WHAT IS THE SVAMITVA SCHEME?

- The **Survey of Villages and Mapping with Improvised Technology in Village Areas** (SVAMITVA) is a **central sector scheme** launched in 2020.
- It aims to **provide rural people with the right to document their residential properties** so that they can use their property for economic purposes.
- The scheme is for surveying the land parcels in rural inhabited areas **using drone technology.**
- The **survey shall be done across the country in a phased manner.**
- The scheme seeks to achieve the following **objectives:**
    - To bring **financial stability to the citizens in rural India** by enabling them to use their property as a financial asset for taking loans and other financial benefits.
    - **Creation of accurate land records for rural planning.**
    - **Determination of property tax,** which would accrue to the Gram Panchayats (GPs) directly in States where it is devolved or else, add to the State exchequer.
    - **Creation of survey infrastructure and GIS maps** that can be leveraged by any department for their use.
    - To support the **preparation of a better-quality Gram Panchayat Development Plan** (GPDP) by **making use of GIS maps.**
    - To **reduce property-related disputes** and legal cases.
- **Nodal Ministry:** The **Ministry of Panchayati Raj (MoPR)** is the Nodal Ministry for implementation of the scheme.
- **In the States, the Revenue Department / Land Records Department** will be the Nodal Department and shall carry out the scheme with the support of the State Panchayati Raj Department.
- **Survey of India** is the **technology partne**r its implementation.

BAGLIHAR DAM

- Baglihar Dam, also known as the **Baglihar Hydroelectric Power Project,** is a **run-of-the-river power project** on the **Chenab River** in the Doda District of **Jammu and Kashmir.**
- It consists of a **concrete gravity dam**5 m high and 363 m long, which has a total volume of 1.9 million m^3, creating a reservoir with a capacity of 475 million m^3.
- The **underground powerhouse** is 221 m long, 24 m wide, and 51 m high.
- The planning of the project started in 1992 and was approved in 1996; the construction began in 1999.
- The project consists of **two stages of 450 MW each.**
- The first phase of the Baglihar Dam was completed in 2004. With the second phase **completed on 10 October 2008,** the Baglihar Dam has a **capacity of 900 MW**.

Key Facts about Chenab River:

- The Chenab River literally means "Moon" (Chan) and "River" (aab); is a **major river of India and Pakistan.**
- It is a **tributary of the Indus**
    - **Origin**: It is formed by the **confluence of** two streams, **Chandra and Bhaga, at** Tandi in the **upper Himalayas** in the Lahaul and Spiti Districts of **Himachal Pradesh.**
- Its total length is about 605 miles (974 km), and it feeds several irrigation canals.
- **Tributaries**: The tributaries of the Chenab River include **Miyar Nalla, Sohal, Thirot, Bhut Nalla**, Marusudar, and Lidrari.
- The **waters** of the Chenab are **shared by India and Pakistan as per** the terms of the **Indus Water Treaty.**

ICAR UNVEILS WORLD'S FIRST GENOME-EDITED RICE

ICAR has developed the **world's first genome-edited rice varieties** featuring higher yields, drought and salinity tolerance, and improved nitrogen-use efficiency, making them climate-resilient and water-conserving.

Genome Editing (GE) in Plants and GM Crops

- Genome editing in plants refers to making precise, targeted changes to a plant's DNA without introducing foreign genetic material.
    - It uses technologies like CRISPR-Cas9 to edit specific DNA sequences within a plant's existing genome.
    - This can involve deleting, inserting, or modifying DNA at precise locations.
- On the other hand, GM crops involve inserting genes from other organisms into the plant's genome.
- In essence, genome editing modifies existing DNA, while GM crops introduce new DNA.

ICAR Develops Two Genome-Edited Rice Varieties

- ICAR has developed the world's first genome-edited rice varieties—**DRR Dhan 100 (Kamala)** and **Pusa DST Rice 1**—to enhance yield, drought and salinity tolerance, and nitrogen-use efficiency, without using any foreign DNA.
- **DRR Dhan 100 (Kamala)**
    - **Key Traits:**
        - Early maturity (~130 days; 20 days earlier than parent)
        - Drought tolerance
        - High nitrogen-use efficiency
    - **Superior yield**:
        - **5.37 tonnes/ha** (vs. 4.5 t/ha for parent) – 19% increase
        - **Up to 9 t/ha** under optimal conditions
        - Retains the grain and cooking quality of Samba Mahsuri

- **Recommended Zones:** Andhra Pradesh, Telangana, Karnataka, Tamil Nadu, Puducherry, Kerala (Zone VII), Chhattisgarh, Maharashtra, Madhya Pradesh (Zone V), Odisha, Jharkhand, Bihar, Uttar Pradesh, West Bengal (Zone III).

