Constitution ensures secularism and the equal rights of all religious communities.	- Created on the basis of **religious identity** during the Partition of India in 1947. - Pakistan's identity is deeply tied to **Islamic ideology**, with religion playing a central role in governance and society. - Over time, the country has moved toward greater **religious conservatism**, with significant political influence wielded by religious groups.
Treatment of Minorities	- Despite occasional communal tensions, Bangladesh generally ensures **legal protections and cultural inclusivity for minorities**. - Instances of violence are isolated, and public sentiment often supports the protection of minority communities.	- Religious minorities often **face systemic discrimination and violence**, with limited state intervention to protect their rights. - Forced conversions and mob violence against minority communities are recurrent issues.
Governance and Political Evolution	- Has largely maintained a **civilian-led government**, despite periods of military intervention. - The political landscape has been	- The military has played a dominant role in politics, with frequent coups and military-backed governance. - Democracy is often undermined by

	shaped by competition between major secular parties, emphasizing democratic principles.	the military and judiciary, with civilian governments struggling to maintain authority.
Counterterrorism and Radicalization	● **Proactive in dismantling extremist networks** such as Jama'atul Mujahideen Bangladesh (JMB) and Harkat-ul-Jihad-al Islami Bangladesh (HuJI-B)**.** ● The state and public sentiment **reject extremist ideologies**, ensuring minimal support for radical movements.	● **Struggles with deeply entrenched extremist groups** like Tehrik-i-Taliban Pakistan (TTP) and Lashkar-e-Taiba (LeT). ● Extremist ideologies have **greater societal and political influence**, with groups occasionally receiving tacit support.
Role of Women	● Women play a significant role in public life, with prominent female leaders like **Sheikh Hasina and Khaleda Zia** shaping its political landscape. ● The country has made notable strides in women's empowerment, particularly in education and employment sectors.	● Women face significant **societal restrictions**, especially in conservative regions. ● Gender inequality remains a major challenge, with limited representation in politics and public life.
Regional and Global Outlook	● Prioritizes **regional cooperation** and peacekeeping efforts, maintaining a balanced foreign policy. ● Emphasizes cultural diplomacy and integration into global markets.	● Faces **isolation in global forums** due to its alleged support for militant groups and internal political instability. ● Its foreign policy is largely shaped by security concerns, particularly its rivalry with India.

Current Political Climate and Future Outlook

● **Transition of Power**: The interim government, led by key figures such as Prof. Yunus, focuses on maintaining order and safeguarding minorities amid political uncertainty following Sheikh Hasina's ouster.
● **Challenges and Strengths**: Concerns exist over the potential resurgence of Islamist parties.
  ○ However, Bangladesh's rich cultural traditions, history of secular governance, and firm counterterrorism stance mitigate fears of a theocratic shift.
● **Outlook**: As elections approach, Bangladesh's ability to navigate these challenges will depend on its foundational values of tolerance and pluralism.
  ○ Its history demonstrates a strong capacity to preserve stability and progress even in turbulent times.

Source: The Indian Express: Bangladesh is Unlike Pakistan

Railways (Amendment) Bill 2024

Context
The Railways (Amendment) Bill, 2024, was taken up for discussion in the Lok Sabha.

Key Points of the Railways (Amendment) Bill, 2024
- **Existing Legislation**:
  ○ The **Railways Act, 1989** governs the administration and functioning of Indian Railways, including organising it into zones for better management.
  ○ The **Indian Railway Board Act, 1905** established the Railway Board as the central authority for overseeing Indian Railways.
- **Purpose of the Amendment**:
  ○ The central government moved the bill to unify the **Indian Railways Board Act, 1905, and the Railways Act, 1989**, into a single comprehensive legislation aimed at improving efficiency in the overall framework of Indian Railways.
  ○ This aims to **simplify the legal framework** by eliminating the need to refer to two separate laws governing Indian Railways.
- **Historical Context**:
  ○ The **Joint Parliamentary Committee**, during the examination of the Railways Bill, 1986, recommended incorporating the provisions of the 1905 Act into the 1986 Bill (which became the 1989 Act).
  ○ The 2024 Amendment seeks to act on this long-standing recommendation to streamline railway governance.

