

Today's Prelims Topics

Soapstone mining and Land subsidence in Bageshwar

Context

The Uttarakhand High Court has suspended all mining operations in Bageshwar district, citing environmental, socio-economic and safety concerns after taking *suo motu* cognizance of a news article.

About Soapstone

- It is a metamorphic rock primarily made up of talc along with varying amounts of **chlorite, pyroxenes, micas, carbonates and other minerals**.
- **Properties:**
 - Soft texture (can be scratched with a fingernail due to high talc content).
 - Heat-resistant and non-porous.
 - It is durable, inert and has a soapy feel.
- **Uses:**
 - **Industrial applications:** Talcum powder, ceramics, cosmetics and paints.
 - **Thermal applications:** Linings in stoves, fireplaces and laboratory countertops due to heat resistance.
- **Largest producer of soapstone in India:** Rajasthan
- **Major Deposits:**
 - **Rajasthan (Udaipur & Bhilwara) - 57% of India's Deposits**
 - **Uttarakhand (Bageshwar & Almora) - 25% of India's Deposits**

Environmental & Safety Concerns

- **Land Subsidence:**
 - It is a significant issue in Uttarakhand which is magnified by mining activities.
 - **E.g. Joshimath Example (2022)** - cracks in roads and houses due to subsidence.
 - **Affected Areas in Bageshwar:** Kanda-Kanyal and Kanda are highly vulnerable.
 - **Cause:** Mining on lower slopes undermines the stability of upper slopes, where villages are located. Soil in these areas is **loamy and loose, prone to erosion and destabilization**, especially during monsoons.
- **Pollution:**
 - Mining activities contribute to water scarcity and pollution.
 - Transportation of mined materials intensifies air pollution.
- **Lack of Safety Measures:**
 - Absence of green belts and retaining walls around mines.
 - Lack of essential safety protocols such as buffer zones, slope monitoring and protective structures.

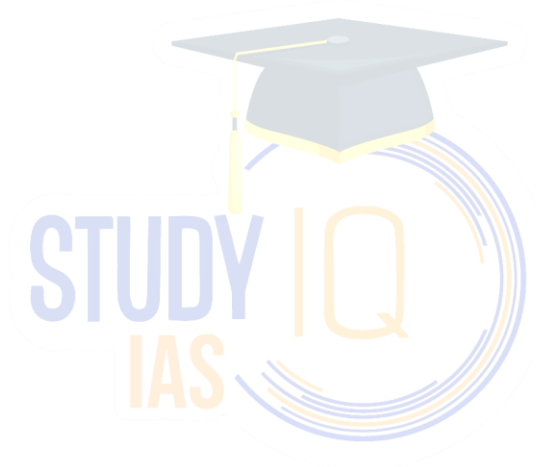
Cultural and Heritage Concerns

- **Kumaoni Bakhli Houses:**
 - Traditional houses of the region, known for their seismic resilience are now at risk due to land subsidence.
 - Foundations of many such houses have shifted or been damaged.
- **Kalika Temple:**
 - A 10th-century religious site in Kanda with cultural and historical importance.
 - **Current Status:** Cracks in temple floors due to land subsidence.
- **Local Traditions:**

- Kanda tehsil is renowned for folk music, dance and handicrafts, which face disruption due to mining activities.

Source:

- [Indian Express - soapstone mining is leading to land-subsidence in Uttarakhand's Bageshwar](#)



Delay in Implementation of Dam Safety Act

Context

The Supreme Court criticized the Union government for its delay in implementing the Dam Safety Act, 2021.

Key concerns raised by Supreme Court

- **Delay in Implementation:** The Act mandates the creation of the National Committee on Dam Safety **within 60 days of its commencement**. The committee, which must be reconstituted every three years, has **not yet been formed**.
- **Mullaperiyar Dam:** Structures like Mullaperiyar Dam, which was **built in 1895 using limestone and surkhi** are vulnerable to **structural failures**. This is a great cause of concern.

