



## FII to Invest in India's Sovereign Green Bonds

**For Prelims:** [Reserve Bank of India \(RBI\)](#), [Foreign Institutional Investors](#), [Sovereign Green Bonds](#), [Securities and Exchange Board of India](#), [Statutory Liquidity Ratio](#), [Comptroller and Auditor General](#)

**For Mains:** Sovereign Green Bonds, Status of Green Bonds, Green Finance initiatives.

**Source:** [TH](#)

### Why in News?

The recent decision by the [Reserve Bank of India \(RBI\)](#) to allow [Foreign Institutional Investors \(FIIs\)](#) operating within the [International Financial Services Centre \(IFSC\)](#) to invest in [India's Sovereign Green Bonds \(SGrBs\)](#) marks a significant step towards financing the nation's transition to a **low-carbon economy**.

### Note

- FIIs are institutional investors that invest in assets belonging to a different country than where the organizations are based.
- The [Securities and Exchange Board of India \(SEBI\)](#) regulates FII investments in the country, while the RBI maintains the investment ceilings to keep FII participation in check.

### What are Sovereign Green Bonds (SGrBs)?

- **About:**
  - In the [Union Budget 2022-23](#), the FM announced the government's decision to issue **SGrBs**, a kind of government debt that specifically funds projects attempting to accelerate **India's transition to a low-carbon economy**.
  - Funds raised through SGrBs are earmarked exclusively for **green projects**, ensuring transparency and accountability in fund utilization.
  - SGrBs typically offer **lower interest rates compared to [Government-Securities \(G-Secs\)](#)**, reflecting their alignment with sustainable development objectives.
  - Issuance of SGrBs requires adherence to internationally recognised green standards and certification processes to ensure the credibility of funded projects.
- **Classification:**
  - SGrBs are classified under the [Statutory Liquidity Ratio \(SLR\)](#), a liquidity rate set by the RBI for financial institutions.
    - Financial institutions must maintain SLR with themselves before lending to customers, affecting the availability of funds for other purposes.
- **Greenium:**
  - As SGBs typically yield lower interest rates compared to conventional G-Secs, the **difference in interest rates between SGrBs and G-Secs is called a greenium**.

- Central banks and governments globally encourage embracing greeniums to support the transition to a greener future.
- **Sovereign Green Bonds Framework:**
  - The Finance Ministry released [India's first SGrB Framework in 2022](#) detailing the kind of projects that would receive funding through this class of bonds.
  - **Funding Projects:**
    - Funds will be directed towards **nine green project categories:** [renewable energy](#), energy efficiency, clean transportation, climate adaptation, [sustainable water management](#), pollution control, sustainable land use, [green buildings](#), and biodiversity conservation.
    - **Excluded Projects:**
      - Projects involving [fossil fuel](#) extraction, [nuclear power generation](#), and direct waste incineration. Additionally, projects related to alcohol, weapons, [tobacco](#), gaming, or palm oil industries are also excluded.
      - Furthermore, **renewable energy projects using biomass** from protected areas, landfill projects, and [hydropower plants larger than 25 MW are not eligible](#).
    - The Indian government sought validation from **Norway-based validator Cicero** to enhance credibility. Cicero rated India's framework as a "**green medium**" with a score of "good governance," showing alignment with global green standards set by the **International Capital Market Association (ICMA)**.
  - **Features of the SGrB:**
    - issued through **Uniform Price Auction** (a public sale where a fixed number of similar items are sold for the same price).
    - eligible for [Repurchase Transactions \(Repo\)](#).
    - reckoned as eligible investments for SLR purposes.
    - **eligible for trading in the secondary market.**
  - **Management:**
    - Sovereign green bond proceeds will be deposited into the [Consolidated Fund of India](#) and managed by the **Ministry of Finance's Public Debt Management Cell**.
    - Allocation and utilization of Green Bonds will be audited by the [Comptroller and Auditor General \(CAG\) of India](#).
  - **Advantages:**
    - Indian green bonds not only support sustainability goals but **also strengthen the Indian currency** by attracting investors and increasing funds within the central bank.
    - The growing demand for socially responsible investments and the limited supply of **green bonds can raise their price and yield.**

## How do FIIs' Investments in Green Bonds Boost India's Green Transition?

- FIIs investing in India's green projects **expands the capital pool** for funding the country's ambitious [2070 net zero goals](#), which aim to derive [50% of India's energy from non-fossil fuel sources](#) and **reduce the nation's carbon intensity by 45%**, as promised at [United Nations Climate Change Conference\(COP 26\) in Glasgow 2021](#).
- FIIs provide an alternative source of funding, lessening the pressure on domestic lenders and freeing up capital for other uses.
- The recent inclusion of foreign investors has **expanded the pool of potential investors for India's SGrBs**, potentially leading to more funds for green projects that aim to reduce the [carbon footprint of the Indian economy](#), and contributing to India's [Sustainable Development Goals](#).
  - The government aims to raise Rs 20,000 crore through SGrBs in FY24 and **plans to borrow Rs 12,000 crore in the first six months of FY25**.
- Foreign investors bring valuable knowledge and experience in **green technologies** and project management, which can benefit Indian green infrastructure projects.

