

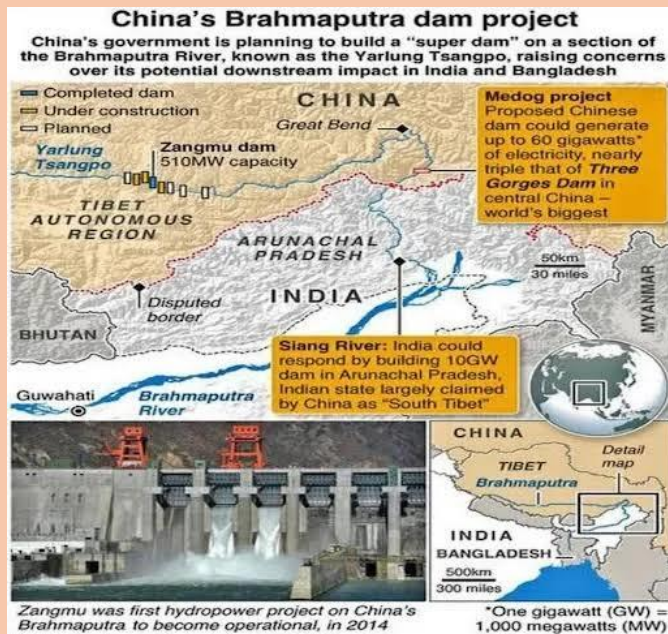
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Topic : China's Proposed Dam on the Yarlung Tsangpo River and Its Implications

Relevance : GS Paper 1 Geography

Source : Indian Express

Context :



- China plans to build the world's largest hydropower dam on the **Yarlung Tsangpo River** in Tibet, near the **Great Bend**.
- The dam's expected capacity is **60,000 MW**, three times that of the **Three Gorges Dam** (22.5 GW).
- The project is part of China's **14th Five-Year Plan (2021–2025)** and **Long-Term Goals 2035** to achieve renewable energy targets.
- India has raised concerns over the impact on **water flow, agriculture, biodiversity, and regional geopolitics**.

Geographical Context and Dam Specifications

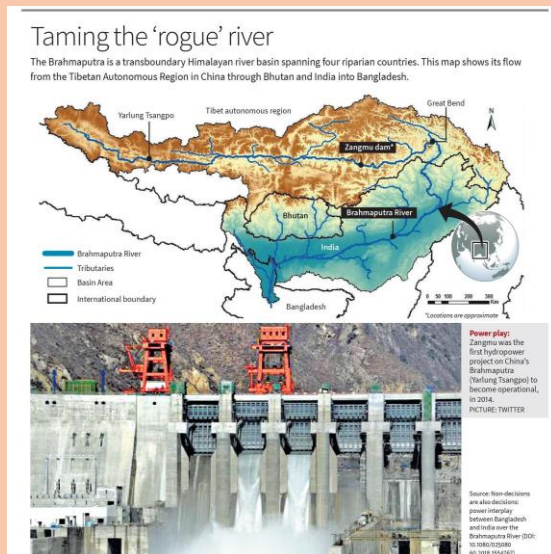
River Characteristics:

- **Origin:** Chemayungdung Glacier near **Mansarovar Lake**, Tibet.
- **Length:** 2,880 km (1,200 km in Tibet as Yarlung Tsangpo).
- **Course:**
 - Takes a **U-turn (Great Bend)** at **Namcha Barwa** and enters India as **Siang/Dihang River**.
 - Joined by **Dibang** and **Lohit** rivers to become **Brahmaputra**.
 - Flows through **Assam** and **Bangladesh**, merging with the **Padma River**.

Gradient and Flow:

- **Tibetan Slope:** Steep gradient of **2.82 m/km** (4,800 m drop).
- **Indian Slope:** Gradually decreases to **0.1 m/km** in Assam.
- **Sediment Load:**
 - In Tibet: **Cold, dry regions with less water and silt**.
 - In India: **Heavy precipitation from monsoon-fed tributaries**, causing frequent **flooding and erosion**.
- **Riverine Island:** **Majuli** in Assam, the world's largest riverine island (352 sq km).

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Environmental Concerns

a) Alteration of Natural Flow:

- Disruption of **water availability** for downstream countries (India and Bangladesh).
- Reduced water flow can hinder **agriculture** and **fisheries**, affecting livelihoods.

b) Sediment Retention:

- The dam may trap **essential sediments**, leading to:
 - **Reduced soil fertility** in floodplains.
 - **Riverbed degradation** and **increased erosion**.

c) Flood and Erosion Risks:

- Possible increase in **flood frequency** and **bank erosion** in Assam.
- Threat to **Majuli Island** and other flood-prone areas.

d) Seismic Vulnerability:

- Located in a **seismically active region** where the **Indian and Eurasian plates collide**.
- Risk of **landslides and earthquakes** due to large-scale construction.

Geopolitical Implications

a) Hydropolitical Tensions:

- **Lack of a formal water-sharing treaty** between India and China.
- Reduced water flow may adversely impact India's **hydropower projects**:
 - **Lower Subansiri (2,000 MW), Dibang (3,000 MW), Kameng (600 MW), etc.**

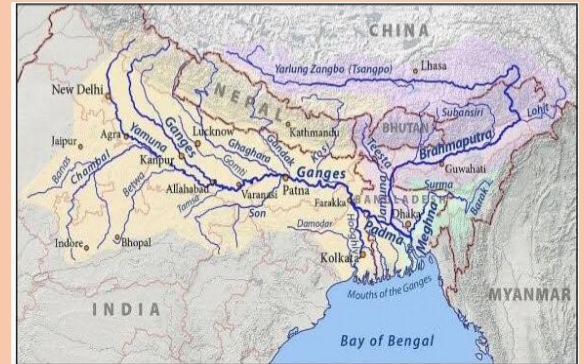
b) Strategic Concerns:

- China's infrastructural presence near the Great Bend raises **strategic vulnerabilities**.
- Possibility of using **water as a strategic tool** during conflicts.

c) Regional Stability:

- Possible strain on China's relations with **Bangladesh**, as the Brahmaputra is a **lifeline for agriculture and fisheries**.
- India and Bangladesh may seek diplomatic pressure through **international forums**.

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India-China Border Conflicts: The Eastern Sector

a) Arunachal Pradesh Conflict:

- Disputed region with China claiming **90,000 sq km** as **South Tibet**.
- **McMahon Line** (1914) not recognized by China.

b) Key Conflicts:

- **Tawang Region:**
 - Spiritual and strategic significance with **Buddhist monasteries**.
 - Witnessed heavy fighting during the **1962 Sino-Indian War**.
- **Doklam Standoff (2017):**

- Tension over road construction by China in **Bhutanese territory**, highlighting regional vulnerabilities.

• **Galwan Valley Clash (2020):**

- Violent confrontation between Indian and Chinese troops.
- Raised concerns over China's aggressive infrastructural push near the border.