Key Features of Dam Safety Act, 2021

- It was passed by Parliament to ensure the safety and operation of dams in India and prevent disasters caused by dam failures.
- **National Dam Safety Committee (NDSC):**
 - **Role:** To help evolve uniform dam safety policies, protocols and procedures.
- **National Dam Safety Authority (NDSA):** Established under the Act to regulate dam safety across India.
 - **Headed by:** Chairman of Central Water Commission (CWC)
 - **Functions:**
 - Implement dam safety policies.
 - Resolve disputes between States.
 - Ensure compliance with safety protocols.
- **State Institutions:**
 - **State Committee on Dam Safety:** Oversee safety measures for dams located within the respective State.
 - **State Dam Safety Organization (SDSO):** Inspect dams, review their safety and monitor compliance with regulations.
- **Regulatory Provisions:**
 - **Obligations of Dam Owners:** Conduct periodic safety inspections and Maintain records and update emergency action plans.
 - **Periodic Inspections:** Mandatory inspection of dams at regular intervals by qualified engineers.
 - **Emergency Action Plan (EAP):** Dam owners must prepare and implement EAPs to address risks and ensure public safety.

Source:

- [The Hindu - Dam Safety Act](#)

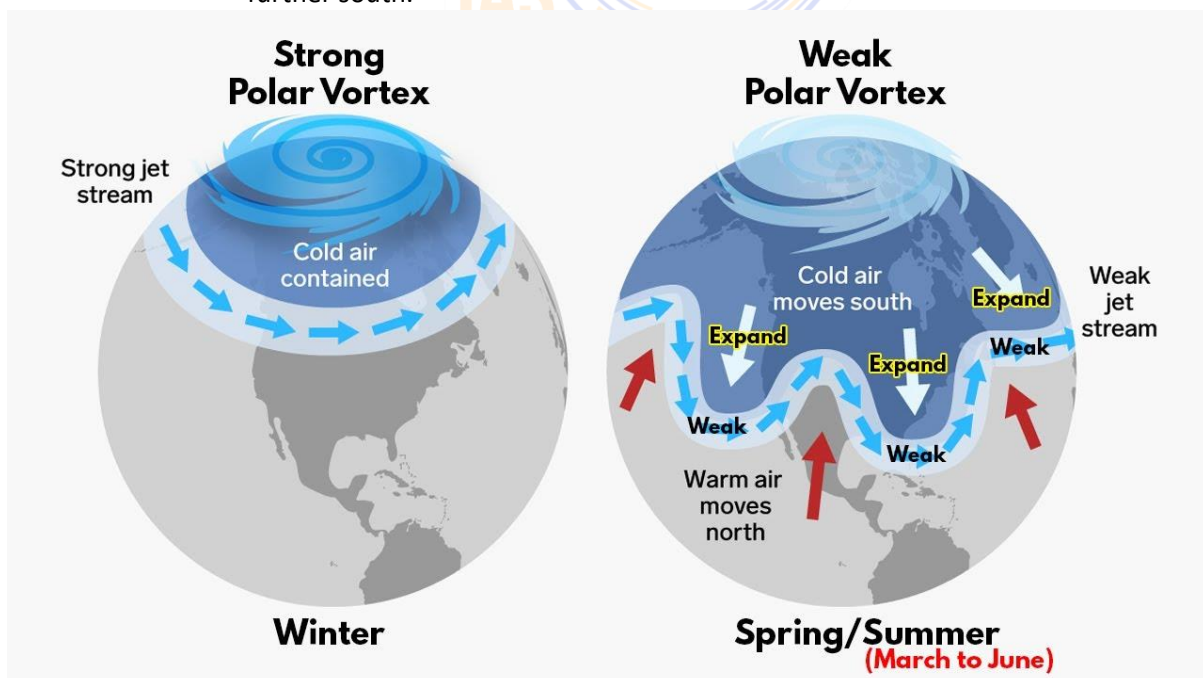
How Polar Vortex caused massive winter storm in USA

Context

At least 5 people have died in the United States after a winter storm hit. The extreme weather has been caused by the expansion of the **polar vortex southwards**.

About Polar Vortex

- A polar vortex is a **large area of low-pressure**, cold air that swirls around the Earth's polar regions.
- The term **vortex** refers to **counter-clockwise flow of air** that helps keep the colder air near the poles.
- **It is of 2 types:**
 - **Tropospheric Polar Vortex:** Occurs in the lowest atmospheric layer, extending up to 10-15 km.
 - **Stratospheric Polar Vortex:** Found at 15-50 km, strongest during autumn and disappears in summer.
- **How It Causes Extreme Cold**
 - Normally, a **strong polar vortex** keeps the jet stream stable in a circular path, separating cold Arctic air from warmer southern air.
 - When the vortex **weakens:**
 - The **jet stream** destabilizes and becomes wavy.
 - Arctic air moves southward, affecting regions as far as Florida.
 - High-pressure systems disrupt the vortex, pushing cold air south.
- **Link with Climate Change:** Ongoing research explores how climate change influences the polar vortex.
 - **Hypothesis:**
 - The **Arctic warms faster** than other regions, weakening the vortex and jet stream.
 - Weaker systems are more prone to disruptions, causing extreme cold weather further south.



