Mass Wasting in Sedongpu Gully of Tibet

For Prelims: Mass Wasting, **Avalanches**, **Glaciers**, **Gorge**, Gully, Sedongpu Gully, **Earthquake**, **Erosion**

For Mains: Disaster Management, Important Geophysical Phenomena, Climate Change and Geophysical Events

Source: TH

Why in News?

A recent study in the *Journal of Rock Mechanics and Geotechnical Engineering* has raised concerns about the **increasing frequency of mass wasting events in Tibet's Sedongpu Gully** since 2017, with implications for India's northeastern states due to the region's proximity and river systems.

What are the Key Highlights of the Study?

- **Increased Frequency of Mass Wasting:** The study documents a significant rise in mass wasting events in the Sedongpu Gully since 2017.
    - **Using satellite data from 1969 to 2023,** the study identified 19 major mass-wasting events, categorised into **ice-rock avalanches, ice-moraine avalanches, and glacier debris flows.** Notably, 68.4% of these events occurred after 2017.
    - Over 700 million cubic meters of debris have been mobilized in the Sedongpu Gully catchment since 2017. This substantial volume of debris has implications for downstream river systems.
- **Historical Context:** The earliest recorded mass wasting event in the Sedongpu Gully occurred between 1974 and 1975, with notable activity resuming in 1987.
- **Causes of Increased Activity:** The rise in mass wasting events is attributed to long-term **warming of the region and increased seismic activity.**
    - Sedongpu basin consists mostly of **Proterozoic (2.5 billion to 541 million years ago) marble** and the conditions indicate its land surface temperature ranges from **-5º to -15º C,** rarely exceeding 0º C before 2012.
        - Recent data from the nearby weather stations revealed that the annual temperature in this **area increased at rates of 0.34º to 0.36º C** during 1981-2018, which is higher than the global average (since 1970 the global average temperature has been rising at a rate of 1.7°C per century).
- **Impact on Tsangpo River:** The debris from **mass wasting events** has temporarily blocked the **Tsangpo River and its tributaries,** leading to concerns about potential flash floods downstream, particularly in Arunachal Pradesh and Assam.
    - Notably, such **blockages caused catastrophic flash floods in** Arunachal Pradesh and Assam in 2000.

Sedongpu Gully

- The Sedongpu Gully, located in the catchment area of the **Sedongpu Glacier in Tibet.**
    - A gully is a **landform created by erosion from running water, mass movement or both.**
- It drains into the **Yarlung Zangbo, or the Tsangpo River**, near where it takes a sharp turn called the **Great Bend,** while flowing around **Mt. Namcha Barwa** (altitude 7,782 metres) and **Mt. Gyala Peri** (7,294 metres) to create a **gorge** 505 km long and 6,009 metres deep. This is one of the **deepest gorges on the earth.**
- The Great Bend is close to **Tibet's border with Arunachal Pradesh**, where the Tsangpo flows as the **Siang River.**
    - In Assam further downstream, the **Siang meets the Dibang and Lohit** to **form the Brahmaputra,** which flows as the **Jamuna in Bangladesh**.

What is Mass Wasting?

- **Definition:** Mass wasting is the **downslope movement of rock, soil, and debris** under the influence of gravity. It includes various types of slope movements such as rock falls, slumps, and debris flows.
- **Key Triggers for Mass Wasting:** Heavy rainfall can saturate soil, increasing its weight and making it more prone to movement.
    - Quick melting of snow can add significant amounts of water to the soil, leading to instability.
    - **Earthquakes** (Seismic activity) can shake the ground and initiate **landslides.**
    - **Volcanic Eruption** can destabilise slopes through eruptions and associated seismic events.
    - **Erosion** by water bodies can undercut slopes and lead to mass wasting.
- **Types of Mass Wasting Events:**
    - **Rock Fall or Topple:** This involves the **falling, bouncing, and rolling of rock** debris down a slope. It can **occur suddenly and with significant impact.**
    - **Landslides and Rock Slides:** These events involve **large masses of soil** and rock sliding down a slope.
    - **Debris Flows:** A debris flow is a rapid downslope movement of **water-saturated rock debris and soil**, resembling wet cement. It moves quickly and can be very destructive.
    - **Avalanche:** An avalanche is a sudden mass movement of **rock or ice** under gravity. It can **occur in both mountainous and glacial regions.**
    - **Slope Creep:** This is a gradual, **slow movement of soil and rock down a slope,** often imperceptible **over short periods** but significant over longer timescales.

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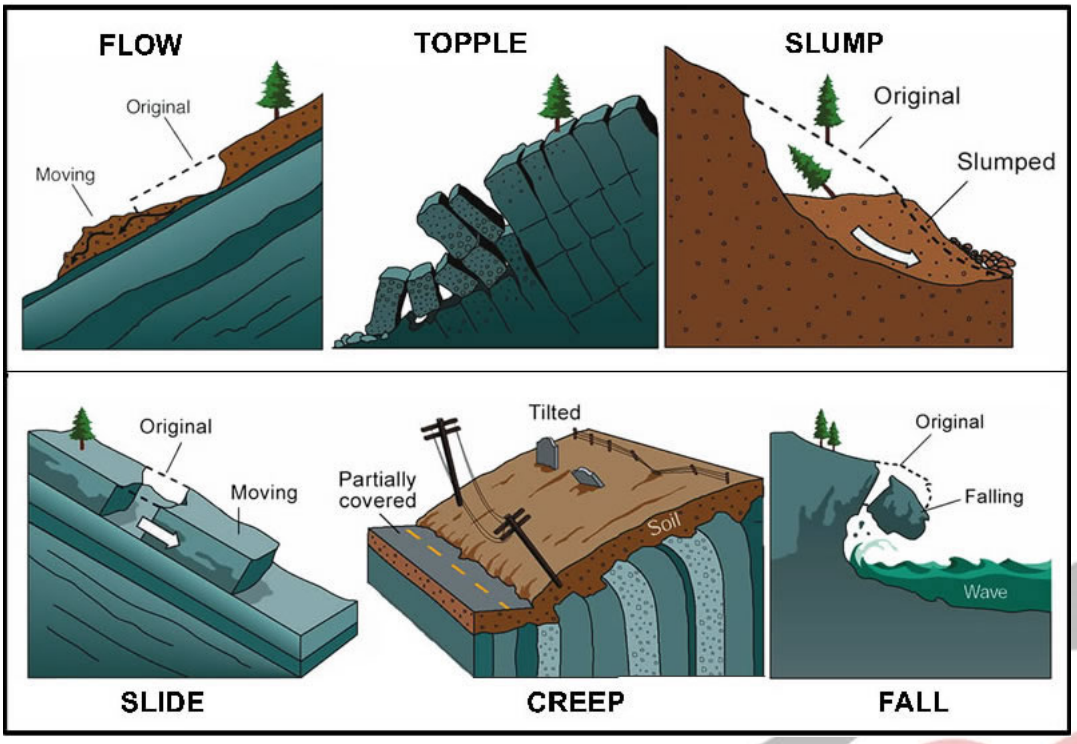