## What are the Challenges Regarding India's SGrBs?

- **Lack of Green Taxonomy:**
  - The absence of a green taxonomy or standardized method to assess an investment's environmental credentials poses a challenge.

- Without clear criteria, there is a risk of **greenwashing**, where projects falsely claim to be environmentally friendly to secure funding.

▪ **Framework Implementation:**

- While the Finance Ministry released India's first SGrB Framework, its implementation and enforcement remain critical.
- Ensuring that funded projects align with the defined criteria and contribute to environmental sustainability requires robust monitoring and evaluation mechanisms.

▪ **Project Selection and Impact:**

- Identifying **new green projects with credible audit trails** and high impact is crucial for optimal deployment of SGrB proceeds.
  - Projects with limited private capital, such as Distributed Renewable Energy and clean energy transition finance for MSMEs, may face challenges in attracting sufficient funding.

▪ **Availability of Suitable Projects:**

- Securing a pipeline of eligible green projects may be challenging, particularly in sectors like offshore wind, grid-scale **solar power production**, and **Electric Vehicles (EVs)**.
  - The government needs to actively **encourage and incentivize** the development of such projects to ensure a steady flow of investment opportunities.

## Way Forward

- Augment **transparency in green bond** issuance and viability to overcome existing challenges.
  - Implement specialized awareness programs to promote the advantages of investing in green projects.
- **Reduce legal, default, liquidity, and other risks** by establishing a favorable environment for private investors.
  - Implement robust legal frameworks regarding defaulters to instill investor confidence.
- Prioritize the establishment of a **green capital pool** to stimulate domestic demand.
- Integrate green projects into institutional investors' portfolios, potentially involving Indian institutions like the **Insurance Regulatory and Development Authority of India (IRDAI)**.

### **Drishti Mains Question:**

Q. Assess the policy measures required to promote investments in green projects and stimulate the growth of India's green bond market.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### **Prelims**

**Q. Indian Government Bond Yields are influenced by which of the following? (2021)**

1. Actions of the United States Federal Reserve
2. Actions of the Reserve Bank of India
3. Inflation and short-term interest rates

**Select the correct answer using the code given below.**

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

**Ans: (d)**

### **Mains**

**Q.** Explain the purpose of the Green Grid Initiative launched at the World Leaders Summit of the COP26 UN Climate Change Conference in Glasgow in November 2021. When was this idea first floated in the International Solar Alliance (ISA)? **(2021)**

## Green Credit Program

**For Prelims:** [Green Credit Program](#), [LiFE campaign](#), [Carbon credits](#), [Kyoto Protocol](#), [Sovereign Green Bond](#), [Green Energy Corridor](#)

**For Mains:** Covered Activities under Green Credit Programme, Concerns Regarding Green Credit Programme.

**Source:** TH

### Why in News?

Recently, the [Ministry of Environment Forest and Climate Change \(MoEFCC\)](#) has clarified that under the [Green Credit Program \(GCP\)](#) primacy must be accorded to **restoring ecosystems** over merely tree planting.

### What is the Green Credit Program?

- **About:**
  - **Green Credit Program (GCP)** is an innovative market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors, by various stakeholders like individuals, communities, private sector industries, and companies.
  - It is designed to foster a sustainable lifestyle and environmental conservation as part of the [‘LiFE’ initiative](#) announced by the [Prime Minister](#) in United Nations Climate Change Conference of the Parties (COP26).
- **Covered Activities:** The Green Credit program encompasses **eight key types** of activities aimed at enhancing environmental sustainability:
  - **Tree Plantation:** Planting trees to increase green cover and combat [deforestation](#).
  - **Water Management:** Implementing strategies to efficiently manage and conserve water resources.
  - **Sustainable Agriculture:** Promoting eco-friendly and [sustainable agricultural](#) practices.
  - **Waste Management:** Implementing effective waste management systems to reduce environmental [pollution](#).
  - **Air Pollution Reduction:** Initiatives aimed at reducing [air pollution](#) and improving air quality.
  - **Mangrove Conservation and Restoration:** Protecting and restoring [mangrove](#) ecosystems for ecological balance.
- **Governance and Administration:**
  - The operational framework of the Green Credit Programme involves a process where both individuals and corporations are given the opportunity to contribute financially to the restoration efforts of forests deemed ‘degraded’.
    - This is facilitated through applications to the [Indian Council of Forestry Research and Education \(ICFRE\)](#), an independent entity under the Environment Ministry.