Source:

- [Indian Express - Winter storm in the US](#)

Link between fluoride levels and IQ loss

Context

A recent study conducted by researchers from the **National Institute of Environmental Health Sciences (NIEHS), USA** has linked higher fluoride exposure to lower IQ in children.

Key Findings of the study

- **Impact of Fluoride on IQ:** For every **1 mg/L increase in urinary fluoride**, children's IQ drops by **1.63 points**.
- Study also suggests even exposure below the **WHO limit of 1.5 mg/L** might affect IQ.

About Fluoride

- Fluoride is a naturally occurring mineral found in soil, water, plants and rocks.
- **Chemical Nature:** It is the ionic form of fluorine, a highly reactive element.
- **Sources:**
 - **Natural:** Groundwater and volcanic emissions.
 - **Artificial:** Added to water supplies, dental products like toothpaste and some pharmaceuticals.
- **Uses of Fluoride**
 - **Dental Health:** Strengthens Tooth Enamel & reduces cavities.
 - **Industrial Applications:** Used in the manufacturing of aluminum, pesticide, and refrigerants.
 - **Public Health:** Added to drinking water to reduce dental decay, known as **water fluoridation**.
- **Health Concerns:**
 - **Fluorosis:**
 - **Dental Fluorosis:** Overexposure to fluoride during childhood can lead to white spots or streaks on teeth.
 - **Skeletal Fluorosis:** Prolonged high fluoride intake can cause joint pain, stiffness and damage to bones.
 - **Neurotoxicity:** Studies suggest high levels of fluoride exposure may impair cognitive development in children.
 - **Thyroid Function:** Excess fluoride may interfere with iodine absorption, affecting thyroid function.

Source:

- [The Hindu - Review asserts link between fluoride levels and IQ loss](#)

Double counting error: Official gold import figures for Nov revised down by \$5 billion

Context

The Ministry of Commerce and Industry on Wednesday revised the gold import figures for November lower by \$5 billion to \$9.9 billion from \$14.8 billion.

Overview of Gold Import Data Revision

- **Initial Data:** Gold imports for November 2024 were reported at **\$14.8 billion**, leading to a record trade deficit of **\$38 billion**.
- **Revised Data:** Imports were adjusted downward by **\$5 billion** to **\$9.8 billion**, reducing the trade deficit to **\$33 billion**.
- **Reason for Revision:**
 - Likely **double counting** of gold shipments due to a transition in e-filing systems from the **National Securities Depository Limited (NSDL)** to **ICEGATE** in July 2024.
 - Misclassification of gold movements in and out of **Special Economic Zones (SEZs)**.

Indian Customs Electronic Data Interchange Gateway (ICEGATE)

- It is a centralized portal that provides a range of services for the Indian customs and trading community. Such as,
 - **E-filing:** Services include filing Bills of Entry and Shipping Bills
 - **Online payments:** Services like online duty payment
 - **Document tracking:** Tracking the status of documents at Customs EDI

India's Trade Trends (April–November 2024)

- **Overall Exports:**
 - **Total exports:** **\$536.25 billion** (up 7.61% from \$498.33 billion in 2023).
 - **Key contributors:** Electronic goods, Engineering goods, Rice and Ready-made garments.
 - **Major Export Destinations:** US, UAE, Netherlands, UK and Singapore.
- **Imports:**
 - **Key imports:** Crude oil , electronic goods, and gold.
 - **Top Import Sources:** China, UAE, Russia, US, Saudi Arabia and Iraq.

Source:

- [Indian Express - Double counting error](#)

Places in News

Greenland

- President-elect Donald Trump has expressed interest in acquiring Greenland, an autonomous territory of Denmark.
- **Reasons Behind Trump's Interest in Greenland:**
 - **Strategic Security:** Proximity to Europe, enabling US to monitor activities of rivals like **Russia and China**. Trump has described **Greenland as “an absolute necessity” for national security.**
 - **Arctic Trade Route:** Greenland lies along a **shorter Arctic Sea shipping route**. Climate change may enhance the strategic importance of this route, reducing dependence on the **Panama Canal**.
 - **Mineral Resources:** Greenland has deposits of **copper, lithium and cobalt**, essential for electric vehicle batteries and other technologies.