Mitigation and Way Forward

a) Enhanced Transboundary Cooperation:

- Formalize **water-sharing agreements** to mitigate potential disputes.
- Establish **real-time hydrological data sharing** to monitor river dynamics.

b) Strategic Infrastructure Development:

- Accelerate India's **hydropower projects** to reduce dependency.
- Strengthen **border infrastructure** to counter strategic threats.

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c) Multilateral Diplomacy:

- Collaborate with **Bangladesh and Bhutan** to create a **unified stance**.
- Utilize platforms like **BRICS, SCO**, and the **UN** to address transboundary water issues.

d) Disaster Preparedness:

- Develop **joint disaster management protocols** to handle potential dam failures or natural calamities.

China's proposed **Yarlung Tsangpo Dam** is a massive hydropower project with significant **environmental and geopolitical risks**.

For India, it is crucial to adopt a **multi-pronged strategy** involving **diplomacy, infrastructure development, and enhanced preparedness** to address potential challenges.

Proactive engagement with China and downstream nations through **dialogue and cooperation** will be vital to maintaining **regional stability and water security**.

Prelims Practice Question:

Q. With reference to the Yarlung Tsangpo/Brahmaputra River and its associated geopolitical and environmental issues, consider the following statements:

1. The Yarlung Tsangpo River originates from the Chemayungdung Glacier and flows into India as the Siang/Dihang River before being known as the Brahmaputra.

2. The planned hydropower dam by China on the Yarlung Tsangpo River is located near the Great Bend and aims to generate three times more electricity than the Three Gorges Dam.
3. India and China have a formal water-sharing treaty to monitor and regulate the flow of the Brahmaputra River.
4. The Brahmaputra River's gradient is significantly steeper in Tibet than in Assam, leading to a reduced sediment load in the Indian plains.

Which of the statements given above are correct?

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

Answer: (a) 1 and 2 only

Explanation:

1. Statement 1 - Correct:

- The **Yarlung Tsangpo River** originates from the **Chemayungdung Glacier** in Tibet and flows into India as the **Siang/Dihang River**, which later becomes the **Brahmaputra**.

2. Statement 2 - Correct:

- China's planned dam is located near the **Great Bend** and, when completed, it will generate around **60,000 MW**, which is approximately **three times the capacity** of the **Three Gorges Dam (22.5 GW)**.

3. Statement 3 - Incorrect:

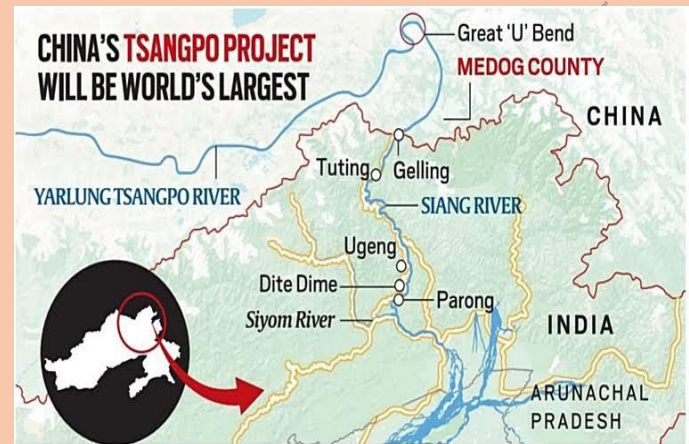
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- India and China **do not have a formal water-sharing treaty** for the Brahmaputra. They have **Memorandums of Understanding (MoUs)** and an **Expert-Level Mechanism (2006)** for data sharing, but no formal treaty.

4. Statement 4 - Incorrect:

- The gradient of the Brahmaputra is **steep in Tibet (2.82 m/km)**, but it significantly **decreases in Assam (0.1 m/km)**.
- Contrary to the statement, the **sediment load increases in the Indian plains** due to heavy rainfall and tributary inflow, forming braided channels and riverine islands like **Majuli**.

particularly for India and Bangladesh, the lower riparian states.



Environmentally, the dam threatens to alter the natural flow of the Brahmaputra, affecting water availability and sediment transport downstream. The steep gradient of the river in Tibet results in significant sediment accumulation in Assam, crucial for maintaining soil fertility and preventing riverbank erosion. Reduced sediment flow due to the dam may degrade agricultural productivity, harm fisheries, and jeopardize the unique biodiversity of the Eastern Himalayas. Furthermore, the proposed site is in a seismically active zone, increasing the risk of catastrophic dam failure due to earthquakes or landslides, which could devastate downstream communities.

Geopolitically, the project poses a strategic challenge to India. In the absence of a formal water-sharing treaty, China's unilateral control over the river heightens India's vulnerability. Any diversion or reduction in water flow could severely impact India's own hydropower projects and irrigation systems, particularly in Arunachal Pradesh and Assam. Additionally, China's control over the river

Hence, the correct answer is (a) **1 and 2 only**.

Mains Model Question:

Discuss the environmental and geopolitical implications of China's proposed hydropower dam on the Yarlung Tsangpo River for India and downstream countries. How can India mitigate the challenges arising from this project? (250 words)

China's proposed hydropower dam on the Yarlung Tsangpo River, which becomes the Brahmaputra in India, is poised to be the world's largest dam with a capacity of 60,000 MW. While China emphasizes its renewable energy ambitions, this project raises serious environmental and geopolitical concerns,

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could be leveraged as a strategic tool during conflicts, exacerbating existing border tensions.

To mitigate these challenges, India must strengthen transboundary cooperation through diplomatic engagement, emphasizing real-time data sharing and environmental impact assessments. Forming alliances with downstream countries like Bangladesh and raising the issue at international forums would also increase pressure on China. Simultaneously, India should expedite its hydropower and water conservation projects while enhancing disaster preparedness in vulnerable areas. By adopting a multifaceted approach, India can better safeguard its environmental and strategic interests.

Topic : Smart Proteins and the BioE3 Initiative

Relevance : GS Paper 3 Science and Technology

Source : Indian Express

Context :



The Department of Biotechnology (DBT), under the Government of India, has recently launched the **BioE3 initiative**, aimed at developing sustainable and climate-resilient food systems. One of the primary areas of focus under this initiative is the development of "**smart proteins**" to address the growing challenges of protein deficiency and environmental sustainability. Smart proteins are designed to taste and feel like conventional animal proteins while being produced through advanced biotechnological methods.

Understanding the BioE3 Initiative

The **BioE3 initiative** stands for "**Biotechnology for Environment, Economy, and Ecology**" and is a government-funded program aimed at fostering innovation and research in biotechnology. The initiative is designed to:

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- **Promote sustainable biotechnology solutions** that mitigate the adverse effects of climate change.
- **Enhance the country's capacity for bio-manufacturing**, especially in the field of food production.
- **Create resilient and sustainable food systems** by leveraging cutting-edge biotechnology.

The initiative is aligned with India's goals of reducing carbon emissions, ensuring food security, and developing **green technologies** to promote environmental sustainability.