How does Mass Wasting in Tibet Affect India and Bangladesh?

- **Downstream Effects:** The sediment mobilized by these events can affect the **Tsangpo River and its tributaries.**
    - The river flows into India and joins the Brahmaputra, which is already one of the **most sediment-laden rivers in the world.**
    - **China plans to set up a 60-gigawatt project on the Tsangpo,** which will have thrice the capacity of China's **three Gorges project on the Yangtze**, the world's largest hydropower plant.
        - This seismically unstable region, which experienced the 8.6-magnitude 1950 **Assam-Tibet earthquake** and the 6.4-magnitude **2017 Nyingchi earthquake**, may see increased sedimentation in the **Tsangpo-Siang-Brahmaputra-Jamuna river system**, with serious implications for **India and Bangladesh.**
- **Flooding and Navigation Issues:** The **Brahmaputra carries over 800 tonnes of sediment at Pandu in Guwahati,** increasing to more than a billion tonnes at Bahadurabad in Bangladesh.
    - Increasing sedimentation may make the river **more intensely braided in the Assam plains, leading to more bank erosion.**
    - The sedimentation **can elevate the river beds, leading to flood hazards** and the channels may get choked with sand and silt in the lean season, making navigation difficult and affecting livelihoods related to fishing.

Way Forward

- The study underscores the **need for ongoing monitoring of geophysical events to manage sedimentation** and assess their impact on the Brahmaputra and its tributaries.
    - There is a call for further research to better understand the trends and implications of mass wasting in this critical region.
- **Promote reforestation and afforestation efforts to stabilize slopes** and reduce erosion. Implement **sustainable land use planning** to avoid development in high-risk areas.
- Employ **erosion control measures, such as terraces,** check dams, and gabions, to prevent soil erosion and reduce the risk of mass wasting.
- Conduct regular disaster risk assessments to identify vulnerable areas and prioritize mitigation measures.

Drishti Mains Question:

Q. What is the impact of increased mass wasting events in the Sedongpu Gully on river systems in India's northeastern states?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. Which of the following is/are tributary/tributaries of Brahmaputra?

1. Dibang
2. Kameng
3. Lohit

Select the correct answer using the code given below:

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

Ans: (d)

Mains:

Q. Differentiate the causes of landslides in the Himalayan region and Western Ghats. **(2021)**

Unified Pension Scheme

For Prelims: Unified Pension Scheme (UPS), Inflation Indexation, All India Consumer Price Index for Industrial Workers, Old Pension Scheme (OPS), National Pension Scheme (NPS), Income Tax Act, 1961, Pension Fund Regulatory and Development Authority (PFRDA), Debt-to-GDP Ratio.

For Mains: Changes in India’s Pension Framework and their Impact on Economy and Society.

Source: IE

Why in News?

The Union Cabinet approved the **Unified Pension Scheme (UPS)**, which will provide government employees with **assured pension** after retirement.

- The scheme will be effective from **1st April, 2025** with **central government employees** shifting to UPS from the current National Pension System (NPS).
- **State governments** will also have the option to adopt the **Unified Pension Scheme.**

What are the Provisions of the Unified Pension Scheme?

- **Assured Pension:** This would amount to **50%** of the **employee's average basic pay** drawn over the **last 12 months** before retirement for a minimum qualifying service of **25 years.**
    - The amount would **proportionately go down** for a smaller service period, up to a minimum of **10 years** of service.
- **Assured Minimum Pension:** In the case of retirement after a minimum 10 years of service, the UPS provides for an **assured** minimum pension of **Rs 10,000 per month**.
- **Assured Family Pension:** Upon a retiree's death, their **immediate family** would be eligible for **60%** of the pension last drawn by the retiree.
- **Inflation Indexation:** Dearness relief will be available on the above mentioned three kinds of pensions.
    - **Indexation** will be calculated based on the **All India Consumer Price Index for Industrial Workers.**
- **Lumpsum Payment at Retirement:** In addition to **gratuity**, employees will receive a **lump sum payment** at retirement equivalent to **1/10th of their monthly emoluments** (pay+DA) as of the retirement date for every completed six months of service.
    - This payment will not affect the amount of the assured pension.
    - Gratuity is an **amount paid** by an employer to its employees for **rendering their services.**
- **Choice for Employees: The employees can still opt to remain under the NPS. However, an employee can only opt for once. once opted, the option can not be changed.**

What are the Key Differences between UPS, Old Pension Scheme (OPS) and National Pension Scheme (NPS)?