- **Location:** Between the Arctic and Atlantic Oceans. It is the **world's largest island**.
- Presently it is an **autonomous territory under the Kingdom of Denmark**.
- **Three-fourth** of its surface is **permanently covered by ice**.
- It is majorly inhabited by the **Inuit community**.

Source:

- [Indian Express - Donald Trump to buy Greenland](#)

News in Shorts

Border fencing on inWest Bengal despite BGB objections

- Recently **BGB (Border Guard Force, Bangladesh)** raised objections to the fencing carried on by **Border Security Force (BSF)** on the border between India & Bangladesh, alleging territorial issues.
- BSF clarified that the fencing work was well within Indian territory and posed no infringement.
- This confrontation took place near **Sukdepur and Ranaghat village area in North 24 Parganas district (West Bengal)**.
- **West Bengal shares a 2,216-km border with Bangladesh**. Much of this is **unfenced** making the border porous and susceptible to smuggling.

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).

Source:

- [The Hindu - Border fencing on inWest Bengal](#)

Vaikunta Ekadasi festival at the Tirumala temple

- Six persons were killed and more than 20 critically injured in a stampede at **Tirupati** as people jostled for tickets for the **Vaikunta Ekadasi festival at the Tirumala temple (Andhra Pradesh)**.
- **Vaikunta Ekadashi** marks the opening of the sacred **Vaikunta Dwara**, a special gate beside the temple. It remains closed throughout the year and opens only on this auspicious day.
- According to Hindu mythology, Lord Vishnu himself opened this gate to grant devotees the **opportunity for salvation and spiritual enlightenment**.

Source:

- [The Hindu - 6 killed, 20 hurt in Tirupati stampede](#)

India's first battery energy storage system

- India's **1st commercial utility-scale battery energy storage system (BESS)** from renewable energy is expected to go live in Delhi in March this year.
- **Capacity:** 20 MW (megawatt)/40 MWh (megawatt hour)

About BESS

- It is a device which enables renewable energy like solar energy, wind energy to be stored and released when needed.
- **Types of batteries used in BESS:** Lithium-ion (Li-ion) batteries, Lead-acid batteries, Sodium-sulfur batteries etc.
- **Significance of BESS:**
 - **Minimizes greenhouse gas emissions**

- **Reduce Energy Costs:** Stored energy can be used during peak hours, when energy prices are highest.
- Reduces dependency on Grid and Improves Grid Stability.

Source:

- [The Hindu - India's first battery energy storage system to go live in south Delhi's Kilokri](#)

ICMR gets low-cost tech to detect iron deficiency - AnemiaPhone

- AnemiaPhone is developed by **Cornell University researchers** to accurately, quickly and cheaply assess iron deficiency.
- It has been transferred to the **Indian Council of Medical Research (ICMR)** for integration into its programmes for anaemia alleviation, women's health, and maternal and child health.
- Iron deficiency is a leading cause of anaemia, which affects **50% to 70% of pregnant women in India.**

How it works

- The technology requires a small finger stick, a drop of blood on a test strip similar to a COVID-19 home test, and a few minutes for the reader to assess.
- Then the information is uploaded to a clinical database via mobile phone, wireless tablet or computer.
- Healthcare workers can interpret the test and provide guidance, referral or intervention on the spot.

Source:

- [The Hindu - low-cost tech to detect iron deficiency](#)

Assam Mining Tragedy

- 3 miners were confirmed dead and 6 remained trapped in a **flooded coal "rat-hole" mine** in **Assam's Dima Hasao district.**
- Combined teams of the Indian Army and deep sea divers from the Indian Navy are assisting the operation.

Rat Hole Mining

- It is a technique for coal extraction primarily used in Meghalaya, characterised by narrow, horizontal coal seams.
- It involves **creating small pits like rat holes in the ground.** These pits are just wide enough for a single miner to enter and reach the coal seams.
- **Mining Process:** Miners access the coal seams by descending into these pits with the aid of ropes or bamboo ladders, then manually mine the coal using basic tools like pickaxes and shovels.
- **Ban:** The **National Green Tribunal (NGT) prohibited rat-hole mining in Meghalaya in 2014,** because of multiple fatalities linked to flooding in the mines during the monsoon.