- **Pusa DST Rice 1**
  - **Key Traits:**
    - Drought and salinity tolerance
    - Enhanced yield under stress conditions:
      - **Inland salinity:** 3,508 kg/ha (9.66% higher than MTU1010)
      - **Alkaline soils:** 3,731 kg/ha (14.66% higher)
      - **Coastal salinity:** 2,493 kg/ha (30.4% higher)
    - Contains no foreign DNA, comparable to conventional varieties
  - **Recommended Zones:** Same as Kamala – major rice-growing states across India

Practical Benefits of ICAR's New Genome-Edited Rice Varieties

- **Higher Yields, Lower Emissions**
  - Cultivating **DRR Dhan 100 (Kamala)** and **Pusa DST Rice 1** over 5 million hectares can:
    - Increase paddy production by 4.5 million tonnes
    - Reduce greenhouse gas emissions by 32,000 tonnes (approx. 20%)
- **Significant Water Savings**
  - **Kamala's shorter maturity period** allows for:
    - Three fewer irrigations
    - Savings of 7,500 million cubic metres of irrigation water, which can benefit other crops
- **Use of Safe and Award-Winning Technology**
  - Developed using **CRISPR-Cas9** genome-editing technology, awarded the **2020 Nobel Prize in Chemistry**
  - No foreign DNA used; only native gene edits to enhance traits

WHAT IS IGLA-S?

- It is a **Man Portable Air Defence System (MANPADS) developed by Russia.**
- It is a hand-held defence system that can be **operated by an individual or crew**.
- It is designed to **bring down low-flying aircraft** and can also identify and neutralise air targets such as **cruise missiles and drones**.
- **Features:**
  - The Igla-S system comprises the 9M342 missile, the 9P522 launching mechanism, the 9V866-2 mobile test station and the 9F719-2 test set. These components work together to provide a comprehensive air defence solution.
  - Weighing only 10.8 kilograms (missile) and 18 kilograms (entire system), it offers **significant battlefield mobility**.
  - Its **compact form** makes it ideal for mobile ground units in high-threat zones.
  - It **uses infrared (IR) homing** to lock onto the heat signatures of aerial targets.
  - It is capable of **engaging targets up to 6 km away** and at altitudes of up to 3.5 km.
  - The speed of the missile is 400 metres per second and the deployment time is 13 seconds.

FUEL VS. FEED: THE MAIZE ETHANOL CONTROVERSY

Agriculture provides food, feed, fibre, and fuel. For example, cotton yields lint (fibre), edible oil from seeds (food), and protein-rich cake (feed).

However, the growing use of crops like maize for fuel is raising concerns among traditional user industries, as it affects the availability and cost of maize for food and feed purposes.

Imbalance from Ethanol: Impact on Maize Supply and Prices

- Until 2021–22, India produced 32–33 million tonnes (mt) of maize, against a domestic demand of 28 mt.
- Surplus allowed for 3.7 mt in exports.
- **Major demand segments**:
  - Poultry feed: 15 mt
  - Cattle feed: 5 mt
  - Industrial starch: 5 mt
  - Human consumption: 2 mt
  - Seed/other uses: 1 mt
- **Rising Ethanol Demand**
  - Maize, rich in starch (68–72%), is now used to produce ethanol for fuel blending.
  - 1 tonne of maize = ~380 litres of ethanol.
  - Ethanol production from maize:
    - **2022–23**: 0.8 mt maize → 31.51 crore litres
    - **2023–24**: 7.5 mt maize → 286.54 crore litres
    - **2024–25 (contracted)**: Projected 12.7 mt maize → 484.35 crore litres
- **Disruption in Supply Chain**
  - Biofuel demand has disrupted the earlier demand-supply equilibrium.
  - Livestock feed industry, particularly poultry and cattle feed sectors, is hit hard.
- **Surge in Prices**
  - Maize prices have risen from **Rs 14,000–15,000** to **Rs 24,000–25,000 per tonne** over four years.
  - Main reason: diversion of maize towards ethanol under the blending programme.
- **Winners and Losers**
  - **Maize farmers** benefit from rising prices due to ethanol demand (close to or above MSP of ₹2,225/quintal).
  - **Soyabean farmers**, however, suffer price declines due to falling demand.

