

**GS PAPER - 2 | LOCAL SELF GOVERNANCE | GOVERNMENT POLICIES & INTERVENTIONS | CONSTITUTIONAL AMENDMENTS**
**Panchayat Advancement Index (PAI)**
**Why in News?**

- On *National Panchayati Raj Day (24th April 2024)*, PM Modi highlighted the **Panchayat Advancement Index (PAI)** as a key instrument to empower Gram Panchayats and achieve the vision of *Viksit Bharat@2047*.

**What is PAI?**

- A **composite index** that ranks 2.16 lakh Gram Panchayats (GPs) based on development aligned with Sustainable Development Goals (SDGs).
- Developed under the **Localization of SDGs (LSDGs)** and **National Indicator Framework (MoSPI)**.
- Enables **evidence-based planning** and identifies development gaps.

**Key Features**

- **Indicators:** 435 local indicators across **9 LSDG-aligned themes**.
- **Performance Categories:**
  - *Achiever* (90+),
  - *Front Runner* (75–89.99),
  - *Performer* (60–74.99),
  - *Aspirant* (40–59.99),
  - *Beginner* (<40).
- **2022–23 Status:**
  - *No Achievers*
  - *61.2% Aspirants*
  - *35.8% Performers*
  - *0.3% Front Runners*
  - *2.7% Beginners*

**Constitutional Provisions**

- **73rd Constitutional Amendment Act (1992):**
  - Created the 3-tier PRI system (Article 243 to 243-O).
  - Introduced the **11th Schedule** with 29 devolvable subjects.
- **Article 40 (DPSP):** Directs the State to organize and empower village panchayats.

**Challenges Facing PRIs**

- **Financial Constraints:**
  - Only 1.1% of GP revenue from own sources.
  - Few states constituted their **6th State Finance Commission**.
- **Incomplete Devolution:**
  - Less than 20% of states have devolved all 29 subjects.
- **Technological & Infrastructure Gaps:**
  - Poor digital access in many states; e.g., *0% computer access* in Arunachal.
  - Only *7 states* have 100% pucca panchayat buildings.
- **Gender Representation Issues:**
  - Women: *46.6%* of elected reps, but limited participation due to “**Pradhan Pati**” issue.
- **Coordination Deficit:**

- Ministries/departments work in silos; poor convergence at village level.

### Way Forward

- **Financial Empowerment:**
  - Regular SFCs, GIS-based tax mapping (RBI 2022), untied fund transfers.
- **Functional Devolution:**
  - Transfer all 29 subjects as per 73rd Amendment.
- **Capacity Building:**
  - Strengthen *RGSA*, train marginalised reps, promote SHG-CBO convergence.
- **Digital Governance:**
  - Expand *e-Gram Swaraj*, use *Mission Antyodaya dashboard*, ensure BharatNet access.
- **Scheme Convergence:**
  - Integrate *MGNREGS*, *JJM*, *SBM* in unified panchayat-level plans.
- **Gender Inclusion:**
  - Establish *Women Resource Centres*, promote gender budgeting, disaggregated data use.

## GS PAPER 3: BIOFUELS, AGRICULTURE, FOOD SECURITY

### Maize for Ethanol Production: Fuel vs Feed Crisis

The rapid expansion of ethanol production from maize under India's Ethanol Blended Petrol (EBP) Programme has triggered a critical *fuel vs feed* dilemma. While ethanol supports clean energy goals and reduces crude oil imports, its rising demand is creating pressure on domestic grain availability and livestock feed supplies.

India's maize requirement for ethanol surged from 0.8 million tonnes (MT) in 2022–23 to 12.7 MT in 2024–25. With 1 tonne of maize yielding around 380 litres of ethanol, this demand significantly reduces feedstock for the poultry and dairy sectors, which together consume over 20 MT annually. The post-fermentation residue, *Distillers' Dried Grains with Solubles* (DDGS), though a protein-rich byproduct, cannot replace the volume or energy content of raw maize.

Previously, India produced 32–33 MT of maize, with a surplus available for exports. However, with over 7 MT now diverted to ethanol, India is turning into a net importer. Maize prices have soared from Rs.15,000 to Rs.25,000/tonne, impacting feed industries and raising consumer prices. This has triggered demands for duty-free imports of genetically modified (GM) maize exclusively for ethanol, to protect feed supply chains.

The shift is also distorting protein markets. Cheaper DDGS (Rs.16,000–Rs.19,000/tonne) is undercutting soybean De-Oiled Cake (DOC), reducing its prices from Rs.32,000 to Rs.22,000/tonne. This has pushed soybean prices below the Minimum Support Price (MSP), affecting farmer incomes and discouraging oilseed cultivation.