- **Pension Calculation Method:** In **OPS**, pension was **fixed at 50%** of the **last base salary plus dearness allowance (DA)**.
    - In **UPS**, pension is calculated as **50%** of the **average of the basic salary plus DA drawn** in the last year before retirement. This adjustment means a slightly **lower pension** if an employee receives a **promotion** shortly before retiring.
- **Employee Contribution:** In OPS, **no employee contribution** was required.
    - In **UPS**, the employee contribution amount is **10%** of the **basic pay**, and the DA and the **government** will also contribute **18.5%**.
    - **NPS** required a **10%** contribution from the **central government employee's** basic salary and **14%** contribution from the **government**.
- **Tax Benefits:** Central government employees are eligible for **tax benefits** for the government's contribution to the **NPS scheme**. They can deduct **14%** under the **Income Tax Act, 1961** from both the old and new taxation regimes.
    - As there were no employee contributions to **OPS**, they **cannot reap tax benefits**.
    - The **government has yet to clarify if employee and government** contributions are available for any tax benefits under UPS.
- **Higher Minimum Pension in UPS:** Under the UPS scheme, the **minimum pension** offered per month is **Rs 10,000** at the time of **retirement** after a 10 year minimum service.
    - The **present minimum amount is Rs 9,000** after the ten-year minimum service period.
- **Lumpsum Payments: OPS** allowed **commutation** of up to **40%** of the pension into a **lumpsum payment**, reducing the monthly pension amount.
    - **UPS** provides a **lumpsum payment** at retirement calculated as **one-tenth** of the monthly salary plus DA for every six months of service, without affecting the pension amount.

What is NPS?

- **About:** NPS was a **market-linked** contribution scheme introduced by the Central Government to help the individuals have **income** in the form of **pension** to take care of their retirement needs.
    - The NPS replaced the OPS on **1st January, 2004** as part of the Centre's effort to reform **India's pension policies**.
    - The **Pension Fund Regulatory and Development Authority (PFRDA)** regulates and administers **NPS** under the **PFRDA Act, 2013**.

- **Need for NPS:** There was a fundamental problem with the **OPS** i.e. it was **unfunded**, there was **no corpus** specifically for pension.
    - Over time, this led to the government's **pension liability** to balloon to fiscally **unhealthy levels**.
    - The pension liabilities of the Centre jumped from **Rs 3,272 in 1990-91 to Rs 1,90,886 crore in 2020-21**.
- **Working of NPS:** The NPS was different from OPS in two fundamental ways.
    - **First, it did away with an assured pension.**
    - Second, **it would be funded by the employee himself/ herself,** along with a matching contribution by the government.
        - The defined contribution comprised 10% of the basic pay and dearness allowance by the employee and the government's contribution of 14%.
    - Individuals under NPS can choose from a range of **schemes and pension fund managers** as well as private companies to **invest** their money contributed to NPS.
- **Opposition to NPS:** Under the NPS, government employees received **lower guaranteed returns** and had to **contribute to their pension**, unlike the OPS where there were no employee contributions and higher guaranteed returns.
    - Amid ongoing calls for a return to the OPS, the union government established a committee in 2023 led by **T V Somanathan**. The recommendations of the committee have led to the introduction of the new **Unified Pension Scheme (UPS)**.

What can be the Fiscal Implications of UPS?

- **Large Debt-to-GDP Ratio:** The **Unified Pension Scheme (UPS)** will have significant fiscal impacts on a government with high debt and a large **debt-to-GDP ratio**.
    - The scheme's cost could strain government finances further.
- **High Fiscal Burden:** A Reserve Bank of India study (September 2023) warned that if all states switched to OPS, the fiscal burden could be up to **4.5 times** that of the **National Pension System (NPS),** potentially reaching **0.9% of GDP** annually by 2060.
    - There is concern about how the **UPS** will impact Union finances as it broadly **resembles OPS.**

Conclusion

UPS aims to **balance** the fiscal cost with employee aspirations. It addresses the uncertainty of the **National Pension Scheme (NPS)** and the high fiscal burden of reverting to the **Old Pension Scheme (OPS)**. UPS combines elements of both OPS **(defined benefit)** and NPS **(contributory)**, providing a defined return on the pension pool and reducing market risk. With assured returns and inflation protection, the UPS is expected to increase the overall pension fund, mitigating some risks associated with debt burden.

Drishti Mains Question:

Q. Explain the key Differences between Unified Pension Scheme (UPS), Old Pension Scheme (OPS) and National Pension Scheme (NPS). How UPS seeks to mitigate the risks associated with NPS?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. Who among the following can join the National Pension System (NPS)? (2017)

(a) Resident Indian citizens only

(b) Persons of age from 21 to 55 only

(c) All State Government employees joining the services after the date of notification by the respective State Governments

(d) All Central Government employees including those of Armed Forces joining the services on or after 1st April, 2004

Ans (c)

Q. Regarding 'Atal Pension Yojana', which of the following statements is/are correct? (2016)

1. It is a minimum guaranteed pension scheme mainly targeted at unorganised sector workers.
2. Only one member of a family can join the scheme.
3. Same amount of pension is guaranteed for the spouse for life after the subscriber's death.

Select the correct answer using the code given below:

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (c)

Nuclear Powered Trains

For Prelims: Indian Railways (IR), Nuclear Power, Non Fossil Fuel, Solar Power, Wind Power, Nuclear Power Corporation of India (NPCIL), Small Reactors, Net Zero Carbon Emission, Solar Energy Corporation of India (SECI), Thorium Reactors.

For Mains: Need and Significance of Alternative Sources of Energy for Indian Railways.

Source: TH

Why in News?

Indian Railways (IR) is exploring the use of **nuclear power** through captive units as it seeks to increase reliance on **non-fossil fuel sources** and **renewable ones**.

- Apart from nuclear power, the Railways is already in the process of commissioning **solar power units** and **wind-based power plants**.

What are Nuclear Powered Trains?