Opposition to the Railways (Amendment) Bill, 2024
- **Concerns Over Autonomy and Privatisation**: The Bill could undermine the autonomy of Indian Railways, potentially paving the way for its privatisation.
  ○ There is apprehension among the public about the government's intentions regarding the privatisation of Indian Railways.
- **Lack of Consensus**: The government **should have convened an all-party meeting** before introducing the Bill to ensure a broader consensus on such a significant legislative change.
- **Safety Before Operation**: The government should focus on addressing frequent rail accidents, reducing operating costs, and enhancing passenger amenities instead of legislative changes.
- **Social Responsibility**: Indian Railways carries significant social obligations, which should not be compromised by potential structural changes or privatisation.

Call for Interventions
- **Reinstatement of Rail Concessions**:
  ○ Several members have called for the reinstatement of rail fare concessions for senior citizens.
  ○ Requests were also made for concessions for journalists and SC/ST/OBC students appearing for examinations.
- **Focus on Passenger Welfare**:
  ○ Instead of prioritising administrative changes, the government should enhance the welfare and affordability of rail services for the public.

Sources:
- **The Hindu: Railways Amendment Bill taken up for discussion in Lok Sabha**
- **Indian Express: Railways (Amendment) Bill a move to privatisation, says Opp**
- **Business Standard: What in the Railways (Amendment) Bill 2024 is upsetting the Opposition?**

India's Strategic Focus on West Africa

Context
PM Narendra Modi during his visit to participate in the G-20 Summit, Brazil, he also visited Nigeria.

About the Visit
● The Prime Minister was also conferred the **Grand Commander of the Order of the Niger**, Nigeria's second-highest national honor, making him the second foreign dignitary to receive it since 1969.

India-Nigeria Ties
● **Historical Partnership**: India and Nigeria have a partnership of over six decades.
  ○ Nigeria is the largest democracy and economy in Africa, playing a crucial role at the African Union and in regional diplomacy.
● **Developmental Assistance**: India offers concessional loans (over $100 million) and capacity-building programs in Nigeria, emphasizing the "India Way" of development partnerships.
● **Trade and Investment**: Trade declined from **$14.95 billion in 2021-22** to **$7.89 billion in 2023-24** due to India's increasing oil imports from Russia.
  ○ India imports crude oil and natural gas from Nigeria, while exporting pharmaceuticals, IT services, and machinery.
● **Defense Cooperation**: India is emerging as a defense supplier for Nigeria, offering arms and expertise in counter-terrorism operations.

Significance of Nigeria for India
● **Energy Security**: Nigeria is a major oil exporter and key to India's diversification of energy sources.
● **Trade Gateway**: As West Africa's largest economy, Nigeria serves as a gateway for Indian businesses in the region.
● **Counterterrorism**: Collaborating with Nigeria on security enhances regional stability and counters terrorism in Africa, which has global implications.
● **Global South Leadership**: As leading nations in the Global South, stronger India-Nigeria ties contribute to shared developmental goals and amplify voices in global governance.

West African Significance For India
● **Natural Resources**: West Africa is rich in natural resources, including oil, natural gas, gold, and bauxite, essential for India's energy security and industrial growth.
  ○ Nigeria, the largest oil producer in Africa, is a key supplier of crude oil to India.
● **Trade Opportunities**: India is one of the largest trading partners of West African countries.
  ○ Major imports include energy resources and agricultural products like cocoa (from Ghana and Côte d'Ivoire).
● **Market for Indian Goods and Services**: West Africa offers a significant market for Indian pharmaceuticals, IT services, automobiles, and agricultural machinery.
  ○ Indian generic drugs are in high demand due to their affordability and quality.
● **Maritime Security**: The Gulf of Guinea, part of West Africa's maritime zone, is critical for global trade and energy supplies.
  ○ India has a strategic interest in ensuring freedom of navigation and combating piracy in