Smart Proteins: A New Era of Sustainable Nutrition

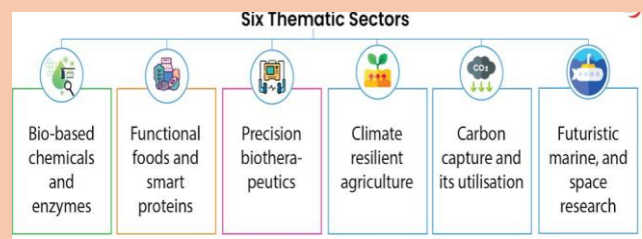
Smart proteins are **engineered protein sources** that mimic the taste, texture, and nutritional value of animal-based proteins without relying on traditional livestock farming. These proteins are expected to address protein deficiency and reduce the environmental footprint of conventional meat production.

The DBT aims to develop three major types of smart proteins:

- **Fermentation-Derived Proteins:**
 - Produced using **microbes like algae, bacteria, and fungi**.
 - Recombinant microbial systems and gene editing techniques are employed to **enhance yield and reduce by-products**.
 - These proteins are sustainable as they can be derived from **agricultural by-**

products rather than primary food sources like glucose.

- The challenge lies in making these processes **commercially viable and allergen-free**.
- **Plant-Based Proteins:**
 - Extracted from **plant sources** and designed to **mimic the taste and texture of meat**.
 - Utilizes **underexploited crops and agricultural by-products** to ensure sustainability.
 - Research is focused on **reducing anti-nutrients and pesticide residues** to enhance the safety and quality of these proteins.
 - A major challenge is achieving a **realistic meat-like texture and flavor**.
- **Cell-Culture Proteins:**



- Grown from **animal cells in laboratory conditions**, eliminating the need to raise and slaughter livestock.
- These proteins closely resemble **conventional meat** and maintain nutritional equivalence.
- The primary challenges include **high production costs** and **ensuring mass-scale manufacturing feasibility**.

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Benefits of Smart Proteins:

1. Environmental Sustainability:

- Reduces **land, water, and energy usage** compared to traditional animal farming.
- Lowers **carbon emissions** and contributes to **climate change mitigation**.

2. Nutritional Security:

- Helps combat **protein deficiency** in a cost-effective manner.
- Ensures **consistent quality** without the risk of zoonotic diseases.

3. Economic and Social Impact:

- Generates **new avenues of employment** in biotechnology and food manufacturing.
- Reduces dependency on **conventional livestock farming**, promoting **food security**.

4. Animal Welfare:

- Reduces the **ethical concerns** associated with animal slaughter and intensive farming.

Challenges and Concerns:

1. Economic Viability:

- High initial investment and **expensive R&D processes** may hinder commercialization.

2. Public Acceptance:

- People may show **reluctance towards lab-grown or engineered proteins** due to perception issues.

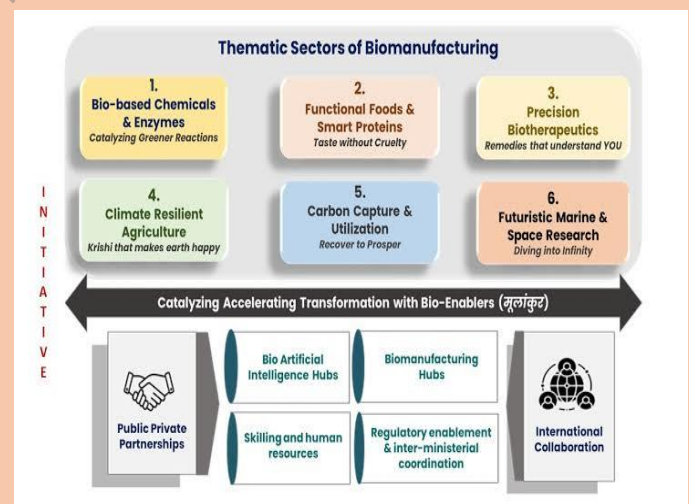
3. Regulatory Hurdles:

- Ensuring **food safety standards** and gaining **regulatory approvals** are crucial yet challenging.

4. Technical Challenges:

- Achieving the **right texture, flavor, and nutritional equivalence** remains a significant hurdle.
- Controlling **contaminants and allergens** is also crucial for consumer safety.

To overcome these challenges, the government and scientific community must focus on **collaborative research** to reduce production costs and enhance scalability. Encouraging **public awareness and acceptance** through outreach programs will also be essential. Moreover, establishing **robust regulations** to ensure food safety and nutritional standards will instill consumer confidence.



The **BioE3 initiative** holds the potential to revolutionize the Indian food industry by fostering innovation in **smart protein production**. By addressing both nutritional and environmental

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challenges, India can lead the way in creating sustainable and climate-resilient food systems for the future.

Prelims Practice Question:

Q. Consider the following statements regarding the BioE3 initiative:

1. The BioE3 initiative is aimed at promoting biotechnology solutions for environmental sustainability, economic growth, and ecological balance.
2. One of the primary focuses of the BioE3 initiative is the development of smart proteins to address protein deficiency and reduce the environmental impact of conventional meat production.
3. Smart proteins under this initiative are developed using only plant-based methods.

Which of the statements given above is/are correct?

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

Answer:

Answer: a) 1 and 2 only

Explanation:

1. Statement 1 is correct as the **BioE3 initiative** focuses on **environmental sustainability, economic growth, and ecological balance** through biotechnological innovations.

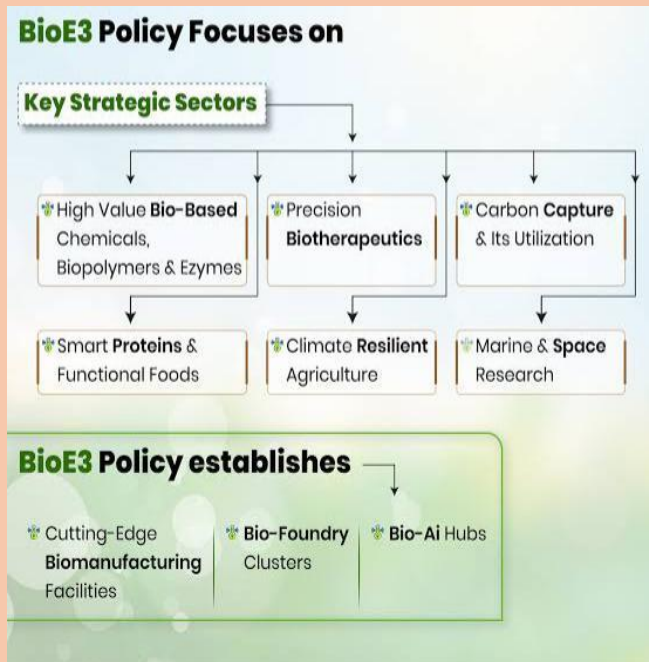
2. Statement 2 is correct as one of the main objectives of the initiative is to develop **smart proteins** to address **protein deficiency** and reduce the **environmental impact** associated with conventional meat production.
3. Statement 3 is incorrect because **smart proteins** under the BioE3 initiative are developed using **three methods: fermentation-derived proteins, plant-based proteins, and cell-culture proteins**, not just plant-based methods.

Therefore, the correct answer is a) **1 and 2 only**.