- **About:** A **nuclear-powered train** uses heat generated from a **nuclear reaction** to produce high-pressure steam.
    - This steam drives **two turbines,** one turbine **powers the train**, while the other

generates **electricity for equipment** like air conditioners and lights.
    - The concept of nuclear-powered trains was first seriously considered in the **1950s**, when it became an official goal of the **USSR's Ministry of Transport**.
- **Functioning of Nuclear-Powered Trains:** The proposed design involves a **portable nuclear reactor** that heats fluid to produce steam. This steam drives **electric turbines**, generating power for the train.
- **Safety Considerations**: The use of **thorium reactors** is considered due to their relatively **low radiation risk** compared to other nuclear materials. The reactor's design includes safety features to minimise risks and prevent misuse.
- **Potential Benefits:**
    - **Reduced Carbon Emissions**: Nuclear power can significantly **reduce CO2 emissions** compared to fossil fuels, aligning with global efforts to combat **climate change**.
    - **Energy Efficiency**: Nuclear reactors provide a **high energy output** with minimal fuel. This could potentially reduce the **operational costs** and environmental impact of rail transport over long distances.
    - **Low Infrastructure Requirements:** Nuclear-powered trains could operate **independently** of overhead electric lines, reducing infrastructure costs and providing greater flexibility in operations.
    - **Extended Range**: Nuclear-powered trains could operate over **long distances** without the need for frequent **refuelling**. This would be advantageous for freight and passenger services on extensive rail networks.
    - **High Efficiency**: The potential for high **operational efficiency** is a major advantage. Nuclear reactors could provide continuous power, optimising rail transport performance.
- **Challenges of Nuclear-Powered Trains:**
    - **Radiation Risks**: Handling nuclear materials and ensuring safety against **radiation leaks** are significant challenges. Adequate **shielding and safety measures** are essential to protect passengers and crew.
    - **High Costs**: The **initial costs** for developing and implementing nuclear-powered trains are **high**. This includes the expense of developing **small, safe reactors and integrating** them into locomotives.
    - **Technical Complexity**: Designing and maintaining nuclear reactors for **moving trains** involves complex engineering challenges.

How Indian Railways Plans to Reduce its Reliance on Fossil Fuel Sources?

- **Nuclear Power Exploration:** Discussions with the **Nuclear Power Corporation of India (NPCIL)** are planned to explore the use of **nuclear power**.
    - Indian Railways is looking to have its own captive use power plants, **small reactors**, captive power generating units and so on.
- **Net Zero Carbon Emission Target:** The Railways plans to become a **net zero carbon emitter by 2030**. For it, **IR** will need **30,000 MW** of renewable capacity by **2029-30**.
- **Current Renewable Energy Efforts:** For use of renewables, the Railways is exploring partnerships with **Solar Energy Corporation of India (SECI)**, NTPC, the Ministry of New and Renewable Energy (MNRE), among others.
- **Renewable Energy Achievements:** In 2023, about **147 MW of solar plants** (both on rooftops and on land) and about **103 MW of wind power plants** have been commissioned.
    - Railways has electrified nearly **63,500 Kilometres** till FY24, or over **96%** of the total broad-gauge network.
    - **2,637 stations** and service buildings have been provided with **solar roof-top plants** with a total power generation capacity of **177 MW**.

Why Indian Railways Need Alternative Sources of Energy?

- **High Energy Consumption:** The Indian Railways consumes over **20 billion kWh** of electricity annually, which is **around 2%** of the country's total power consumption.
    - This high level of consumption underscores the need for more **sustainable energy** solutions.
- **Increasing Power Demand:** Power requirements are projected to **grow** from **4,000 MW in**

2012 to approximately **15,000 MW by 2032** due to ongoing electrification efforts.
    - This substantial increase highlights the need for **diversified energy** sources.
- **Electrification Targets:** Indian Railways aims to electrify **100%** of its broad-gauge network by **2030**. This ambitious goal will significantly increase the demand for electricity, necessitating alternative energy sources to meet this need sustainably.
- **Environmental Impact:** The railway's reliance on **diesel and electricity** results in high CO_2 emissions.
    - As a part of its **low-carbon strategy**, the Indian railways has envisaged a target of **33% reduction** in its emissions intensity below 2005 levels by **2030**.
- **Diminishing Revenue Surplus:** Railways' revenue earnings have barely been able to keep up with its revenue expenditure.
    - Between **2013-14 and 2023-24,** Railways' revenue expenditure is estimated to grow at an annualised rate of **7.2%,** faster than its revenue receipts (annual growth of **6.3%**).
    - Indian Railways aims to **generate its own energy** to reduce its expenditure on outside energy sources.
- **Cost Optimisation:** Indian Railways is the **largest consumer of electricity and spends close to Rs 20,000 crore annually** to run their trains and offices.
    - The organisation is **looking to reduce costs through renewable energy** procurement and lower-cost models for power generation.

Conclusion

The need for alternative sources of energy for Indian Railways is driven by several **critical factors** like high energy consumption and costs, increasing power demand due to electrification, environmental impact, and the necessity for energy security and cost management. While the concept of **Nuclear Powered Trains** holds promise for reducing carbon emissions and improving efficiency, significant hurdles related to **safety, cost, and public acceptance** must be addressed. As research continues and technology advances, nuclear propulsion may play a role in the future of rail transport.

Drishti Mains Question:

Discuss the need for alternative sources of energy for Indian Railways? How nuclear energy can help railways become a net zero carbon emitter by 2030?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q.In the Indian context, what is the implication of ratifying the 'Additional Protocol' with the 'International Atomic Energy Agency (IAEA)'?(2018)

(a) The civilian nuclear reactors come under IAEA safeguards.

(b) The military nuclear installations come under the inspection of IAEA.

(c) The country will have the privilege to buy uranium from the Nuclear Suppliers Group (NSG).

(d) The country automatically becomes a member of the NSG.

Ans: (a)

Q. The function of heavy water in a nuclear reactor is to (2011)

(a) Slow down the speed of neutrons

(b) Increase the speed of neutrons

(c) Cool down the reactor

(d) Stop the nuclear reaction

Ans: (a)

Mains

Q.The setting up of a Rail Tariff Authority to regulate fares will subject the cash strapped Indian Railways to demand subsidy for obligation to operate nonprofitable routes and services. Taking into account the experience in the power sector, discuss if the proposed reform is expected to benefit the consumers, the Indian Railways or the private container operators. **(2014)**

Q.Describe the benefits of deriving electric energy from sunlight in contrast to conventional energy generation. What are the initiatives offered by our government for this purpose? **(2020)**

Q.With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. **(2018)**

Cross-Border Payments

For Prelims: Financial Stability Board, UPI-PayNow, Central Bank Digital Currencies, Non-Resident Indians, National Electronic Fund Transfer, Reserve Bank of India, Payment Aggregators, Project Nexus

For Mains: Cross-Border Payments in Global Trade and Challenges, India's Role in Global Cross-Border Payment Systems

Source: TH

Why in News?