Globally, the U.S. experience under the Renewable Fuel Standard (RFS), where 40% of corn was diverted to ethanol, resulted in food inflation during crises such as 2007–08 and 2022. India's biofuel strategy must avoid similar consequences.

### Way Forward:

- Adopt flexible blending targets with temporary suspension (“off-ramps”) during food/feed crises.
- Promote 2G/3G biofuels from crop residue, used cooking oil, and non-food biomass.

- Permit GM maize imports strictly for ethanol under non-diversion safeguards.
- Develop a national feed buffer stock and subsidize alternative proteins like DDGS and insect-based meals.
- Protect farmer incomes through strict MSP enforcement, crop diversification, and direct benefit transfers.

### Conclusion:

Agriculture must balance its four Fs—food, feed, fibre, and fuel. Ethanol production is vital for energy transition, but it must not compromise food security and farmer welfare. A research-driven, adaptive biofuel policy is key to sustainable development.

## PRELIM FACTS

### 1. Kaleshwaram Lift Irrigation Project (KLIP)

- **Location:** Telangana; on Godavari River (Bhupalpally district).
- **Type:** World's largest multi-stage lift irrigation project.
- **Scale:** 500+ km long; 1,800 km canal network; spans 13 districts.
- **Water Use:** 240 TMC; 70% for irrigation.
- **Issues:** Design flaws & damage flagged by National Dam Safety Authority (NDSA).
- **NDSA:** Statutory body under National Dam Safety Act, 2021.
- **Godavari River:**
  - Origin: Trimbakeshwar, Maharashtra.
  - Length: 1,465 km (2nd longest in India).
  - Tributaries:
    - Left Bank: Purna, Pranhita, Indravati, Sabari.
    - Right Bank: Pravara, Manjira, Manair.

### 2. ECINET- ECI Single Digit Platform

**News:** The Election Commission of (ECI) India will soon launch a single-point App ECINET for stakeholders.

#### About ECINET- ECI Single Digit Platform

- It is a **new one-stop platform** that will **integrate and reorient** over **40** of EC's **existing mobile and web applications**.
- **Aim:** It aims to **alleviate the burden of the users** for downloading and navigating multiple Apps and remembering different logins.

#### Features

- It has an **aesthetic User Interface (UI)** and a simplified **User Experience (UX)** by providing a singular platform for all electoral-related activities.
- It will also **enable users to access relevant electoral data** on their desktops or smartphones.
- The **data** on ECINET will be entered solely by the **authorized EC official** to ensure that data is as accurate as possible.
  - In case of any **conflict**, the **primary data as duly filled in statutory forms** will prevail.
  - The **data provided** through ECINET will be strictly **aligned within the legal framework** established by the Representation of People Act 1950, 1951, Registration of Electoral Rules, 1960 Conduct of Election Rules, 1961 and instructions issued by ECI from time to time.

- It will **subsume existing Apps** like the Voter Helpline App, Voter Turnout App, cVIGIL, Suvidha 2.0, ESMS, Saksham and KYC App which together have clocked over **5 crore downloads**.

### **3.Satavahana Dynasty**

**News:** The **Satavahana-era inscriptions** found in Peddapalli District of **Telangana**.

#### **About Satavahana Dynasty**

- The Satavahana dynasty was a prominent ancient Indian dynasty that ruled large parts of the **Deccan region** from the **1st century BCE to early 3rd century AD**.
- **Founder: Simuka** is regarded as the founder of the Satavahana dynasty.
- **Capital:** Pratishthana (Paithan)
- **Expanses:** Their kingdom included present-day Maharashtra, Andhra Pradesh, Telangana, Karnataka, and at times extended into Gujarat and Madhya Pradesh.
- It was the **first dynasty** to build an empire in Dakshinapatha—i.e. the southern region.
- **Rise:** The dynasty emerged **after the decline of the Mauryan Empire**, establishing its initial power base in Maharashtra before expanding into Andhra Pradesh and Karnataka.
- **Important Ruler:** They reached their zenith under the reign of **Gautamiputra Satakarni (c. 106-130 AD)**.
- He is remembered for his successful **campaigns against the Shakas** and for restoring the kingdom's glory after a period of decline.

#### **About the Inscriptions Found**

- **Two inscriptions** are found from the **Gundaram rock shelter**—
- **One inscription** is written in **early Brahmi script** and records that a person of the **Hāritiputra lineage**— possibly of the **Chutu dynasty**— excavated a cave for Buddhist monks and describes himself as a **friend of Kumāra Hakusiri, a Satavahana prince**.
- **Another inscription** begins with a **trident and damaru**— auspicious **religious symbols**— and states that the land east of the **hill belonged to Siri Devarāna**.
- This is the **first known occurrence** of such religious iconography accompanying early inscriptions in South India, indicating an early association of political authority with symbolic religious elements.