Mains Model Question:

"Discuss the significance of the BioE3 initiative in promoting sustainable food systems in India. Highlight the benefits and challenges associated with the development of smart proteins under this initiative."

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The BioE3 initiative, launched by the Department of Biotechnology, is a landmark step towards fostering sustainable food systems in India. It aims to address environmental, economic, and ecological challenges through biotechnological innovations. One of the key components of this initiative is the development of smart proteins, which are designed to mimic the taste, texture, and nutritional value of animal-based proteins without relying on conventional livestock farming. This initiative aligns with India's goal of reducing carbon emissions and promoting food security while addressing the growing protein deficiency in the population.

Smart proteins under the BioE3 initiative are developed using three primary methods: fermentation-derived proteins, plant-based proteins, and cell-culture proteins. Fermentation-derived

proteins use microbes like algae and fungi to produce protein-rich substances, while plant-based proteins are extracted from crops to create meat analogs. Cell-culture proteins are developed by growing animal cells in laboratories, eliminating the need for animal rearing and slaughter. These innovations offer immense environmental benefits by reducing land, water, and energy consumption and lowering greenhouse gas emissions associated with conventional meat production. Additionally, they help reduce the risk of zoonotic diseases and enhance animal welfare.

However, several challenges hinder the large-scale adoption of smart proteins. Economic viability remains a concern as the initial investment and production costs are high. Achieving consumer acceptance is another challenge, as people may be hesitant to shift from traditional meat to lab-grown or engineered alternatives. Furthermore, technical hurdles related to flavor, texture, and allergen control need to be addressed. Regulatory frameworks must also be strengthened to ensure food safety and quality standards.

In conclusion, the BioE3 initiative holds great promise for transforming India's food landscape. By addressing the existing challenges and creating a supportive regulatory and economic environment, India can lead the way in sustainable protein production, ensuring both nutritional security and ecological balance.

Topic : Minimum Support Price (MSP)

Relevance : GS Paper 3 Agriculture

Source : The Hindu

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Context :



- **Agricultural Dependency:** Agriculture contributes around **17-18% to India's GDP** and employs nearly **50% of the population**.
- **Income Security:** MSP provides a guaranteed price to farmers, safeguarding them from price crashes.
- **Encourages Production:** It motivates farmers to cultivate essential crops, contributing to **food security**.
- **Stabilizes Market Prices:** Prevents distress sales during bumper harvests and maintains steady market prices.
- **Promotes Investment:** Assured returns encourage investment in agricultural inputs and infrastructure.

Benefits of MSP**1. Income Stability for Farmers**

- **Protection from Price Fluctuations:** MSP acts as a safety net during price crashes.
- **Example:** In **2023-24**, the MSP for wheat was **₹2,275 per quintal**, raised to **₹2,425 per quintal** in **2024-25** to stabilize farmer income.

The Minimum Support Price (MSP) is a policy tool in India aimed at safeguarding farmers against unpredictable market fluctuations. It was introduced in 1965 during the Green Revolution to boost agricultural production and ensure food security.

The MSP is announced by the Government of India before the sowing season based on the recommendations of the **Commission for Agricultural Costs and Prices (CACP)**. Currently, MSP is fixed for **23 major crops**, including cereals, pulses, oilseeds, and commercial crops.

Relevance of MSP in India

MSP holds immense importance due to the following reasons:

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EXPRESS explained. | HOW ARE MSPs DETERMINED?

The Centre fixes MSPs for every kharif and rabi cropping season based on recommendations of the Commission for Agricultural Costs and Prices (CACP)

● When a farmer grows a crop, he incurs costs, some of it explicit and some implicit or unpaid. The CACP considers the following costs:

1


A2

Covers all cash and in kind expenses incurred by farmers on seeds, fertilisers, chemicals, hired labour, fuel, irrigation, etc

2

A2+FL

Actual costs plus an imputed value of unpaid family labour



3

C2

Includes 'A2+FL' along with revenues forgone on owned land (rent) and fixed capital assets (interest)

#QUIXPLAINED 2

4. Supporting Green Revolution Crops

- The MSP policy promoted the cultivation of **wheat and rice**, making states like **Punjab and Haryana** the grain bowls of India.

5. Socioeconomic Upliftment

- Improved farmer incomes boost **rural purchasing power**, promoting local economic growth.


2. Promoting Crop Diversification

- MSP now increasingly covers **pulses and oilseeds** to reduce dependency on imports.
- Example:** In 2024, MSP for **mustard and soybean** was significantly raised, promoting domestic cultivation.

3. Ensuring Food Security

- MSP-backed procurement helps maintain **buffer stocks** under the **Public Distribution System (PDS)**.
- In 2024-25, around **51 million tonnes of rice** and **35 million tonnes of wheat** were procured, stabilizing supply during inflation.

Better support PTI



The Cabinet increased the minimum support prices for rabi crops

Crop	MSP for rabi 2025-26*	MSP for rabi 2024-25*	Increase in MSP
Wheat	₹2,425	₹2,275	₹150
Barley	₹1,980	₹1,850	₹130
Gram	₹5,650	₹5,440	₹210
Lentil (masoor)	₹6,700	₹6,425	₹275
Rapeseed & mustard	₹5,950	₹5,650	₹300
Safflower	₹5,940	₹5,800	₹140

(*per quintal)

Challenges Associated with MSP

1. Regional Disparities

- Skewed Beneficiaries:** States like **Punjab and Haryana** benefit significantly, while states like **Bihar and Odisha** lag behind.
- Data (2024):** Over **90% of wheat farmers** in Punjab benefit from MSP, while only **20% in Bihar** do so.

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2. Ecological Degradation

- **Environmental Stress:** Excessive cultivation of **water-intensive crops** like rice leads to **groundwater depletion**.
- **Report (2025):** Punjab's groundwater level is declining at **1 meter per year** due to paddy cultivation.

3. Financial Burden

- The **Food Corporation of India (FCI)** faces increasing costs for procurement and storage.
- **Food Subsidy Bill (2024-25):** Exceeded **₹2.5 lakh crore**, creating fiscal stress.

4. Market Distortion and Waste

- **Over-Procurement:** Leads to storage issues and wastage.
- **CAG Report (2025):** Around **12% of grains** procured in 2024 were lost due to inadequate storage.

5. Lack of Accessibility and Awareness

- **Small and Marginal Farmers:** Constituting **86%** of Indian farmers, they often lack access to MSP benefits due to **poor connectivity and lack of awareness**.

Reforms Needed

Strengthening Procurement Infrastructure

ENSURING REMUNERATIVE PRICES TO FARMERS

Cabinet approves Pradhan Mantri Annadata Aay Sanrakshana Abhiyan

- PRICE SUPPORT SCHEME (PSS)**
 Physical procurement of pulses, oilseeds & Copra by Centre Nodal Agencies. Central Government to bear procurement expenditure and losses due to procurement.
- PRICE DEFICIENCY PAYMENT SCHEME (PDPS)**
 To cover all oilseeds for which MSP is notified. Farmers to get direct payment to the difference between MSP & selling price.
- PILOT OF PRIVATE PROCUREMENT & STOCKIST SCHEME (PPPS)**
 Private sector participations in procurement operation to be piloted. For oilseeds, states have the option to roll out PPPS on pilot basis.