Recently, the **Financial Stability Board (FSB)** has emphasised the urgent need to address inefficiencies in **cross-border payments (CBPs) systems.** With the global cross-border payments **market set to nearly double by 2032,** improving these systems has become a critical focus.

What are Cross-Border Payments?

- **About: CBPs are transactions where the payer and recipient are located in separate countries. These transactions are vital for international trade, investment, and personal transfers.**
- **Types:**
  - **Wholesale Cross-border Payments:** Typically between financial institutions, used for activities such as borrowing, lending, and trading in foreign exchange, equities, and commodities.
    - They are also used by **governments and large corporations** for significant transactions related to imports, exports, and financial markets.
  - **Retail Cross-border Payments:** Generally involve individuals and businesses, including **person-to-person (P2P), person-to-business (P2B), and business-to-**

business (B2B) transactions.

- A notable example is remittances, where migrants send money back to their home countries.

- **Significance:** The global CBP market, valued at **USD 181.9 trillion in 2022, is projected to reach USD 356.5 trillion by 2032**, reflecting a growth rate of 7.3% annually. This rise reflects the expanding global economic activities and financial interactions.
  - The **globalisation** of supply chains, international trade, and **e-commerce** necessitates efficient cross-border transactions to support economic activities.
- **Working Procedure:**
  - **Traditional Models of CBPs:**
    - **Direct Bank Transfers:** Banks maintain accounts with their counterparts in other countries to facilitate international transfers.
      - Instead of physically transferring money, funds are credited and debited between accounts in different jurisdictions.
    - **Correspondent Banking:** When two banks do not have a direct relationship, they use a **correspondent bank that holds accounts with both banks to facilitate the transaction.** This adds layers to the transaction chain. It is declining due to high costs and regulatory burdens.
    - **Single System Model:** Relies on a single payment service provider but faces interoperability issues.
    - **Interlinking Payment Infrastructures:** Connects national **systems for seamless transactions** but encounters technical and regulatory challenges.
    - **Peer-to-Peer Systems**: Utilises technologies like distributed ledgers for direct payments, offering a potential solution to traditional inefficiencies.
  - **New-Age Models:**
    - **Linking Fast Payment Systems (FPS):** Initiatives like the **PayNow-PromptPay** linkage between Singapore and Thailand and the **UPI-PayNow linkage between India and Singapore** facilitate real-time, cross-border fund transfers.
    - **Central Bank Digital Currencies (CBDCs):** **CBDCs** are being explored for their potential to streamline international transactions.
    - **Distributed Ledger Technology (DLT):** DLT projects, often combined with CBDCs, aim to enhance transaction speed, security, and cost-effectiveness.
      - DLT allows simultaneous access, validation, and record updating across a networked database, enabling users to view changes and who made them, reducing the need to audit data, ensuring data reliability, and providing access only to those who need it.

What are the Challenges Regarding the Cross-Border Payments Systems?

- **Legal and Regulatory Compliance:** Payments must adhere to varying domestic laws across multiple jurisdictions, covering **anti-money laundering (AML),** customer due diligence, data sharing, and settlement processes.
  - **Fragmented implementation of AML** and **counter-terrorist financing (CFT)** frameworks leads to friction in system design and functionality.
  - The Financial Stability Board (FSB) 2023 report highlights issues with inconsistent wire transfer recordkeeping, affecting customer identification and sanctions screening.
- **High Costs:** Cross-border transactions often **incur multiple fees,** including charges from intermediary banks and currency conversion costs.
  - **Banks need to hold capital in multiple currencies** to facilitate transactions, which ties up resources and increases costs.
  - Hidden fees and **unclear cost breakdowns** can make it difficult for users to understand the true cost of cross-border transactions.
- **Low Speed: Transactions can take several days to complete due to the involvement of multiple intermediaries and time zone differences.**
  - Payment systems **often operate during local business hours**, causing delays in processing cross-border payments across different time zones.
- **Limited Access**: Not all countries or regions have access to efficient cross-border payment systems, particularly in underserved or less developed areas.

    - Limited access to **banking services or modern financial technologies** can hinder the ability of individuals and businesses to make or receive cross-border payments.
- **Fragmented Data Formats**: Variations in **data formats and standards between different countries** and systems can lead to delays and errors in processing payments.
    - Differences in data quality and requirements across jurisdictions can affect the accuracy and efficiency of transactions.
- **Technology Platforms:** Many cross-border payment **systems rely on legacy technology that is not optimized for real-time processing** or integration with modern systems.
    - Older platforms **may lack advanced features for automation** and real-time monitoring, resulting in inefficiencies.
- **Long Transaction Chains:** The involvement of **multiple correspondent banks in the payment chain can increase costs, delays**, and risks of data corruption.
    - Longer transaction chains complicate the payment process and require more resources to manage.
- **Weak Competition:** High barriers to **entry for new providers can limit competition** and innovation in the cross-border payments market.
    - Difficulty in assessing and comparing costs can reduce competitive pressure and lead to higher prices for end users.

Cross-Border Payments in India

- India, a major hub for global remittances, handles substantial cross-border payment flows, including approximately USD 80 billion in inbound remittances and USD 19 billion outbound.
- **Evolution in Cross-Border Remittances:**
    - **Pre-Technology Era:** Before technological advancements, **Non-Resident Indians (NRIs)** used demand drafts drawn on Federal Bank, which were sent via courier for encashment.
    - **Online Remittances:** In the mid-2000s, **National Electronic Fund Transfer (NEFT),** was launched and allowed for direct and secure transfers to accounts in India.
        - NEFT is a nation-wide centralised payment system owned and operated by the **Reserve Bank of India (RBI).**
    - **IMPS Integration:** The launch of the **Immediate Payment Service (IMPS)** by NPCI allowed for credits to be completed in under 3 minutes, further enhancing efficiency.
    - **UPI for Foreign Inward Remittance:** The integration of the **Unified Payments Interface (UPI)** for **Foreign Inward Remittance (FIR)** further streamlined and innovated the remittance process.
- **Regulatory Changes:** The **RBI** introduced the **Payment Aggregators of Cross-Border Transactions (PA-CB Regulation)** to streamline and regulate cross-border payments, including import and export transactions.
    - This new framework replaces previous guidelines and subjects all entities involved in cross-border payments to direct RBI oversight.