- **Industry's Proposal: GM Maize for Fuel Use Only**
  - Industry experts propose importing GM maize solely for ethanol production, not for seed, food, or feed.
  - This would address the surge in demand from biofuel production without affecting food/feed safety norms.
- **Balancing Act: A Domestic Production Push**
  - Experts suggest increasing **domestic maize production** by:
    - Boosting **yields**
    - Diverting **acreage from rice**, which is **water-intensive** and already in surplus
  - A "**win-win**" strategy would ensure maize expansion **does not hurt soyabean or cotton farmers**.

DEBATE ON STATE SHARE IN TAX POOL - A CRITICAL CHALLENGE FOR THE 16TH FINANCE COMMISSION

Background - Decline in States' Effective Share:

- **14th Finance Commission (2015–20):** Increased states' share in divisible pool to **42**%.
- **15th Finance Commission (2020–25):** Maintained it at **41**% (due to reorganization of J&K as a Union Territory).

- **Shrinking divisible pool:**
  - Despite higher nominal devolution, **Centre imposed more cesses and surcharges**, which are non-shareable with states.
  - **As per RBI data:**
    - Shareable tax pool reduced from **88.6% (2011–12) to 78.9% (2021–22)** of gross tax revenue.
    - States have **effectively received only 32%** of total gross tax revenues over six years.

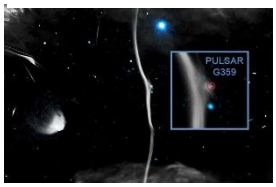
Concerns Over States' Spending Quality:

- **Rising revenue deficits:**
  - States **increasingly borrow for revenue expenditure** (e.g. salaries, subsidies).
  - **Examples:** Karnataka slipping into revenue deficit; Punjab's high revenue deficit hampers capital expenditure.
- **Risk of populist spending:**
  - 14 states have launched cash transfer schemes (**adding up to 0.6% of the GDP**).
  - As India is moving towards some form of **quasi-universal income transfer** (driven by electoral politics), these cash transfers are being **financed through a combination of expenditure switching and higher borrowings.**

Conclusion and Way Forward:

- **The 16th Finance Commission** must **strike a balance** between:
  - **Enhancing states' fiscal autonomy.**
  - Ensuring fiscal sustainability of the Centre.
  - Promoting efficient and equitable spending.
  - Encouraging **genuine federalism** through local empowerment.
- **A holistic approach is required**, considering constitutional, economic, and political dynamics that **shape India's fiscal federalism**.

PULSAR G359- GALACTIC 'BONE'



- **13 is one of the longest and brightest non-thermal filaments** in the Galaxy, stretching **about 230 light-years** and located **~26,000 light-years** from Earth, near the **Galactic Center**.
- These **galactic "bones"** are **elongated structures** seen primarily in **radio waves** and aligned with **magnetic field lines**. Their appearance is due to **charged particles spiraling** along these magnetic fields, emitting synchrotron radiation.

- **A fracture has been detected** in the otherwise continuous structure of G359.13. This **disruption aligns** with the location of a **pulsar**, identified via both **X-ray (Chandra)** and **radio data (MeerKAT and VLA)**.
- The **pulsar is a fast-moving, highly magnetized neutron star**, created by the **collapse of a massive star** during a **supernova explosion**. It travels at speeds estimated between **1 to 2 million miles per hour**.
- The pulsar appears to have **collided with G359.13**, causing a **distortion in its magnetic field**, which in turn **warped the radio signal** and physically **fractured the filament**.
- The **Chandra X-ray data** revealed **blue-colored emission** from the suspected pulsar. **Additional X-ray sources near the pulsar** may originate from **electrons and positrons** (antimatter particles) that have been **accelerated to extremely high energies**.

About Chandra X-ray Observatory

- The **Chandra X-ray Observatory** is **NASA's flagship space telescope** for detecting **X-ray emissions** from super-hot regions of the universe, like supernova remnants, black holes, and **galaxy clusters**.
- **Launched on July 23, 1999**, by the **Space Shuttle Columbia (STS-93)**, Chandra operates in **high Earth orbit** at altitudes up to **139,000 km** to avoid X-ray absorption by Earth's atmosphere.
- It is part of NASA's **"Great Observatories" program**, along with the **Hubble Space Telescope**, **Spitzer Space Telescope**, and the **now-retired Compton Gamma Ray Observatory**.
- Chandra has **eight-times greater resolution** than earlier X-ray missions and can **detect X-ray sources 20 times fainter** than any of its predecessors.
- It is managed by **NASA's Marshall Space Flight Center** and supports international collaboration for studying **extreme environments** in the cosmos.