Government Guarantee increased to **₹45,550 cr**

- **Expand Procurement Centers:** Especially in **underrepresented regions** like eastern India.
- **Develop Warehousing Facilities:** To reduce post-harvest losses and grain spoilage.

Ecological Sustainability

- **Encourage Crop Diversification:** Shift focus from **water-intensive crops** to **pulses and oilseeds**.
- **Promote Climate-Resilient Crops:** To address environmental concerns.

Direct Benefit Transfer (DBT)

- **Targeted Subsidy:** Implement DBT based on **landholding size**, reducing the fiscal burden.

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Digital and Market Reforms

- **E-NAM Expansion:** To ensure better price discovery and reduce exploitation by middlemen.
- **Futures and Options Markets:** Encourage **agricultural futures** to guide farmers' cropping decisions.

Institutional Innovations

- **Improve Value Chains:** Enhance the supply chain from **farm to market**.
- **Skill Development:** Train farmers to understand **market dynamics and digital platforms**.

MSP will continue to play a pivotal role in safeguarding farmers' interests, but its effective implementation and reform are essential for achieving agricultural sustainability and economic equity. The government must strive to make the system efficient, transparent, and equitable, ensuring that MSP benefits reach all farmers irrespective of their location and economic status.

To realize the vision of **Viksit Bharat by 2047**, it is crucial to:

- Reform MSP to make it **more inclusive and regionally balanced**.
- Focus on **sustainable agriculture practices** to mitigate environmental challenges.
- Integrate **technology and digital solutions** to streamline procurement and distribution.
- Empower farmers through **capacity building and market literacy**.



Prelims Practice Question

Q. With reference to the Minimum Support Price (MSP) in India, consider the following statements:

1. MSP is announced before the sowing season for 23 major crops based on the recommendations of the Commission for Agricultural Costs and Prices (CACP).
2. MSP is legally binding, and the government is mandated to procure all the produce offered by farmers at MSP.
3. The MSP policy was introduced during the Green Revolution to ensure food security and stabilize farmers' incomes.

Which of the statements given above is/are correct?

- A) 1 and 2 only
B) 1 and 3 only

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C) 2 and 3 only

D) 1, 2 and 3

Answer: B) 1 and 3 only

Explanation:

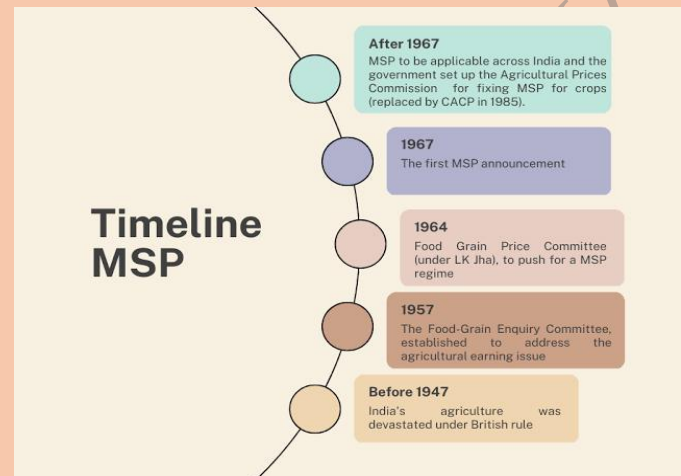
1. **Statement 1 is correct:** MSP is announced before the sowing season for 23 major crops, based on the recommendations of the **Commission for Agricultural Costs and Prices (CACP)**.
2. **Statement 2 is incorrect:** MSP is not legally binding, and the government is not mandated to procure all produce at MSP. Procurement is done primarily for **wheat and rice** through the **Food Corporation of India (FCI)** and state agencies.
3. **Statement 3 is correct:** The MSP policy was introduced during the **Green Revolution (1965)** to promote **food security** and stabilize **farmers' incomes**.

Mains Model Question

Q. Discuss the relevance of Minimum Support Price (MSP) in the Indian agricultural system. Highlight its benefits and challenges, and suggest measures to make it more inclusive and effective.

Minimum Support Price (MSP) is a crucial policy instrument in India designed to ensure a remunerative price to farmers and protect them from price fluctuations. Introduced during the Green Revolution in the 1960s, MSP aims to stabilize farmers' incomes and promote food security by guaranteeing a minimum price for 23 major crops. It is recommended by the Commission for

Agricultural Costs and Prices (CACP) and declared before the sowing season to help farmers make informed cropping decisions.



The relevance of MSP in India lies in its role in income assurance and reducing the distress associated with falling market prices. It also serves as a tool to incentivize the production of essential food grains like wheat and rice, thereby contributing to the nation's food security. Moreover, it helps reduce rural poverty by ensuring a stable income flow to farmers, especially small and marginal cultivators.

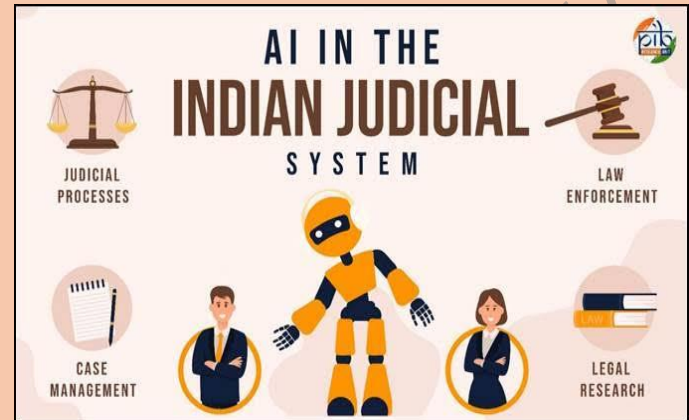
However, MSP faces several challenges. One of the key issues is that it primarily benefits farmers from states like Punjab and Haryana due to the dominance of wheat and rice procurement. This creates regional and crop-based disparities. Additionally, procurement at MSP is limited, as the government does not legally mandate buying all the produce at the declared price. Farmers cultivating pulses, oilseeds, and coarse grains often remain excluded from the safety net. Furthermore, over-reliance on wheat and rice procurement has led to

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groundwater depletion, soil degradation, and environmental issues.

Source : Indian Express

Context :



To make MSP more inclusive and effective, it is essential to diversify the procurement basket and extend coverage to pulses and oilseeds. Strengthening infrastructure and digital procurement systems can reduce regional disparities. Moreover, linking MSP with direct benefit transfers could ensure targeted support to farmers. Reforming MSP to align it with ecological sustainability and market realities will enhance its effectiveness and contribute to achieving agricultural resilience.

Artificial Intelligence (AI) is revolutionizing various sectors globally, including the judicial system. In India, the judiciary is plagued with issues such as a massive backlog of cases, slow case disposal rates, and inefficiencies in court administration. Integrating AI can significantly enhance the efficiency and effectiveness of the justice delivery system by improving case management, legal research, data analysis, and decision-making.