What is being Done Internationally to Improve Cross-Border Payments?

- **G20:** The **G20 has prioritised improving cross-border payments** to enhance speed, reduce costs, increase transparency, and foster inclusivity.
    - The 2020 Roadmap for Enhancing Cross-Border Payments, supported by 11 quantitative targets set by the **Financial Stability Board (FSB)**, aims to address these challenges globally by the end of 2027.
    - These targets cover transaction speed, cost, access, and transparency across wholesale payments, retail payments, and remittances.
- **SWIFT GPI:** The **Society for Worldwide Interbank Financial Telecommunication (SWIFT)** launched the **Global Payments Innovation (GPI)** to enhance the speed and transparency of cross-border payments.
    - It allows for real-time tracking of payments and ensures that funds are transferred within a day.

- **Project Nexus: It is conceptualised by the Innovation Hub of the Bank for International Settlements (BIS).** Project Nexus **is a global initiative designed to enhance cross-border payments by connecting multiple domestic instant payment systems (IPS).**
    - The project aims to create a standardized platform that **links domestic Fast Payment Systems (FPSs) globally,** allowing for near-instantaneous cross-border payments.
    - The founding members of Project Nexus include **India and four Association of Southeast Asian Nations (ASEAN) countries:** Malaysia, the Philippines, Singapore, and Thailand.
- **Global Payment Service Providers: Visa and Mastercard** are advancing cross-border payments with innovative technologies.
    - **Visa's B2B Connect uses Application programming interface (API)** and DLT for same-day or next-day settlement of large-value transactions between banks, integrating payment messaging with security features.

Financial Stability Board

- **The FSB** is an international body responsible for monitoring and making recommendations about the global financial system. It was established in 2009 at the G20 Pittsburgh Summit as a successor to the **Financial Stability Forum(FSF).**
- The FSB's membership includes the G20 countries, Spain, and the European Commission, **in addition to the FSF members.**
- The FSB identifies and **assesses systemic vulnerabilities in the global financial system.**
    - This will contribute to ongoing efforts to strengthen the international financial system.
- **India is an active Member of the FSB** having three seats in its Plenary represented by Secretary (Economic Affairs), Deputy Governor-RBI and Chairman-**Securities and Exchange Board of India (SEBI).**
- The **Financial Stability and Development Council Secretariat** in the Department of Economic Affairs coordinates with financial sector regulators and agencies to represent India's views to the FSB.

Way Forward

- **Balancing Privacy with Financial Integrity: Establish legal frameworks that harmonise user privacy with AML and CFT requirements.**
    - Achieve regulatory consistency across jurisdictions **to prevent fragmentation and inefficiencies.**
    - Clearly **define the roles of all stakeholders in cross-border payments** to streamline compliance. Establish transaction limits to reduce compliance requirements for smaller transactions, easing the burden on businesses.
    - Implement **privacy-by-design principles to address and safeguard** privacy concerns.
- **Explore KYC Utilities**: Develop and integrate **Know Your Customer (KYC) utilities** to standardize and streamline identity verification.
    - Foster technical integration and interoperability among various payment systems. Ensure transparency regarding fees, terms, and grievance redressal mechanisms.
- **Dispute Resolution Framework: Develop a centralized system to manage user grievances and inter-provider disputes. Establish clear processes for resolving conflicts between** Payment Service Providers (PSPs).
- **Central Bank Collaboration:** Encourage central banks to collaborate on the development of interoperable payment systems and explore the potential of CBDCs for cross-border payments.
- **Competition:** Foster competition among payment service providers by involving the Private Sector to drive down costs and improve quality.

Drishti Mains Question:

Q. Discuss the significance of Cross-Border Payments in facilitating global trade. What are the key challenges faced in the current cross-border payment systems?

UPSC Civil Services, Previous Year Questions (PYQ)

Prelims

Q. With reference to 'Financial Stability and Development Council', consider the following statements: (2016)

1. It is an organ of NITI Aayog.
2. It is headed by the Union Finance Minister.
3. It monitors macro-prudential supervision of the economy.

Which of the statements given above is/are correct?

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

Ans: (c)

Cold War Data Challenges Climate Model Accuracy

Source: TH

Why in News?

Recently, a study published in the ***journal Science*** by an international team of researchers has shed new light on the accuracy of current climate models. By analyzing data from nuclear bomb tests conducted during the **Cold War,** scientists have found that these models **may be overestimating how long plants retain carbon.**

- This discovery has significant implications for understanding the **carbon cycle** and its role in **climate change mitigation efforts.**

What are the Key Highlights of the Study?

- **Radiocarbon Data Usage:** The Cold War nuclear tests, though devastating, have provided a unique opportunity for climate research. **Radioactive isotopes like carbon-14** released during these tests have been used to track carbon movement in the atmosphere.
    - In 1963, the **Limited Test Ban Treaty (LTBT)** prohibited nuclear testing over land, air, and under water, leading to a **steady drop in atmospheric radiocarbon concentration.**
    - The study **utilised radiocarbon data between 1963 and 1967** to observe changes in atmospheric carbon levels and plant absorption rates.
        - Radiocarbon bonds with **oxygen to form CO2**, which plants and vegetation absorb during **photosynthesis** to produce food and energy, as suggested by the models.
    - This data revealed that **plants might be absorbing and releasing carbon more quickly than previously estimated**.
- **Carbon Storage in Plants: Researchers found that plants absorb more CO2 from the atmosphere during photosynthesis than previously estimated but also release it back**

into the environment more quickly.