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this region.
- **Counterbalancing China's Influence**: China has a significant presence in West Africa through investments and infrastructure projects.
  - Strengthening ties with West African countries helps India maintain its influence and diversify partnerships.
- **Energy Security:** West Africa is a crucial supplier of energy resources:
  - Nigeria, Ghana, and Senegal are emerging exporters of LNG (Liquefied Natural Gas), meeting India's rising energy demands.
- **Indian Investments in Infrastructure**: India supports infrastructure development in West Africa through **Lines of Credit (LoCs)** via the Export-Import Bank of India.
  - Projects include roads, railways, power generation, and agriculture.
- **Capacity Building and Technical Assistance**: Programs under the **India-Africa Forum Summit (IAFS)** focus on skill development, IT training, and healthcare initiatives.
  - The Pan African e-Network project connects Indian educational and medical institutions with West African nations.
- **Indian Diaspora**: West Africa is home to a vibrant Indian community involved in business, especially in Nigeria and Ghana.
  - Diaspora engagement enhances cultural ties and promotes India's soft power.
- **Cultural Affinity**: Shared colonial history and participation in the Non-Aligned Movement have fostered goodwill.
  - Bollywood movies and Indian cuisine enjoy popularity in the region.
- **UN and Other International Forums**: West African countries often align with India on global issues, such as climate change and sustainable development.
  - Their support is crucial for India's bid for a permanent seat in the **UN Security Council**.
- **South-South Cooperation**: India promotes development partnerships with West Africa under South-South Cooperation frameworks, strengthening solidarity among developing nations.
- **Food Security and Agriculture**: Collaboration in agriculture can help tackle food security challenges in West Africa while providing India with opportunities to export agricultural technology.
- **Health Cooperation**: India has supplied affordable vaccines and generic medicines to West African nations, playing a vital role during the COVID-19 pandemic.
- **Digital and Fintech Growth**: West Africa is witnessing rapid growth in digital services and fintech, offering opportunities for Indian IT companies.
- **Renewable Energy Cooperation**: The International Solar Alliance (ISA), led by India, provides a platform to collaborate with sun-rich West African nations on renewable energy projects.

Nigeria-China Ties and Concerns for India
- **Chinese Presence**: Nigeria hosts **over 200 Chinese companies**, making it China's largest export market and second-largest trading partner in Africa.
  - China has funded **22 major infrastructure projects** worth **$47 billion**, including the Lekki Deep Sea Port and the Abuja Light Rail.
- **Debt Diplomacy**: Chinese loans account for **11.28% of Nigeria's external debt**, raising concerns about dependency.
- **Technology and Mining**: Huawei has a significant presence in Nigeria, building mobile infrastructure and training local workforce.
  - China dominates the mining sector, including lithium processing for EV batteries.
- **Strategic Edge**: China's investments in critical infrastructure and natural resources could limit India's influence and opportunities in Nigeria.

Way Forward for India
- **Expand Economic Ties**: Diversify trade with Nigeria beyond oil, focusing on technology, agriculture, and renewable energy.
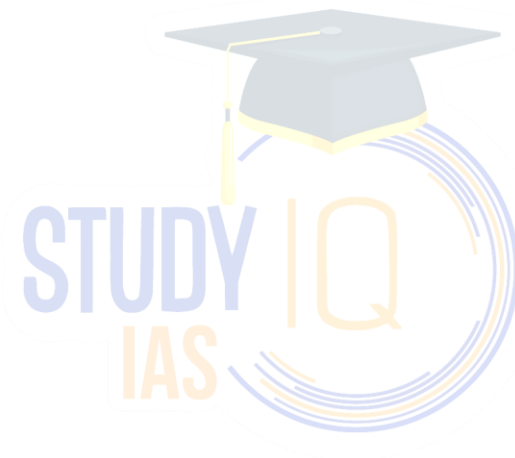
- ○ Increase Indian investments in Nigerian infrastructure and industrial sectors.
- **Strategic Engagement**: Strengthen defense and counterterrorism cooperation with Nigeria to balance China's growing influence.
  - ○ Promote joint ventures in security, focusing on piracy and drug trafficking in the Gulf of Guinea.
- **Development Assistance**: Expand capacity-building initiatives and concessional loans for social infrastructure.
  - ○ Leverage India's expertise in IT, healthcare, and education to address Nigeria's developmental needs.
- **People-to-People Ties**: Foster cultural and academic exchanges to strengthen grassroots connections.
  - ○ Engage the Indian diaspora in Nigeria to enhance bilateral relations.

Source: ORF: India's strategic focus on West Africa

Related PYQ
UPSC CSE 2015
Q. *Increasing interest of India in Africa has its pros and cons. Critically Examine.* (12.5 Marks/ 200 words)

How is science affected when companies fund research?

Context
The involvement of companies in funding scientific research often creates a tension between the traditional principles of science, such as openness, transparency, and reproducibility, and the profit-driven motives of corporations.