- The ICFRE is responsible for overseeing the **financial contributions** directed towards **forest restoration**, which is then executed by the respective State forest departments.
- Post the afforestation efforts, a period of **two years** is observed, after which the ICFRE conducts an **assessment** of the planted trees.
  - Upon successful evaluation, each tree is assigned a value equivalent to **one 'green credit'**. These accrued green credits can then be utilised by the funding organisation in a couple of ways:
    - Firstly, they can serve as a **compliance mechanism** for organisations that have been mandated by **forest laws** to offset the diversion of forest land for non-forestry purposes by providing a comparable area of land for afforestation.
    - Alternatively, these credits can be employed as a **metric for reporting** adherence to **environmental, social, and governance (ESG) standards** or fulfilling **Corporate Social Responsibility (CSR)** obligations.
- **Earning and Calculation of Green Credit:** To earn Green Credits, participants **need to register** their environmental activities through a dedicated website.
  - The activities will then be subject to verification by a **designated agency**. Based on the agency's report, the administrator will grant the applicant a **certificate of Green Credit**.
  - The calculation of Green Credit is determined by factors such as resource requirements, scale, scope, size, and other relevant parameters necessary to achieve the desired environmental outcomes.
- **Green Credit Registry and Trading Platform:** A critical component of the program is the establishment of a **Green Credit Registry**, which will help track and manage earned credits.
  - Additionally, the administrator will create and maintain a trading platform, enabling the trading of Green Credits on a domestic market.
- **Significance:**
  - **Aligned India's Environmental Policies:** India's environmental policies, such as the **Environment Protection Act, 1986**, and the **National Environment Policy, 2006**, provide a framework for protecting and improving the environment.
    - These policies, alongside the GCP, aim to safeguard forests, wildlife, and the overall natural environment.
  - **Aligned with India's Climate Goals:** The GCP is part of India's efforts to adhere to international commitments, such as those made during **COP26**.
    - It complements the **Carbon Credit Trading Scheme** introduced by the **Energy Conservation (Amendment) Act, 2022**, and broadens the scope of tradable credits beyond CO2 reductions to include a range of sustainable practices.
  - **Aligned with Global Ecosystem Restoration Initiatives:** The GCP aligns with the **UN Decade on Ecosystem Restoration (2021-2030)**, which emphasises the scaling up of restoration efforts.
    - India's approach in this regard includes involving all stakeholders in the restoration process and leveraging traditional knowledge and conservation practices.

## Does the Green Credit Program Also Cover Carbon Credits?

- The Green Credit program operates independently of the **carbon credits** provided under the **Carbon Credit Trading Scheme, 2023**, which is governed by the **Energy Conservation Act of 2001**.
  - **Carbon credits**, also known as carbon offsets, are permits that **allow the owner to emit a certain amount of carbon dioxide** or other greenhouse gases.
    - One credit permits the emission of 1 ton of carbon dioxide or the equivalent in other greenhouse gases.
- An environmental activity generating Green Credits may have climate co-benefits, such as reducing or removing carbon emissions, which can potentially lead to the acquisition of carbon credits in addition to Green Credits.

## What are the Challenges With the Green Credit Program?

- **Impact on Forest Ecology:** Critics have raised concerns that the Green Credit Rules could be **detrimental to forest ecology**. The rules direct state forest departments to identify '**degraded land parcels**' for tree plantation to generate green credits.
  - However, this approach has been criticised as **unscientific and potentially disastrous** for local ecosystems.
  - The use of terms like 'degraded' for scrubland and open forests is considered vague and could lead to **industrial-scale plantations** that may irreversibly alter soil quality, replace **local biodiversity**, and harm ecosystem services.
- **Creation of Green Deserts:** There is a fear that the Green Credit Rules might lead to the creation of '**green deserts**'.
  - This term refers to areas where tree plantations are established without considering the ecological complexities and biodiversity of the original landscape.
  - Such plantations can **disrupt the balance of ecosystems** and do not support the diverse range of species that a natural forest would.
  - The rules have been criticised for measuring forests solely by **tree count**, which overlooks the multi-layered structure of a functional forest and its associated wildlife.
- **Methodological Concerns:** The methodology for generating green credits, particularly through tree planting, has been questioned for its environmental soundness.
  - Critics are concerned that the methodology does not adequately address potential **regulatory gaps** and could lead to environmental degradation.
- **Pressure on 'Wastelands':** The emphasis on planting trees on 'degraded land parcels' puts pressure on areas often categorized as **wastelands**, which are ecologically important.
  - These areas, like **grasslands**, play a crucial role in carbon sequestration and supporting unique biodiversity. The push for afforestation in these areas could lead to a loss of endemic species and ecological functions.