Two main types of Rat Hole Mining:

- **Side-Cutting Method:** This involves carving narrow tunnels into hill slopes until the coal seam is located.
- **Box-Cutting Method:** This method starts with making a rectangular opening of 10 to 100 square metres. From this opening, a vertical pit is dug to depths of 100 to 400 feet. When the coal seam is reached, small rat-hole-like tunnels are created for the miners to horizontally extract coal.

Source:

- [The Hindu - Army retrieves one body from Assam mine](#)

Editorial Summary

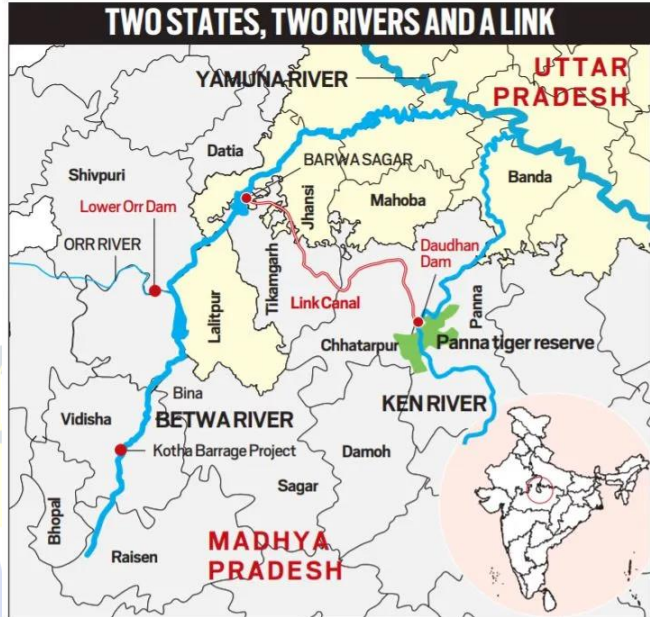
Ken Betwa Linking Project

Context

PM Narendra Modi has laid the foundation stone for the Ken-Betwa river-linking project on the 100th birth anniversary of former Prime Minister Atal Bihari Vajpayee.

About Ken-Betwa link project (KBLP)

- **Aim:** To transfer excess water from the **Ken River to the Betwa River** to solve the water woes of the **Bundelkhand region**.
 - It's the **first interlinking project** under the **National Perspective Plan (1980)**.
- **Components:**
 - **Ken-Betwa Link Canal:** 221 km in length (including a 2-km tunnel) for water diversion.
 - **Phase-I:** Construction of **Daudhan Dam**, related tunnels, canal, and powerhouses.
 - **Phase-II:** Building of **Lower Orr Dam**, **Bina Complex Project** and **Kohta Barrage**.
- **Benefits of the project:**
 - **Irrigation:** 10.62 lakh hectares (8.11 lakh ha in Madhya Pradesh; 2.51 lakh ha in Uttar Pradesh).
 - **Drinking Water:** 62 lakh people.
 - **Power Generation:** 103 MW hydropower, 27 MW solar power.



Facts

- **Ken River:** Originates near **Ahirgawan in Katni district (MP)** and travels a distance of **427 km**, before merging with the **Yamuna at Chilla village (Banda)** in Uttar Pradesh.
- **Betwa River:** Originates in the **Vindhya Range (near Hoshangabad, MP)**, and travels a distance of **590 km**, before merging with the **Yamuna at Hamirpur (UP)**.
- **Yamuna:** It is a tributary of River Ganga.
 - It has four main tributaries in the Himalayan region: Rishi Ganga, Hanuman Ganga, Tons, and Giri.
 - In the plains, the main tributaries are Hindon, Chambal, Sind, Betwa and Ken.
 - Tons is the largest tributary of Yamuna.
 - Other small tributaries of the Yamuna River include the Uttangan, Sengar and the Rind.

What are the Various Concerns Related to the Project?

- **Environmental Impact:** The construction of the dam within the Panna Tiger Reserve will submerge a significant area, threatening biodiversity, wildlife habitats, and tiger conservation efforts.