### **4.Orange Economy**

**News:** At the WAVES Summit in Mumbai, Prime Minister Narendra Modi spotlighted India's booming orange economy and urged India's youth to ride this creative wave.

#### **About Orange Economy**

- It is also known as the **creative economy**.
- It is a **production model** where **goods and services have intellectual value** because they are the product of the **ideas and expertise** of their creators.
- The **United Nations Conference on Trade and Development (UNCTAD)** defines it as an **evolving concept** which builds on the **interplay between human creativity and ideas and intellectual property, knowledge and technology**.
- Essentially it is the **knowledge-based economic activities** upon which the '**creative industries**' are based.
- The **first mandate on creative economies** came from the **UNCTAD XI's outcome document** – the **Sao Paulo consensus** – in **2004**.



- **Creative Industries under Orange Economy:** The creative industries – which include **advertising, architecture, arts and crafts, design, fashion, film, video, photography, music, performing arts, publishing, research & development, software, computer games, electronic publishing, and TV/radio** – are the lifeblood of the creative economy.
- Creative industries deal with the **interplay of various subsectors** ranging from **traditional** crafts, books, and visual and performing arts, to **more technology-intensive and services-oriented fields** such as the music and film industries, television and radio broadcasting, new media and design.
- People **conceptualize and arrange this work**, the **produce and/or publish** it and **get paid** for it.
- This is **no different** from other production processes, **except** that the major input stems from original or copyrightable intellectual property (IP).
- According to **United Nations Educational, Scientific and Cultural Organization (UNESCO)**, the Orange Economy accounts for **3% of global gross domestic product (GDP)** and **30 million jobs worldwide**.

### 5. Bioswales

**News**– The recent downpour in Gurgaon highlighted the importance of bioswales, as areas along the Aravalli Creek showed positive results.

#### **About Bioswales**

- **Description:** Bioswales are *shallow, vegetated channels designed to collect, filter, and manage stormwater runoff*.
- **Primary role:** They play a crucial role in *preventing erosion, removing pollutants, and promoting groundwater recharge*.
- **Structural composition:** These systems typically consist of native vegetation, gravel, and sand, which work together to naturally filter and treat stormwater.
- **Key advantages:** Bioswales provide efficient stormwater management, help mitigate urban flooding, and contribute to biodiversity conservation.
- **Urban application:** Commonly used in urban areas, bioswales are ideal for managing runoff from roads, parking lots, and building rooftops.
- **Diverse forms:** The dimensions and design of bioswales can be tailored to local site conditions and precipitation patterns.

### **ANSWER WRITING**

**Q. Discuss several ways in which microorganisms can help in meeting the current fuel shortage.**

#### **Introduction:**

The global fuel shortage, driven by rising energy demand, fossil fuel depletion, and climate concerns, calls for sustainable and renewable energy alternatives. Microorganisms, owing to their metabolic diversity, offer immense potential in biofuel production. They can convert organic matter, waste, and sunlight into viable fuels, making them crucial allies in achieving energy security and environmental sustainability.

#### **Body:**

**1. Bioethanol Production:** Yeasts like *Saccharomyces cerevisiae* ferment sugars from sugarcane, maize, and molasses to produce ethanol. Advancements in genetic engineering have

enabled the use of cellulolytic bacteria and fungi to convert agricultural waste into **Second-Generation (2G) ethanol**, reducing dependence on food crops.

**2. Algal Biodiesel:** Certain microalgae such as *Chlorella* and *Nannochloropsis* possess high lipid content. These lipids can be transesterified into biodiesel. Algae grow rapidly in non-arable areas and wastewater, making them a sustainable and land-efficient biofuel source. Algal biodiesel has a higher yield compared to conventional oilseed crops.

**3. Biogas and Bio-CNG:** Anaerobic bacteria break down organic waste in the absence of oxygen to produce **methane-rich biogas**. This is a widely used rural energy source in India. With purification, it can be upgraded to **bio-compressed natural gas (bio-CNG)** for vehicular use. It also supports waste management and circular economy models.

**4. Biohydrogen Production:** Certain photosynthetic bacteria and green algae like *Chlamydomonas reinhardtii* produce **biohydrogen** through biological water splitting. Though still under research, biohydrogen is a clean and high-energy fuel with only water as the by-product upon combustion.