## Way Forward

- **Biodiversity-Based Afforestation:** Shift the focus from **tree count** to biodiversity-based afforestation, where the goal is to **restore diverse native species** and ecosystems rather than simply planting a large number of trees.
  - This approach ensures that the newly established plantations mimic natural forests and support a wide range of wildlife.
- **Technology Integration:** Utilise **remote sensing** and satellite imagery to identify truly degraded lands suitable for tree plantations, minimising the risk of harming existing ecosystems.
- **Transparency and Knowledge Sharing:** Ensure clear and transparent definitions of terms like "degraded land" and "wasteland" within the program guidelines.
  - Promote knowledge sharing and **capacity building** among stakeholders, including forest departments, businesses, and NGOs, to ensure environmentally responsible practices.

### **Drishti Mains Question:**

Discuss the potential environmental and socio-economic impacts of implementing a Green Credit Program. How can we ensure that such programs strike a balance between environmental conservation and socio-economic development effectively?

## UPSC Civil Services Examination Previous Year Question (PYQ)

### **Prelims**

**Q. The concept of carbon credit originated from which one of the following? (2009)**

- (a) Earth Summit, Rio de Janeiro
- (b) Kyoto Protocol

- (c) Montreal Protocol  
(d) G-8 Summit, Heiligendamm

**Ans: (b)**

**Q. Regarding “carbon credits”, which one of the following statements is not correct? (2011)**

- (a) The carbon credit system was ratified in conjunction with the Kyoto Protocol  
(b) Carbon credits are awarded to countries or groups that have reduced greenhouse gases below their emission quota  
(c) The goal of the carbon credit system is to limit the increase of carbon dioxide emission  
(d) Carbon credits are traded at a price fixed from time to time by the United Nations Environment Programme.

**Ans: (d)**

### **Mains**

**Q.** Should the pursuit of carbon credits and clean development mechanisms set up under UNFCCC be maintained even though there has been a massive slide in the value of a carbon credit? Discuss with respect to India’s energy needs for economic growth. **(2014)**

**Q.** Discuss global warming and mention its effects on the global climate. Explain the control measures to bring down the level of greenhouse gases which cause global warming, in the light of the Kyoto Protocol, 1997. **(2022)**

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## **Advance Pricing Agreements and Double Taxation Avoidance Agreement**

**For Prelims:** [Central Board of Direct Taxes](#), [Advance Pricing Agreements](#), [Double Taxation Avoidance Agreement](#), [Tax evasion](#)

**For Mains:** Significance of APAs in ensuring tax certainty, Double Taxation Avoidance Agreements and their significance, Ease of Doing Business

**Source:** [PIB](#)

### **Why in News?**

The [Central Board of Direct Taxes \(CBDT\)](#) has achieved a remarkable milestone by signing 125 [Advance Pricing Agreements \(APAs\)](#) during the fiscal year 2023-24.

- This surge in APA signings underscores the growing importance of transfer pricing regulations and the efforts to provide certainty to taxpayers.
- In an additional development, India and Mauritius have amended their [Double Taxation Avoidance Agreement \(DTAA\)](#) to curb [tax evasion](#) and ensure fair taxation practices,

## What is an Advance Pricing Agreement?

### ▪ About:

- An APA is a formal arrangement between a taxpayer and a tax authority on transfer prices.
- APAs allow businesses to reduce the risk of their transaction prices being challenged by tax authorities.
- The APA programme has significantly contributed to India's mission of **promoting ease of doing business**, especially for **Multinational Enterprises (MNEs)** with a large number of cross-border transactions within their group entities.

### ▪ Types of APAs:

#### ◦ Unilateral APAs:

- Limit risks for transactions between domestic entities. No guarantee of avoiding **double taxation for transactions** with foreign entities.
- Relatively shorter proceedings compared to other APA types.

#### ◦ Bilateral APAs:

- Limit risks for transactions between a domestic entity and a foreign entity. **Eliminate the risk of double taxation.** Longer proceedings as two states must agree.

#### ◦ Multilateral arrangements:

- They mitigate risks for transactions between related entities in 3 or more states, serving as a protective instrument for complex transactions and ensuring safety for both parties, although the proceedings take longer.