    - Previous estimates indicated that vegetation worldwide stores 43-76 billion tonnes of carbon annually, but the new study proposes this could be around 80 billion tonnes.

    - The **faster cycling of carbon between plants and the atmosphere** indicates that current climate models may need adjustments, challenging earlier models of **carbon sequestration.**
- **Implications for Climate Models:** The findings indicate that **current climate models may overestimate** how long plants hold onto carbon, necessitating adjustments to improve accuracy.

    - The study points out that many climate models, including those used in the **Coupled Model Intercomparison Project (CMIP) by World Climate Research Program,** have not adequately incorporated radiocarbon data.
        - This lack of data integration may lead to inaccuracies in carbon storage and climate projections.
    - The **'Community Earth System Model 2'** developed in the US was the **only model that accounted for radiocarbon in its simulations,** but it predicted that plants had absorbed much less radiocarbon than what was found.
- **Future Implications:** The study underscores the **need for improved climate models with better representation of isotopes** like radiocarbon for more accurate predictions is crucial for refining future climate assessments and enhancing model accuracy.

What is the Carbon Cycle and its Impact on Climate?

- **About:** The **carbon cycle describes the flow of carbon** through different reservoirs on Earth, including the atmosphere, hydrosphere, lithosphere, and biosphere.
- **Impact of the Carbon Cycle on Climate:** The carbon cycle helps regulate atmospheric CO_2 levels, maintaining a balance between **carbon sources (e.g., respiration, combustion) and sinks (e.g., forests, oceans).**
    - Variations in CO_2 levels affect the **greenhouse effect,** which influences global temperatures and climate patterns.
    - Oceans absorb a significant portion of atmospheric CO_2. Increased CO_2 levels lead to **higher carbonic acid concentrations, causing ocean acidification.**
    - Activities such as deforestation reduce the land's capacity to sequester carbon, leading to higher atmospheric CO_2 levels.
    - Warming temperatures can **thaw permafrost,** releasing stored **methane**, a potent greenhouse gas, which further accelerates climate change.

What are Climate Models?

- **About:** Climate models are essential **tools for understanding and predicting climate change.** They use mathematical **equations to simulate the Earth's climate system,** including interactions **between the atmosphere, oceans, land surface, and ice**.
    - These models help scientists project **future climate conditions based on various greenhouse gas emission scenarios** and assess potential impacts on weather patterns, sea levels, and ecosystems.
    - Climate Models provide essential **information to inform decisions on** water resource management, agriculture, transportation, and urban planning.
- **Climate Models and Weather Prediction Models: Unlike weather forecasts, which predict specific daily conditions, climate models provide probabilistic projections of long-term climate patterns and trends.**
    - Climate models **focus on global patterns and historical weather records** under similar conditions, rather than short-term predictions.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. In the context of mitigating the impending global warming due to anthropogenic emissions of carbon dioxide, which of the following can be the potential sites for carbon sequestration? (2017)

1. Abandoned and uneconomic coal seams
2. Depleted oil and gas reservoirs
3. Subterranean deep saline formations

Select the correct answer using the code given below:

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

Ans: (d)

Horseshoe Crabs

Source: TH

Why in News?

Recently, the **Zoological Survey of India (ZSI)** and Odisha Forest Department have started the exercise to tag **Horseshoe Crabs** to conserve this ancient species.

- **ZSI planned to tag hundreds of crabs** to determine their **population pattern and threats to them.**

What are the Key Facts About Horseshoe Crabs?

- **About:**

    - Horseshoe crabs are **marine and brackish water arthropods** of the family **Limulidae** and the only living members of the order **Xiphosura.**
    - **These are one of the oldest living creatures on Earth (emerged 250 million years ago), also called living fossils.**
- **Species and Location:** There are **4 existing species** of horseshoe crabs.
    - India has **2 species** of horseshoe crabs: ***Tachypleus Gigas*** (found in Odisha and West Bengal) and ***Carcinoscorpius rotundicauda*** (found in Sundarbans mangroves of West Bengal).
    - **American horseshoe crab (*Limulus polyphemus*)**: Found along the eastern coast of the USA and in the Gulf of Mexico.
    - **Tri-spine horseshoe crab (*Tachypleus Tridentatus*):** Found in the Indo-Pacific region.
- **Threat:**
    - **Destructive fishing** practices and **illegal smuggling**.
- **Conservation Status:**
    - **Wildlife Protection Act (WPA), 1972:** Indian species are protected under **Schedule II** of **WPA 1972.**
    - **IUCN Status:**
        - American horseshoe crab: **Vulnerable.**
        - Tri-spine horseshoe crab: **Endangered.**
        - The two other species are **not listed yet**.
- **Medicinal Uses:**
    - Its **carapace (hard upper shell)** is applied onto scars.
    - Horseshoe crab blood is **bright blue** and contains **immune cells** that are **sensitive to toxic bacteria.**
        - These cells **clot around invading bacteria**, protecting the horseshoe crab's body.
        - Scientists used these cells to develop a test called **Limulus Amebocyte Lysate (LAL)**, which **checks new vaccines for contamination**, preventing the distribution of vaccines with harmful bacteria.
- **International Horseshoe Crab Day** is celebrated on **20th June** every year to showcase the collective conservation efforts for horseshoe crabs.

Living Fossils

- Living fossils are **species that have survived for millions of years,** maintaining the **same traits as their ancient ancestors.**
- These organisms provide **invaluable insights into Earth's evolutionary history** and ancient ecological landscapes.
- **Other Examples of Living Fossils:**
    - **Coelacanth:** Rediscovered in 1938 off the coast of South Africa, **this deep-sea fish is notable for its lobed fins,** which function similarly to limbs.
    - **Ginkgo Biloba:** The **sole surviving member of an ancient group of plants**, it has distinctive **fan-shaped leaves that have remained unchanged** for millions of years.
    - **Wollemi Pine: A rare plant discovered in 1994 in Australia,** known for its ancient lineage.
    - **Tuatara**: A **reptilian species unique to New Zealand,** representing a link to ancient reptiles.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. Recently, our scientists have discovered a new and distinct species of banana plant which attains a height of about 11 meters and has orange coloured fruit pulp. In which part of India has it been discovered? (2016)

(a) Andaman Islands
(b) Anaimalai Forests
(c) Maikala Hills
(d) Tropical rain forests of northeast

Ans: (a)

Q. Biodiversity forms the basis for human existence in the following ways: (2011)

1. Soil formation
2. Prevention of soil erosion
3. Recycling of waste
4. Pollination of crops

Select the correct answer using the codes given below:

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

Ans: (d)

8th Dharma Dhamma Conference 2024

Source: IE

Recently, the **8th Dharma Dhamma conference** was organised by the **India Foundation** in collaboration with **Gujarat University** in **Ahmedabad**.