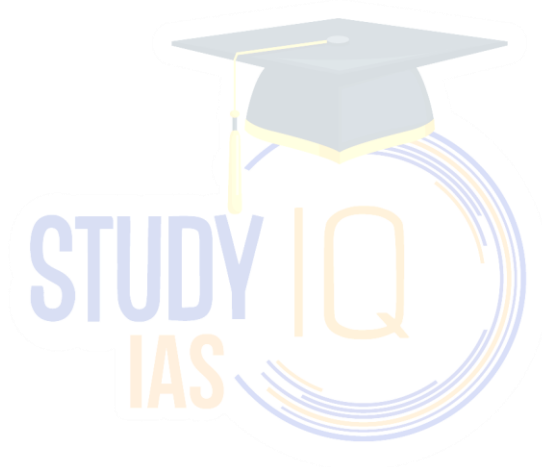
- Eco-services of rivers, such as silt deposition for delta formation and maintaining ecological balance, will be disrupted.
- **E.g.,** A study by IIT-Bombay scientists found that moving large quantities of water as part of river-linking projects can affect land-atmosphere interplay and feedback, leading to a **mean rainfall deficit of up to 12% in September.**
- **Hydrological Imbalance:** Claims of "surplus" water in the Ken River ignore its role in maintaining downstream ecosystems, including deltaic regions.
 - Climate change and altered rainfall patterns may reduce water availability, jeopardizing the project's viability.
- **Socioeconomic Costs:** The estimated cost of ₹45,000 crore (part of ₹5.5 lakh crore for all interlinking projects) does not factor in social displacement, loss of livelihoods, and long-term operational expenses.
 - Taxes will likely burden common citizens to fund the project.
- **Historical Lessons:** Examples such as the degradation of the Indus Delta and the Narmada downstream areas highlight the risks of river manipulation.
 - International disasters, such as the Aral Sea's desertification and the Kissimmee River's channelisation in Florida, reinforce the environmental consequences of large-scale geoengineering projects.
- **Policy and Governance Gaps:** Circumvention of legal provisions and expert recommendations (including members of an empowered committee appointed by the Supreme Court of India) undermines environmental regulations.
 - The lack of comprehensive studies on the project's feasibility and impact raises concerns about decision-making processes.
- **Cultural and Ideological Contradictions:** The project contradicts the cultural ethos of reverence for rivers, emphasized by the ruling regime's Hindutva ideology, by prioritizing commodification and exploitation over preservation.

Way Forward

- **Holistic Watershed Management:** Implement a national water policy focusing on watershed management and involving local stakeholders.
 - Promote aquifer management and regulate groundwater usage through scientific monitoring.
- **Adoption of Sustainable Agricultural Practices:** Introduce modern irrigation techniques like Israel's drip irrigation to reduce water usage and maintain aquifer health.
 - Train farmers in efficient irrigation practices to optimize water use and minimize wastage.
- **Revival of Vernacular Practices:** Integrate traditional water management practices, such as rainwater harvesting and tank systems, into modern frameworks.
 - Leverage community knowledge for localized solutions to water management challenges.
- **Improved Wastewater Management:** Establish innovative wastewater reuse programs to reduce dependence on river water for industrial and agricultural purposes.
 - Enhance urban water management systems to conserve resources.
- **Preserving Ecosystem Services:** Avoid projects that compromise the ecological balance of rivers, including their role in groundwater recharge, delta formation, and biodiversity sustenance.
 - Strengthen legal protections for river ecosystems and enforce compliance with environmental laws.
- **Climate Change Adaptation:** Incorporate climate-resilient strategies to manage water resources, considering variability in rainfall and river flows.
 - Develop alternatives to inter-basin transfers, such as local water conservation and decentralized management.

Sources:

- [The Hindu: River interlinking, the fount of environmental disaster](#)
- [Indian Express: Ken-Betwa River linking project](#)



The Right Food And Struggle With PDS

Context

In 2023, alarming reports emerged highlighting significant issues with the Public Distribution System (PDS) in states like Jharkhand, Odisha, and Bihar.

What are the Key Issues?