### ▪ Key Features of APAs:

- The APA process is **voluntary and will supplement appeal and other Double Taxation Avoidance Agreement (DTAA)** mechanisms for resolving transfer pricing disputes.
- The **term of APA can be a maximum of 09 years** (Including **five years prospective and 04 years** retrospective if the taxpayer has opted for roll back mechanism).
- The procedure ensures the protection of sensitive data provided by businesses.
- Statistical data and summary information are published, but without disclosing names of entities with concluded arrangements or applicants.

### ▪ Importance of APAs for Businesses:

- Provides tax certainty for determining arm's length price of international transactions.
- Reduces risk of potential double taxation through bilateral or multilateral APAs.
- Reduces compliance costs by eliminating transfer pricing audit risk and resolving disputes.
- Alleviates burden of record keeping by knowing required documentation in advance.
- APAs allow businesses to reduce the risk of their transaction prices being set incorrectly or challenged by tax authorities.
- APAs can be an effective tool for businesses to manage their tax risks and planning.

## Central Board of Direct Taxes (CBDT):

- It is a statutory body, established under the **Central Board of Revenue Act, 1963**, and is a part of the **Department of Revenue in the Ministry of Finance**.
- CBDT provides essential inputs for policy and planning of direct taxes in India, at the same time it is also responsible for administration of direct tax laws through the **Income Tax** Department.

## Double Taxation Avoidance Agreement (DTAA)

- A DTAA is a tax treaty signed between two or more countries. Its key objective is that tax-payers in these countries can avoid being taxed twice for the same income.
- A DTAA applies in cases where a taxpayer resides in one country and earns income in another.
- DTAA's can either be comprehensive to cover all sources of income or be limited to certain areas such as taxing income from shipping, air transport, inheritance, etc.
- In **1983, India and Mauritius agreed on the DTAA** to prevent double taxation. The DTAA applies to residents of both countries.



## What Does the India and Mauritius DTAA Amendment Entail?

- **Principal Purpose Test (PPT):**
  - The amended protocol introduces the **Principal Purpose Test (PPT)** to the India-Mauritius Double Taxation Avoidance Agreement (DTAA).
    - The PPT denies treaty benefits if obtaining those benefits was the primary purpose of any transaction or arrangement.
- **Article 27B:**
  - A new article, Article 27B, is included in the treaty, defining the 'entitlement to benefits.'
    - This article specifies conditions under which treaty benefits, such as reduced withholding tax on interest, royalties, and dividends, are denied.
- **Focus on Preventing Treaty Abuse:**
  - The amendment aims to address concerns related to **tax evasion and avoidance** through the abuse of the DTAA.
  - By incorporating the PPT, the revised treaty seeks to ensure that tax benefits are not misused for improper purposes.
- **Uncertainty Regarding Past Investments:**
  - Despite the amendment, clarity is lacking regarding the treatment of past investments made under the previous provisions of the DTAA.
  - The Ministry of Finance is yet to issue clarification regarding the applicability of the new provisions to existing investments.

## India and Mauritius Commercial Relations

- India has been one of the largest trading partners of Mauritius since 2005.
- Indian exports to Mauritius for FY 2022-2023 were USD 462.69 mn, while Mauritian exports to India were USD 91.50 mn, with total trade amounting to USD 554.19 mn.
- Trade between India and Mauritius has grown by 132% in the last 17 years.
- **Petroleum products were the largest export item for India to Mauritius** until mid-2019. Other Indian exports to Mauritius include pharmaceuticals, cereals, cotton, shrimps, prawns, and bovine meat.
- Main Mauritian exports to India include vanilla, medical devices, needles, aluminum alloys, scrap paper, refined copper, and men's cotton shirts.
- Cumulative FDI worth USD 161 billion came from Mauritius to India between 2000 - 2022, largely due to the **DTAA**.
- Mauritius and India signed the **Comprehensive Economic Cooperation and Partnership Agreement (CECPA)** in 2021.
  - CECPA is the first trade agreement signed by **India with an African country**.
- In 2024, the **Unified Payment Interface (UPI) and also RuPay card services were launched in Mauritius**.
  - Users in Mauritius and India will experience convenience in making transactions, both domestically and internationally, through the **adoption of RuPay and UPI**.

### Drishti Mains Question:

Q. Evaluate the impact of the surge in APA signings by the Central Board of Direct Taxes (CBDT) during the fiscal year 2023-24 on India's efforts to promote ease of doing business and attract foreign investment.