Topic : Artificial Intelligence (AI) in the Indian Judicial System

Relevance : GS Paper 2 Polity and Governance

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Potential Applications of AI in the Indian Judicial System

- AI can analyze past judgments to predict possible outcomes, aiding both lawyers and litigants in assessing the strength of their cases.
- Predictive algorithms can guide plea bargaining and settlement processes.
- **Courtroom Automation:**
 - Automated transcription services, like "SUVAAS" (Supreme Court Vidhik Anuvaad Software), can instantly transcribe oral arguments, reducing clerical work.
 - Virtual courtrooms can leverage AI to manage virtual hearings and evidence submission.
- **Enhanced Transparency and Accessibility:**
 - AI-driven chatbots can provide basic legal information and help citizens track their case status.
 - Translation tools can bridge language barriers, making legal processes more accessible.
- **Data Analytics and Judicial Insights:**
 - AI can analyze vast volumes of court data to identify trends, case durations, and bottlenecks.
 - Insights derived from data can support policy decisions and judicial reforms.
- **Case Management and Prioritization:**
 - AI can help manage case backlogs by prioritizing cases based on urgency and complexity.
 - It can assist judges in identifying similar cases, summarizing lengthy documents, and suggesting relevant precedents.
- **Legal Research and Documentation:**
 - AI-driven platforms like SUPACE (Supreme Court Portal for Assistance in Court Efficiency) use machine learning to assist judges by providing relevant case laws and legal briefs.
 - Legal databases integrated with AI can instantly generate legal references, saving substantial time.
- **Predictive Justice:**

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Challenges of Implementing AI in the Judicial System



- **Data Privacy and Security:**

- Handling sensitive judicial data raises concerns about data breaches and unauthorized access.
- Proper encryption and secure data storage mechanisms are essential.

- **Bias and Fairness:**

- AI algorithms trained on biased historical data can perpetuate existing prejudices.

- For instance, biases against marginalized communities may be inadvertently reinforced, leading to unfair judgments.

- **Lack of Standardization:**

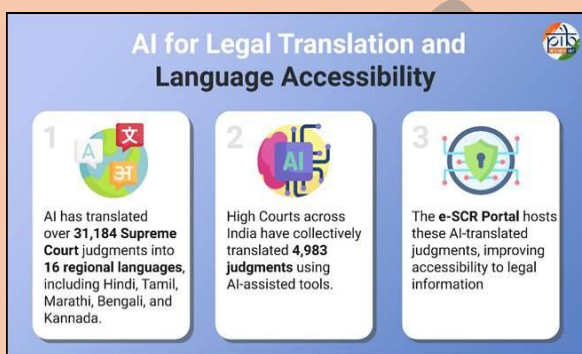
- Different courts and jurisdictions may adopt varied AI solutions, leading to inconsistent practices.
- Standardization of AI protocols and tools is necessary for uniformity.

- **Judicial Accountability:**

- The final decision-making power must lie with human judges, as complete reliance on AI might undermine judicial accountability.
- Judges need to understand the algorithms to ensure unbiased and fair outcomes.

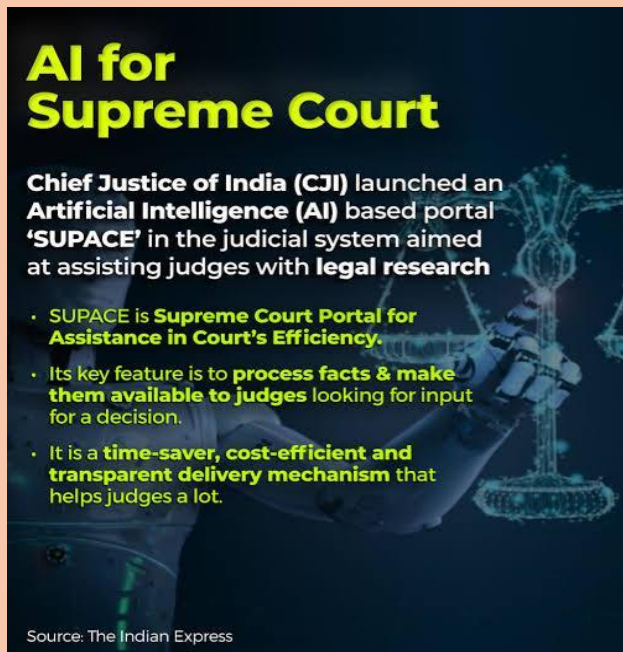
- **Ethical and Moral Dilemmas:**

- Relying on AI for judgments could raise ethical concerns, especially when human emotions and societal impacts are considered.



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Indian Initiatives Towards AI Integration



- **SUPACE (Supreme Court Portal for Assistance in Court Efficiency):**
 - An AI-driven platform to assist Supreme Court judges in legal research and documentation.
- **SUVAAS (Supreme Court Vidhik Anuvaad Software):**
 - An AI-based translation tool that translates legal documents between Indian languages.
- **National Judicial Data Grid (NJDG):**
 - Uses data analytics to provide information on pending and disposed cases, helping with backlog reduction.
- **E-Courts Project:**
 - Digitization of court records and virtual hearings using AI tools to ensure speed and efficiency.

- **Digital Infrastructure for Knowledge Sharing (DIKSHA):**

- A platform to educate judicial officers about AI applications and their responsible use.

Significance:

- **Capacity Building:** Training judges and court staff in the effective use of AI tools.
- **Data Integrity and Bias Mitigation:** Implementing robust mechanisms to reduce biases in AI algorithms.
- **Public Awareness:** Educating the public about AI's role in the judicial system to build trust.
- **Ethical Guidelines:** Formulating comprehensive guidelines on the ethical use of AI in judiciary.

Prelims Practice Question:

With reference to the use of Artificial Intelligence (AI) in the Indian Judicial System, consider the following statements:

1. **SUPACE (Supreme Court Portal for Assistance in Court Efficiency)** is an AI-driven platform designed to assist judges in legal research and documentation.
2. **SUVAAS (Supreme Court Vidhik Anuvaad Software)** is an AI-based tool designed for automating the transcription of court proceedings.
3. The **National Judicial Data Grid (NJDG)** uses AI-driven analytics to provide

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information on pending and disposed of cases.

Which of the statements given above is/are correct?

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

Answer:

- (b) 1 and 3 only**

Explanation:

1. **Statement 1 is correct:**
 - **SUPACE (Supreme Court Portal for Assistance in Court Efficiency)** is an AI-driven platform aimed at assisting judges by streamlining legal research and documentation.
2. **Statement 2 is incorrect:**
 - **SUVAAS (Supreme Court Vidhik Anuvaad Software)** is an AI-based translation tool designed for translating legal documents between Indian languages, not for transcription.
3. **Statement 3 is correct:**
 - The **National Judicial Data Grid (NJDG)** utilizes data analytics to provide insights on pending and disposed of cases, aiding in reducing the backlog.

Therefore, the correct answer is **(b) 1 and 3 only**.

Mains Model Question:

Discuss the potential of Artificial Intelligence (AI) in enhancing the efficiency of the Indian judicial system. What are the associated challenges, and what initiatives have been taken by India to address them?