- Vice-President **Jagdeep Dhankhar** was the **chief guest** for the event.
- The theme for the 2024 conference is **"Cosmology in Dharma and Dhamma."**
- **Dharmic cosmology**, unique to Indian traditions, **frees people** from the **fear of death**. It highlights the perspective that **life is brief** and **may not have a definitive meaning**.
    - The roots of Dharmic cosmology are found in the **Vedas** and further developed in texts like the **Itihasa-Purana** and **Brahmanas**, as well as the Buddhist **Nikayas** and **Sutras**, and **Jain Karikas and Sutras**.
- The conference is an initiative of **India Foundation**, aiming to highlight the essential identity between the Dharma (Hindu) and Dhamma (Buddhist) viewpoints.
    - India Foundation is an **independent research centre** focussed on the issues, challenges and opportunities of the Indian polity
- The conference seeks to facilitate the exchange of ideas and foster **harmony** between **Hindu and Buddhist civilisations**, emphasising their relevance over millennia.

Read More: Buddhism in India

Approval of Vigyan Dhara Scheme

Source: PIB

The **Union Cabinet** approved the continuation and merger of various schemes of the **Department of Science and Technology (DST)** into **three major components** under a unified central sector scheme named **'Vigyan Dhara'** .

- **Components:** It has three broad components.
  - Science and Technology (S&T) Institutional and Human **Capacity Building**
  - **Research and Development**
  - Innovation, Technology **Development and Deployment.**
- Existing schemes like the **INSPIRE programme** would fall under one of these three components.
- **Duration**: The scheme has been proposed for the **15th Finance Commission** period from 2021-22 to 2025-26.
- **Primary Objective: To promote S&T capacity building, research, innovation, and technology development, thereby strengthening the** Science, Technology, and Innovation (STI) ecosystem **in India.**
- **Gender Parity**: The scheme includes focused interventions to increase women's participation in Science and Technology (S&T), with the ultimate goal of achieving **gender parity** in Science, Technology, and Innovation (STI).
- **Viksit Bharat 2047**: All programs under **'Vigyan Dhara'** will be aligned with DST's 5-year goals toward realising the vision of **Viksit Bharat 2047**.
- **Research and Development**: The R&D component of the scheme will align with the **Anusandhan National Research Foundation (ANRF)**, adhering to global standards while addressing national priorities.

Read More: Science Technology and Innovation Policy

Indigenous Zn-ion Battery Technologies

Source: PIB

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute of the Department of Science and Technology (DST) has signed a MoU with **Hindustan Zinc Limited (HZL)**.

- The MoU aims to develop **new variants of zinc** materials and propel the **commercialization** of **zinc-based batteries**.

Zinc-Ion Battery: A Zinc-Ion Battery is a type of **rechargeable battery** that uses **zinc ions** as the **charge carrier** instead of lithium and sodium ions.

- Zinc is a **blue-grey, metallic element**, and a **good conductor of electricity**.
  - **Sphalerite, Smithsonite, Willemite** etc are ores of Zinc.
  - The most common alloy is **brass**, which is a mixture of **zinc and copper.**
- **Importance of Zinc-Ion Batteries:**
  - **Cost Efficiency:** It is a **low-cost alternative** to expensive lithium-ion batteries.
  - **Abundant Materials:** It is **abundantly** available on Earth.
  - **Safety and Performance:** Zinc-ion batteries are considered **safer** and offer **stable** performance across temperature ranges.
- **Modifications Required for Commercialization of Zinc:** Zinc is **thermodynamically unstable** with water-based solutions and therefore requires suitable modifications at the **electrode, electrolyte and interfaces**.
- **Expected Outcomes:** Researchers will explore developing new **Zinc alloys** for use as anodes in Zn-ion batteries and electrolytes for their application in rechargeable batteries.
- **Production and uses of Zinc-Ion Batteries are aligned with Sustainable Development**

Goals (SDGs) like SDG7 **and** SDG13**.**

Read More: Lithium-ion Technology, Minerals

Malaysia's Orangutan Diplomacy

Source: IE

Recently, **Malaysia** has withdrawn its proposal to gift **ape species orangutans** to countries that import Malaysian **palm oil**, inspired by **China's "panda diplomacy."**

- Instead, the new plan invites importers to "sponsor" orangutans, with the funds going towards their conservation in Malaysia.
- Malaysia, the **second-largest palm oil producer** (after Indonesia) is facing pressure to make its palm oil industry more **sustainable due to its links to deforestation**, which threatens orangutan habitats.
- **About Orangutan (*Pongo*): The Malay word orangutan means "person of the forest."**
    - These are **highly intelligent, long-haired, orangish primates** found only in **Borneo and Sumatra.**
    - There are 3 species: **Bornean, Sumatran**, and **Tapanuli.**
    - They have **long arms and gripping hands and feet** for moving through trees, eating fruit, and playing a **key role in seed dispersal.**
    - Unlike other great apes, they are **more solitary and communicate primarily through facial expressions** and body language. They are endangered due to **rapid deforestation, largely driven by palm oil plantations.**
    - **IUCN Status: Critically Endangered**
- Recently, Malaysia and India have upgraded their existing Enhanced Strategic Partnership to a **Comprehensive Strategic Partnership.**

Read More: Comprehensive Strategic Partnership between India and Malaysia

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