Q. Evaluate the objectives of the amendment in curbing tax evasion and ensuring fair taxation practices between India and Mauritius.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### Prelims

**Q. With reference to India's decision to levy an equalization tax of 6% on online advertisement services offered by non-resident entities, which of the following statements is/are correct? (2018)**

1. It is introduced as a part of the Income Tax Act.
2. Non-resident entities that offer advertisement services in India can claim a tax credit in their home country under the "Double Taxation Avoidance Agreements".

**Select the correct answer using the code given below:**

- (a) 1 only  
(b) 2 only  
(c) Both 1 and 2  
(d) Neither 1 nor 2

**Ans: (d)**

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## Decentralised Industrialisation in Tamil Nadu

**For Prelims:** [Gross Value Added \(GVA\)](#), Decentralised Industrialisation Model, Cluster Development, [Production-Linked Incentive](#), [Service sector](#)

**For Mains:** Role of cluster capitalists in industrial development, India's Industrial Sector, Government Initiatives for Growth of the Industrial Sector

**Source:** [IE](#)

### Why in News?

Tamil Nadu's economic landscape is undergoing a significant transformation, moving beyond its agricultural roots to embrace a **more diversified and industrialised economy**.

- This shift is **largely attributed to the emergence of cluster capitalists** and **'entrepreneurs from below,'** who are driving growth in various industry sectors.

### How Diversified and Industrialised is Tamil Nadu's Economy?

- Tamil Nadu's farm sector accounts for a **lower share (12.6%)** of its [gross value added \(GVA\)](#) and **employed labour force (28.9%)** compared to the national average.
- The state has a **higher share of industry, services, and construction** in its economy relative to the all-India figures.
- Tamil Nadu's **agriculture** itself is diversified, with the [livestock subsector](#) contributing a significant **45.3% of the farm GVA**, the highest among all states.
- The state has developed numerous industry clusters across various sectors like textiles, engineering, leather, food processing, etc.
- **Gujarat is more industrialized than TN**, with the factory sector generating 43.4% of the state's GVA and engaging 24.6% of its workforce, compared to TN's 22.7% and 17.9% respectively.
  - However, Gujarat also has a higher share of agriculture in its GVA (15.9%) and workforce (41.8%) compared to TN's 12.6% and 28.9%.

- This makes Gujarat's economy less diversified and balanced compared to TN.

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## SECTOR-WISE SHARES OF GVA & WORKFORCE: 2022-23 (%)

	Gross Value Added*		Workforce	
	All-India	Tamil Nadu	All-India	Tamil Nadu
Agriculture	18.19	12.55	45.76	28.87
Industry**	18.80	22.69	12.27	17.88
Construction	8.84	11.70	13.03	18.04
Services	54.18	53.05	28.94	35.21

\*At Basic Prices; \*\* Includes manufacturing, mining, electricity and utilities. GVA is GDP net of product taxes and subsidies.

Sector-wise shares of GVA and workforce for the year 2022-23

### What Factors have Driven Tamil Nadu's Economic Transformation?

- **Decentralised Industrialisation:**
  - Tamil Nadu has only a **few major business entities with annual revenues over Rs 15,000 crore.**
  - However, TN's economic **transformation has been driven by medium-scale businesses** with turnover ranging from **Rs 100 crore to Rs 5,000 crore**, with some reaching the Rs 5,000-10,000 crore level.
    - The industrialisation has been decentralised and spread out through the development of clusters.
    - This decentralised approach has allowed for a more diverse and balanced economic landscape.
- **Cluster-Based Development:**
  - Cluster development is a **form of economic development that involves placing businesses in a specific geographic area.**
    - The goal is to increase productivity and maximise regional efficiency.
  - **Examples of successful clusters in TN:**
    - **Tirupur:** Cotton knitwear (employs 800,000 people);
    - **Coimbatore:** Spinning mills and engineering goods;
    - **Sivakasi:** Safety matches, firecrackers, and printing;
  - These clusters have not only created employment opportunities but also **fostered a culture of entrepreneurship and innovation**, contributing to the overall economic development of the state.
- **Diversification Beyond Agriculture:**
  - The creation of employment in cluster towns has reduced Tamil Nadu's workforce dependency on farming, leading to diversification beyond agriculture.
    - This shift has expanded the state's economic base by providing alternative employment options.
- **Entrepreneurship from Below:**
  - Entrepreneurs from **more ordinary peasant stock and provincial mercantile castes** have played a crucial role in driving the state's economic transformation.
    - These entrepreneurs have built and expanded businesses in various sectors, contributing to the overall industrialisation and economic development of Tamil Nadu.
  - Diverse community involvement, has contributed to the success in achieving

industrialisation and diversification beyond agriculture.