Artificial Intelligence (AI) has immense potential to transform the Indian judicial system by enhancing efficiency and reducing pendency. With over four crore cases pending across various courts in India, AI can aid in streamlining processes, reducing human error, and expediting decision-making. One of the notable applications of AI is in legal research through tools like **SUPACE (Supreme Court Portal for Assistance in Court Efficiency)**, which assists judges in analyzing documents and legal precedents. Similarly, **SUVAAS (Supreme Court Vidhik Anuvaad Software)** is being utilized for translating judicial documents between Indian languages, promoting inclusivity.

AI can also facilitate case management by analyzing large volumes of data and identifying priority cases. Predictive analytics can help estimate the likely duration and outcome of cases, assisting in resource allocation. Furthermore, AI-driven analytics on platforms like the **National Judicial Data Grid (NJDG)** provide real-time data on case pendency and disposal, enabling better monitoring and planning.

However, the integration of AI into the judiciary faces several challenges. The primary concern is data privacy and the risk of bias in AI algorithms, which may lead to unjust outcomes. The lack of

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standardized data formats and inadequate digital infrastructure also hinder AI adoption. Additionally, there is a fear of undermining judicial discretion and autonomy as AI tools may be perceived as encroaching upon judicial decision-making.

India has initiated several steps to address these challenges. The **e-Courts Mission Mode Project** aims to digitize court records and build IT infrastructure to support AI integration. The **Artificial Intelligence Committee of the Supreme Court** is exploring safe and ethical AI usage in judicial processes. Furthermore, the **Digital India** initiative promotes digitization that lays the foundation for AI adoption in courts.

To realize AI's full potential, there must be a balance between technological innovation and judicial prudence. Addressing challenges related to data privacy, bias, and ethical considerations is crucial to ensuring that AI serves as an enabler rather than a disruptor of justice.

Topic : Balochistan Conflict

Relevance : GS Paper 2 International relations

Source : The Hindu

Context :



The Balochistan conflict is a longstanding insurgency in Pakistan's southwestern province, rooted in demands for greater autonomy and resistance against perceived economic exploitation. This conflict has major implications for regional security, particularly in the context of Indo-Pak relations and strategic projects like **Gwadar Port** and the **China-Pakistan Economic Corridor (CPEC)**.

Why Are Baloch People Against Pakistan?

The Baloch people's grievances against the Pakistani state stem from a combination of **historical, economic, political, and socio-cultural factors**:

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What is Balochistan Liberation Army?



What it is

- The Balochistan Liberation Army (BLA), active since 2011, is the most prominent of the many separatist groups in Pakistan's Balochistan province
- **Majeed Brigade** is the BLA's dedicated suicide squad

The context

- Balochistan is the country's largest province. It has oil and other natural resources, but the ethnic Baloch are Pakistan's **poorest and most under-represented** people
- Till 1947, Balochistan comprised multiple chieftoms.
- Ahmed Yar Khan, the chief of Kalat, was the most powerful. He was **forced to accede to Pakistan in 1948**, after Pakistan invaded Kalat
- This triggered an insurgency which remains ongoing due to **'unjust' behavior of Pakistan govt towards Balochs**



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- **Historical Marginalization:**

- Balochistan was forcibly annexed into Pakistan in 1948, despite opposition from the **Khan of Kalat** and tribal leaders.
- Ever since, there has been a strong sense of betrayal and resentment among the Baloch population.

- **Economic Exploitation:**

- Although Balochistan is rich in natural resources (like gas, coal, and minerals), the province remains **one of the poorest and least developed regions in Pakistan**.

- The Baloch accuse the federal government of exploiting their resources without fair revenue sharing or local development.
- Projects like **Gwadar Port and CPEC** are seen as benefiting Punjab and China more than the local Baloch population.

- **Political Exclusion:**

The Complex History of Balochistan


From Independence to Annexation

1758

The vast region of Balochistan, spanning from Dera Ismail Khan to Hormuz Island, was an independent country ruled by the powerful Haseer Khan. The Khanate of Kalat flourished under his leadership, but after his death, it faced internal and external challenges, leading to a decline in its power and influence.

1947

After WWII Kalat (Balochistan) sought independence from prolonged British occupation. Lawyers were hired to regain territories that had been incorporated into British Balochistan. The Baloch state declared independence on August 11, 1947, but only nine months later, ending the short-lived independence.



The Balochistan Post Explains: Navigating Balochistan's Complex Border History

- Baloch leaders and activists feel politically marginalized, with key decisions being made without consulting local representatives.
- There is a perception that the **federal government and military dominate provincial affairs**, leaving the Baloch people with little say.

- **Human Rights Violations:**

- Reports of **enforced disappearances, extrajudicial killings, and military crackdowns** have fueled anti-state sentiment.
- The **Pakistani military's heavy-handed operations** against insurgents have often

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targeted civilians, worsening public anger.

- **Cultural and Identity Suppression:**

- The Baloch people feel that their distinct culture and identity are being diluted by forced assimilation into mainstream Pakistani culture.

Recent Developments and Allegations Against India

The Balochistan conflict recently flared up with the hijacking of a passenger train by the **Baloch Liberation Army (BLA) in March 2025**, resulting in 31 deaths. Pakistan immediately blamed India for allegedly supporting the insurgents, although it did not provide credible evidence. This accusation reflects a pattern where Pakistan often attributes unrest in Balochistan to Indian interference.

Current scenario

- China-backed Gwadar Port is a symbol of the economic injustice faced by the Baloch — despite rampant unemployment in the province, engineers and technical specialists were hired from Punjab, Sindh, and even China
- In recent years, Baloch militants have repeatedly targeted both Gwadar and Chinese nationals in the country

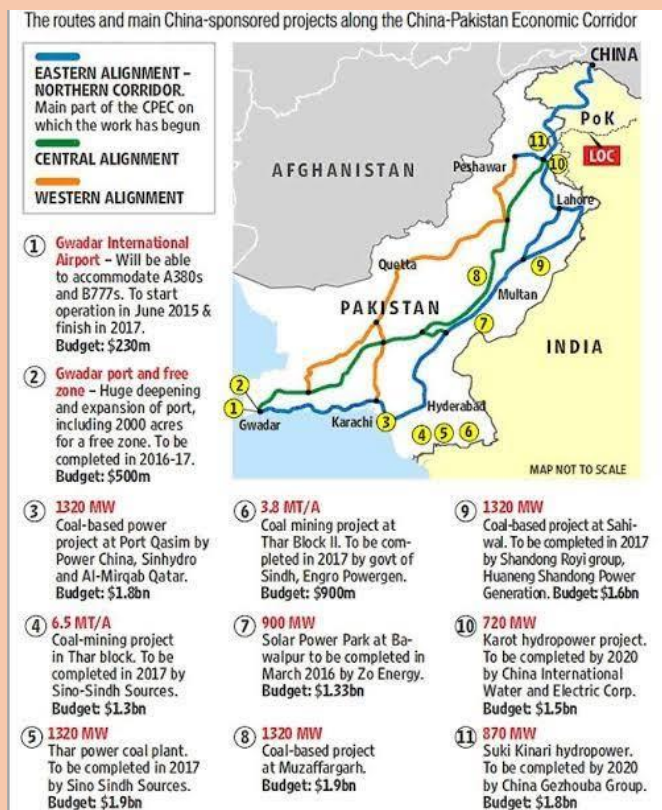
Demands for autonomy

- There have been demands for greater regional autonomy for Balochistan, and it was emboldened by the secession of Bangladesh in 1971
- Since the dismissal of the provincial govt (National Awami Party) by the then PM Zulfikar Ali Bhutto (Pakistan Peoples' Party) followed by 'human rights abuse' in the province, there has been a rise in insurgency.
- There have been sympathies for brothers Majeed Langove Sr (killed in 1974) and Majeed Langove Jr (killed in 2010).
- When Aslam Achu, a BLA leader, decided to establish a suicide squad, the name 'Majeed' was chosen for it.
- The Majeed Brigade carried out its first suicide attack on December 30, 2011
- After a long hiatus, the group became active again in 2018. It has been very active since then