**5. Microbial Fuel Cells (MFCs):** In MFCs, electrogenic bacteria convert organic substrates directly into electricity. These systems can simultaneously treat wastewater and generate power, though their application is currently limited to small-scale use.

**Conclusion:**

Microorganisms provide sustainable pathways to address fuel shortages through bioethanol, biodiesel, biogas, and biohydrogen. By leveraging India's biotech potential, agricultural waste, and research infrastructure, microbial biofuels can reduce fossil fuel reliance, lower emissions, and ensure long-term energy security. Policy support, investment in R&D, and commercialization are vital to scale up these microbial innovations.

**MCQ**

1. Which of the following biofuels can be produced using microalgae?

1. Bioethanol
2. Biodiesel
3. Biogas
4. Biohydrogen

Select the correct answer using the code below:

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

2. Consider the following statements regarding microbial fuel cells (MFCs):

1. They use bacteria to directly convert organic matter into electricity.
2. They can be used for wastewater treatment along with energy generation.
3. MFCs are widely used for large-scale power generation in India.

Which of the statements given above is/are correct?

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

3. With reference to the Panchayat Advancement Index (PAI), consider the following statements:

1. It ranks Gram Panchayats based on indicators aligned with the Sustainable Development Goals (SDGs).
  2. It is developed by the Ministry of Panchayati Raj under the National Indicator Framework.
  3. The index includes more than 400 indicators across various thematic areas.
- Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only**

- (c) 1 and 3 only  
 (d) 1, 2 and 3
4. Consider the following pairs regarding performance categories under the Panchayat Advancement Index (PAI):

**Category                      Score Range**

- |              |              |
|--------------|--------------|
| 1. Achiever  | 90 and above |
| 2. Performer | 75–89.99     |
| 3. Aspirant  | 60–74.99     |
| 4. Beginner  | Below 40     |

Which of the above pairs is/are correctly matched?

- (a) 1 and 2 only  
**(b) 1 and 4 only**  
 (c) 1, 3 and 4 only  
 (d) 1, 2, 3 and 4
5. Consider the following statements regarding the Kaleshwaram Lift Irrigation Project (KLIP):

1. KLIP is the world's largest multi-stage lift irrigation project, located in Telangana.
2. The project spans over 500 km across 13 districts and has a canal network of 1,800 km.
3. The primary goal of KLIP is to provide water exclusively for drinking purposes.
4. The project uses a series of pump systems and surge pools to lift water for distribution.

Which of the statements given above are correct?

- (a) 1, 2 and 4 only**  
 (b) 2 and 3 only  
 (c) 1 and 4 only  
 (d) 1, 2, 3 and 4
6. Consider the following statements regarding the ECINET platform launched by the Election Commission of India (ECI):

1. ECINET will integrate over 40 of the ECI's existing mobile and web applications.

2. It will only be available for use on desktop platforms.

3. The data entered on ECINET will be verified by authorized ECI officials to ensure accuracy.

Which of the statements given above is/are correct?

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

7. The Satavahana dynasty is known for its significant contributions to Indian history. Which of the following statements about the Satavahana dynasty is correct?

1. The Satavahana dynasty was founded by Gautamiputra Satakarni in the 3rd century BCE.
2. The capital of the Satavahana dynasty was Pratishthana (Paithan).
3. The dynasty was the first to build an empire in the southern region (Daksinapatha).
4. The Satavahanas primarily followed Jainism as their religion.

Select the correct answer using the code below:

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

8. Which of the following industries are considered part of the "Orange Economy"?

1. Software development
2. Film production
3. Agriculture
4. Architecture
5. Renewable energy

Select the correct answer using the code below:

- (a) 1, 2, and 4 only**  
 (b) 1, 2, 3, and 4 only  
 (c) 1, 2, and 5 only

- (d) 1, 2, 3, 4, and 5
9. Bioswales are designed to manage stormwater runoff in urban areas. Which of the following are true about bioswales?

1. They are vegetated channels used to collect and filter stormwater.
2. Bioswales prevent soil erosion, remove pollutants, and help in groundwater recharge.
3. They are commonly used for managing runoff from agricultural fields.
4. Bioswales are an urban solution typically involving native vegetation, gravel, and sand.

Select the correct answer using the code below:

**(a) 1, 2, and 4 only**

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

10. Consider the following statements about Satvahana Dynasty:

1. It was founded by Simuka with its capital at Pratihthana.
2. It was the first Deccanese dynasty to build an empire in daksinapatha.
3. Gautamiputra Satakarni is regarded as one of the most important Satavahana king known for his campaigns against Mongols.

How many of the above statements are correct?

- (a) Only one  
**(b) Only two**  
(c) All three  
(d) None



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