▪ **Social Progress Indices:**

- High social progress indices resulting from **public health and education investments** have likely contributed to Tamil Nadu's relative success in achieving industrialisation and diversification beyond agriculture.
- The state's focus on social development has created a conducive environment for economic growth and transformation, leading to improved living standards and economic opportunities for its residents.

## What is the Decentralised Industrialisation Model?

▪ **About:**

- Decentralisation involves the systematic **distribution of powers and functions across different political and economic agents** in society.
- It encompasses both political and economic dimensions, including the decentralisation of decision-making, ownership of means of production, structure of production, and location of production.

▪ **Key Features:**

- Dispersion of industrial activities across **rural and peri-urban areas**, reducing dependence on urban centers.
- Promotion of **small and cottage industries, owned and controlled by local communities**, to foster local entrepreneurship and economic empowerment.
- Emphasis on **labour-intensive production** methods to generate employment opportunities and alleviate rural poverty.
- The utilisation of **local resources and skills** to meet local needs and promote sustainable development.
- Interdependence between different village industries creates a self-sustaining economic ecosystem.
- Equalisation of production and distribution through the decentralised location of production units.

▪ **Benefits:**

- Facilitates balanced **regional development and reduces spatial inequalities**.
- Promotes **inclusive growth** by providing economic opportunities to rural communities.
- Enhances resilience to economic shocks by diversifying industrial activities across regions.
- Fosters community participation and ownership in the development process.
- Supports sustainable development by utilizing local resources efficiently and reducing environmental impacts.

▪ **Challenges:**

- Limited technical capacity can lead to **greater inefficiency**.
- Decentralised models may lead to increased costs due to a loss of economies of scale, especially in procurement.
- Skilled labour may not be uniformly available across regions in a decentralised model and may result in skill gaps in certain locations.

## Gandhi's Concept of Decentralisation:

- Gandhi envisioned a socio-political and economic order based on an egalitarian framework, emphasising decentralisation in decision-making and ownership of means of production.
- He advocated for village-level self-sufficiency and empowerment, promoting rural industrialisation through small-scale, labor-intensive production units such as khadi and village industries.

## Initiatives for the Growth of the Industrial Sector in India

- [Production-Linked Incentive \(PLI\);](#)
- [PM Gati Shakti- National Master Plan;](#)
- [Bharatmala and Sagarmala Project;](#)
- [Start-up India;](#)
- [Make in India 2.0;](#)

- [Atmanirbhar Bharat Campaign:](#)
- [Special Economic Zones.](#)

**Drishti Mains Question:**

Q. Evaluate the impact of decentralized industrialisation and cluster-based development in economic diversification and regional efficiency.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### **Prelims**

**Q. In the 'Index of Eight Core Industries', which one of the following is given the highest weight? (2015)**

- (a) Coal production
- (b) Electricity generation
- (c) Fertilizer production
- (d) Steel production

**Ans: (b)**

### **Mains**

**Q.1** "Industrial growth rate has lagged behind in the overall growth of Gross-Domestic-Product(GDP) in the post-reform period" Give reasons. How far are the recent changes in Industrial Policy capable of increasing the industrial growth rate? **(2017)**

**Q.2** Normally countries shift from agriculture to industry and then later to services, but India shifted directly from agriculture to services. What are the reasons for the huge growth of services vis-a-vis the industry in the country? Can India become a developed country without a strong industrial base? **(2014)**

## Parkinson's Disease

**Source: TH**

### **Why in News?**

Scientists have found a new **genetic variant** associated with **Parkinson's disease**, offering insights into the evolutionary roots of various familial forms of parkinsonism and paving the way for improved understanding and treatment of the condition.

### **What is Parkinson's Disease?**

- **About:** Parkinson's disease is a **progressive neurodegenerative disorder** that impairs movement and can lead to immobility and dementia over time.
  - The disease usually **occurs in older people**, but younger people can also be affected. Men are affected more often than women.
  - The prevalence of PD has doubled in the past 25 years. India shares around **10%** of the global burden of Parkinson's disease.

- **Causes:** The exact cause of Parkinson's disease is not fully known yet, but it is believed to involve a **combination of genetic and environmental factors.**
  - It is primarily characterized by the loss of dopamine-producing neurons in the brain, leading to motor and non-motor symptoms.
- **Symptoms:** Motor symptoms include **slow movement, tremors, rigidity,** and walking difficulties.
  - Non-motor symptoms include cognitive issues, mental health disorders, sleep disturbances, pain, and sensory problems.
- **Treatment:** There is no cure for Parkinson disease, but therapies including medicines, surgery and rehabilitation can reduce symptoms.
  - **Levodopa/carbidopa,** a combination medicine that increases the amount of dopamine in the brain, is the most common medication.
- **World Parkinson's Day:** Every year, **11<sup>th</sup> April** is observed as World Parkinson's Day.
  - The day aims to amplify awareness and understanding about Parkinson's disease internationally.