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India, on its part, has officially denied any involvement, maintaining that Balochistan is Pakistan's internal matter. However, Indian Prime Minister Narendra Modi's reference to **Balochistan in 2016**, where he mentioned human rights violations, was seen by Pakistan as indirect support for the insurgency. This statement was perceived as a strategic counter to Pakistan's international campaign over Kashmir.

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- **Security Challenges:** Baloch insurgents view the project as exploitative, as locals benefit little from job creation or infrastructure development, while foreign investments flow out of the region.

India's Concerns and Strategic Response

India views Gwadar and CPEC as strategic threats for multiple reasons:

1. **Territorial Violation:** CPEC passes through **Pakistan-occupied Kashmir (PoK)**, infringing on India's territorial claims.
2. **Maritime Security:** China's presence in Gwadar challenges India's naval dominance in the Indian Ocean.
3. **Geo-Economic Rivalry:** Gwadar competes with India's **Chabahar Port in Iran**, which serves as a gateway to Afghanistan and Central Asia.

Strategic Significance of Gwadar Port and CPEC

Gwadar Port, located on the Arabian Sea coast in Balochistan, is a key infrastructure project developed with Chinese investment. It forms the southern hub of the **China-Pakistan Economic Corridor (CPEC)**, a multi-billion-dollar initiative to connect Gwadar to China's Xinjiang region via highways, railways, and energy projects.

- **Economic Significance:** The port is essential for China's energy imports from the Middle East, bypassing the **Strait of Malacca** and reducing shipping costs.
- **Strategic Importance:** It gives China direct access to the Arabian Sea, strengthening its foothold in the Indian Ocean.

India has countered this by strengthening its strategic partnerships with countries like **Iran and Oman** and increasing its naval presence in the Indian Ocean Region (IOR).

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The Balochistan conflict, intertwined with the development of Gwadar Port and CPEC, continues to shape Indo-Pak relations and the strategic landscape of South Asia. While Pakistan blames India for fueling the insurgency, the deeper roots of the conflict lie in Balochistan's historical grievances, socio-economic marginalization, and resistance against perceived exploitation. The strategic significance of CPEC and Gwadar also amplifies the geopolitical rivalry between India and China, making the region a focal point of both domestic unrest and international competition.

Prelims Practice Question:

Q. With reference to the Balochistan conflict and its geopolitical significance, consider the following statements:

1. Gwadar Port is located in Pakistan's Sindh province and is a crucial part of the China-Pakistan Economic Corridor (CPEC).
2. The Baloch insurgency primarily stems from economic exploitation, political

marginalization, and human rights violations.

3. India's strategic concerns regarding CPEC include territorial violation and maritime security challenges.

Which of the statements given above are correct?

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

Answer:

Correct Answer: (b) 2 and 3 only

Explanation:

1. **Statement 1 is incorrect** because Gwadar Port is located in **Balochistan**, not Sindh. It is indeed a crucial part of CPEC.
2. **Statement 2 is correct** as the Baloch insurgency arises from **economic exploitation, political marginalization, and human rights violations** by the Pakistani state.
3. **Statement 3 is correct** as India's strategic concerns regarding CPEC include the **territorial violation of PoK and maritime security challenges** due to China's presence in the Arabian Sea.

Therefore, the correct answer is **(b) 2 and 3 only**.

Mains Model Question:

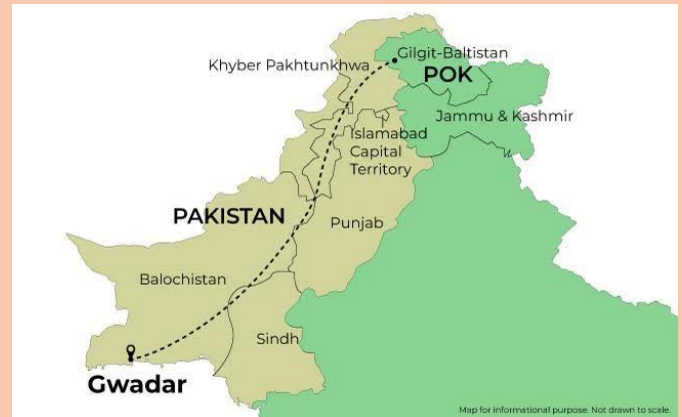
Q. The Balochistan conflict and the China-Pakistan Economic Corridor (CPEC) have

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significant geopolitical implications for South Asia. Discuss the reasons behind the Baloch insurgency and its impact on India-Pakistan relations.

The Balochistan conflict is rooted in decades of economic exploitation, political marginalization, and human rights violations by the Pakistani state. Despite being resource-rich, Balochistan remains one of the most underdeveloped regions in Pakistan. The local population has long felt alienated due to the extraction of natural resources without adequate economic benefits or representation. Moreover, forced disappearances, military crackdowns, and the suppression of political dissent have fueled resentment among the Baloch people, leading to an armed insurgency demanding greater autonomy or independence.

The China-Pakistan Economic Corridor (CPEC), a flagship project under China's Belt and Road Initiative (BRI), has intensified the conflict. Gwadar Port, located in Balochistan, is a strategic focal point of CPEC, promising economic transformation but largely bypassing local interests. The Baloch nationalists view CPEC as another means of exploiting their resources while denying them socio-economic benefits. As a result, attacks on infrastructure projects and Chinese nationals have increased, posing security challenges for both Pakistan and China.



From India's perspective, CPEC poses strategic and territorial concerns. The corridor passes through Pakistan-occupied Kashmir (PoK), which India claims as its own territory, thus violating its sovereignty. Additionally, China's control over Gwadar Port is perceived as a potential threat to India's maritime security, as it could increase Chinese naval presence in the Arabian Sea. India's support for the Baloch cause is often seen as a counter to Pakistan's stance on Kashmir, further straining bilateral relations.

The Balochistan conflict, therefore, not only highlights the internal challenges faced by Pakistan but also reflects broader geopolitical rivalries in South Asia. Addressing the aspirations of the Baloch people while balancing regional security dynamics remains a complex challenge for the stakeholders involved.