- **Removal of Households from PDS Rolls:** Reports from Jharkhand and Odisha highlight that many households have been excluded from PDS rolls.
 - Bihar faces a similar crisis, particularly during the COVID-19 pandemic, which worsened access to rations.
- **Exclusion from Ration Cards:** Many Musahar households in Patna district lack active ration cards or have incomplete family details on their cards.
 - Biometric verification at Fair Price Shops (FPS) has led to the exclusion of names from PDS rolls.
 - The Musahar community, deeply marginalized by caste-based socio-political structures, is particularly affected.
- **Corruption and Poor Food Quality:** BPL households with Priority Household (PHH) cards are entitled to 5 kg of food grains per person.
 - However, FPS dealers often release only 4 kg, and this is usually of the lowest quality rice ("Usna" rice).
 - Wheat is often not issued at all.
 - Households regularly report FPS dealers diverting food grains for personal profit.
- **Documentation and Bureaucratic Barriers:** Bihar requires Aadhaar details and additional documents like caste, income, and residence certificates for PDS enrolment.
 - Similar requirements exist in Jharkhand, Uttar Pradesh, and Madhya Pradesh, though they lack legal backing under the National Food Security Act (NFSA) of 2013 or the PDS Control Order of 2015.
 - Officials in Bihar attribute these requirements to oversight in the digitized system.
 - Though ration cards must be issued within 30 days under the 2015 order, applications often remain pending for 4 to 18 months.
- **Exploitation by Middlemen:** Marginalized communities, particularly the Musahars, lack resources and knowledge to navigate online processes for PDS.
 - Middlemen exploit this by charging ₹3,000 or more for ration card applications, with instances of money being taken without delivering the service.
- **Digitization and Governance Disconnect:** Governments prioritize digitization and "smart city" projects over citizen welfare, creating a disconnect with the most vulnerable populations.
 - Bureaucratic inefficiency and indifference choke the right to food, despite its recognition as a fundamental right in *People's Union of Civil Liberties vs. Union of India (1999)*.

Conclusion

The PDS system, meant to uphold the fundamental right to food, is failing due to bureaucratic inefficiencies, systemic corruption, and digitization hurdles. Marginalized communities like the Musahars are disproportionately affected, and the lack of government accountability perpetuates these challenges. Reforms in governance, digitization, and citizen support mechanisms are essential to ensure equitable access to food security.

Source: [The Hindu: The right to food and the struggle with the PDS](#)

China's long game in Africa

Context

- China is strategically increasing its influence in Africa by shaping its political landscape through investments in education, diplomacy, and governance models.
- The establishment of the Mwalimu Julius Nyerere Leadership School in Tanzania in 2022 is a key part of this broader strategy to embed Chinese governance principles and build long-term alliances with African leaders.

The Mwalimu Julius Nyerere Leadership School

- **Purpose:** Aimed to train African political leaders in Chinese governance principles.
 - Emphasizes the centrality of the ruling party and strong state control.
- **Key Details:** Located in Tanzania, built at an estimated cost of \$40 million.
 - Inaugural cohort included 120 officials from South Africa, Mozambique, Angola, Namibia, Zimbabwe, and Tanzania — countries with strong historical ties to China.
- **Significance:** These six nations are ruled by liberation parties that came to power during pre-independence struggles.
 - They also form the Former Liberation Movements of Southern Africa, a coalition for addressing governance challenges and staying in power.

Broader Strategy of Influence in Africa

- **Political Training and Educational Initiatives**
 - **Study Tours:** Hundreds of African officials participate annually in visits to China, including lectures, cultural exchanges, and interactions with provincial governments.
 - **Expansion of Political Schools:** Kenya expressed interest in a Chinese Communist Party (CCP)-modeled leadership school financed by China.
 - China also funded the renovation of Zimbabwe's Herbert Chitepo School of Ideology.
- **Diplomatic Ties with Political Parties:** During the 8th Forum on China-Africa Cooperation (2021), China reported ties with over 100 political parties in 51 African countries.
- **Historical Support:** Beijing supported African independence movements and governance structures, maintaining its strong ties through investments in infrastructure and industrial projects.
- **Other Engagement:**
 - **Kenya:** China funded the construction of Kenya's new foreign ministry headquarters as part of celebrations for 60 years of diplomatic relations.
 - **Other Infrastructure Investments:** China continues to fund and refurbish institutions across Africa, embedding its governance model in local frameworks.
- **Response to Political Changes:** China is aware of the potential for regime changes in Africa and is nurturing relationships with both ruling and opposition parties.
 - This dual engagement helps safeguard its interests regardless of political transitions.

Long-term Vision for Political Stability

China's establishment of the Nyerere Leadership School is a critical component of its long-term strategy to embed itself within Africa's political landscape. By fostering relationships with ruling parties and promoting its governance model, China **aims to create a Sino-centric world order** that significantly influences global governance structures. Through these initiatives, China ensures its continued relevance and influence in shaping Africa's political future.

Source: [The Hindu: China's long game in Africa](#)