Reasons How Science Is Affected When Corporate Interests Shape Research
Conflict Between Transparency and Intellectual Property (IP)
● **Secrecy vs. Open Science**:
  ○ Corporate-funded research often prioritizes intellectual property protection, which necessitates secrecy.
  ○ Science historically thrives on openness, reproducibility, and falsifiability. When these principles are compromised, scientific progress is hindered.
● **Case Study: AlphaFold 3**
  ○ Google DeepMind's AlphaFold 3 predicted protein structures with enhanced capabilities, such as simulating protein-drug interactions.
  ○ The underlying algorithm was not fully disclosed, unlike its predecessors (AlphaFold and AlphaFold 2).
  ○ The lack of full transparency sparked criticism, with scientists arguing that secrecy prevented reproducibility and verification of findings.
  ○ DeepMind justified this approach, citing commercial interests of its spin-off, Isomorphic Labs, in drug discovery.

Trade-offs in Academic-Industrial Collaborations
● **Shift in Research Goals**:
  ○ Corporate-funded researchers often align their goals with industry needs, potentially sidelining broader scientific inquiry.
  ○ For example, companies may restrict researchers to specific avenues that align with commercial priorities rather than scientific curiosity.
● **Example: Anaesthesia Robot (McSleepy)**
  ○ Developed by Thomas Hemmerling's team, its algorithms were published openly.
  ○ Some parts were integrated into other technologies, referencing the original work.
  ○ Hemmerling emphasized that closer a research output is to a product, the more likely researchers are to withhold details for commercialization.

Financial Pressures on Researchers and Institutions
● **Economic Dependency**: Universities and research institutions rely on commercial funding to compensate for limited public funding.
  ○ Researchers are encouraged to patent their findings, turning scientific outputs into revenue streams.
● **Challenges for Scientists**: Researchers face the dilemma of balancing open science with financial viability.
  ○ They may choose to publish foundational algorithms openly but reserve enterprise-ready versions for commercial purposes, as suggested by Benjamin Haibe-Kains.

Intellectual Property and Restricted Access
● **Delayed or Partial Disclosure**: Corporations may delay the release of data or algorithms, hindering independent verification and scientific advancement.
  ○ **Example**: AlphaFold 3's authors promised to release the full code six months after publication, compromising immediate reproducibility.
● **Exclusive Rights**: Companies often retain exclusive rights to commercialize discoveries, limiting broader societal benefits.

○ For instance, Nigeria rejected Tesla's proposal to buy lithium, preferring a Chinese company to build a processing plant, showcasing how corporate interests can dictate research use.

Misalignment of Incentives
● **Blurred Boundaries**: Corporations use academic journals to advertise their findings but retain proprietary control over key data and methods.
    ○ This creates an imbalance where industry uses academic platforms for credibility without adhering to academic principles.
● **Focus on Profit**: For corporate researchers, generating revenue often outweighs advancing science.
    ○ This leads to prioritization of short-term gains over long-term scientific contributions.

Collaborative Agreements and Their Trade-offs
● **Joint Ventures with Companies**: Researchers sometimes negotiate agreements where companies fund specific projects while allowing labs to retain freedom in other areas.
    ○ This provides financial security but tightens control over specific research directions.
● **Trade-offs**: Partnerships may limit researchers' ability to explore conflicting areas of interest due to company-imposed restrictions.

Reduced Public Accessibility of Findings
● **Accessibility Barriers**: While foundational research may be disclosed, advanced, deployable versions of algorithms or products are kept proprietary.
    ○ This limits the scientific community's ability to build on such work.

Dependence on Public Funding for Independence
● **Role of Government Funding**: Public funding ensures researchers can operate without corporate-imposed restrictions.
    ○ **Example**: COVID-19 vaccines by Moderna and Pfizer were subsidized by governments, ensuring affordability despite IP protection.
● **Sustainability through Public Support**: Hemmerling emphasized that public funding allows researchers to focus purely on innovation without conflicts of interest.

Way Forward to Balance Transparency and Commercialization
● **Hybrid Models**: Researchers can publish foundational discoveries while reserving advanced versions for commercialization.
    ○ Example: Haibe-Kains' lab publishes algorithms openly but develops a premium version for commercial use.
● **Increased Public Funding**: Governments should allocate more funds to ensure research independence and reduce reliance on corporate funding.
● **Ethical Guidelines for Corporate Partnerships**: Clear agreements should define the scope of corporate control while preserving academic freedom.
● **Incentives for Open Science**: Encourage recognition and funding for researchers who prioritize transparency and reproducibility.

Source: The Hindu: When for-profit companies fund research, how is science affected?

Data And Facts

- **Overall Toll Collection (GS 3, Infrastructure)**: Total ₹2.4 lakh crore collected as user fees at toll plazas since the inception of toll collection in India.