## What are the Current Major Advancements in Understanding Parkinson's Disease?

- Geneticists and neuroscientists are exploring genetic variations to understand Parkinson's better. Two primary approaches are used: linkage analysis and genome-wide association studies (GWAS).
  - **Linkage Analysis:** Focuses on rare families with **inherited parkinsonism,** identifying gene mutations associated with the disease.
    - Recent research identified a new genetic variant called **RAB32 Ser71Arg** linked to Parkinson's in multiple families globally.
  - **Genome-wide Association Studies (GWAS):** Under this genetic data from Parkinson's patients and healthy individuals were compared, identifying over 92 genomic locations and 350 genes potentially related to Parkinson's risk.

## What are the Other Key Neurological Diseases?

- [Alzheimer's disease](#)
- [Multiple sclerosis \(MS\)](#)
- [Huntington's disease](#)
- [Cerebral palsy](#)
- [Guillain-Barre syndrome](#)

## UPSC Civil Services Examination Previous Year Question

### Q. Consider the following statements:

1. Genetic changes can be introduced in the cells that produce eggs or sperms of a prospective parent.
2. A person's genome can be edited before birth at the early embryonic stage.
3. Human induced pluripotent stem cells can be injected into the embryo of a pig.

### Which of the statements given above is/are correct?

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

**Ans: (d)**

# Tiantong Project

[Source: FP](#)

## Why in News?

Recently, **Chinese engineers** and scientists have created the **world's first [satellite](#)** enabling **smartphones** to make calls without mobile towers.

- It is **aimed at [emergencies](#)** where mobile connectivity may be disrupted, people can directly seek help by connecting to an overhead communication orbiter.

## What is the Tiantong Project?

### ▪ About:

- The **Tiantong satellite initiative** represents a **strategic response** to the evolving landscape of telecommunications, characterised by the **increasing demand** for connectivity, especially in remote and disaster-prone regions.
- Each Tiantong satellite is designed to have a **lifespan of 12 years**, and its antenna undergoes daily temperature changes of up to 160 degrees Celsius while simultaneously transmitting and receiving **[electromagnetic waves](#)** in 800 different frequency bands.
- The **first satellite** of the **Tiantong-1 series** was launched in August 2016, with the second and third satellites following in 2020 and 2021.
  - The three satellites form a network in a **[geosynchronous orbit](#)** at an altitude of 36,000km, covering the **entire Asia-Pacific region** from the Middle East to the Pacific Ocean.
- In September 2023, Huawei Technologies launched the **world's first smartphone supporting satellite calls**, connecting directly to Tiantong satellites, followed by similar models from other companies.
- Chinese consumers have embraced these products, with Huawei alone selling tens of millions of units, surpassing **[SpaceX's Starlink satellite](#)** service with over 2 million global customers.

### ▪ Need:

- The satellite concept arose following the 2008 **[Sichuan earthquake](#)**, where over 80,000 lives were lost due to communication breakdowns hindering rescue efforts.
- The Chinese government initiated the **Tiantong Project**, a **[satellite communication system](#)**, in response to the disaster, symbolising a commitment to enhancing communication resilience.

### ▪ Issues:

- Satellite communication with mobile phones is expected to become mainstream. However, experts argue that **challenges** may occur in its **implementation**.
- **Since the 1970s**, most commercial communication satellite networks operated by the US, Europe, and international organisations have faced **significant disruptions** because their **signals overlap** with the receiving frequency band.
- **A similar challenge** can occur in the case of the Tiantong Project. **For example**, to reach a small smartphone, the satellite must emit a powerful signal, but when many high-power signals flood the satellite's antenna simultaneously, they can **interfere, creating new signals**.
- These randomly occurring signals can **deteriorate satellite call quality** and, in severe instances, **lead to system failure**.
- This issue, known as **passive intermodulation (PIM)** among telecommunications engineers, has become a bottleneck for further development of satellite communication

technology.

- There is currently **no universally effective technology** to suppress the occurrence of PIM.

▪ **Solutions:**

- To deal **with the issue of passive intermodulation (PIM)**, China's Tiantong Project has gathered communication technology elites from across the country.
- The scientist observed that different metal components in huge satellite antennas come into contact with each other, leading to the main source of PIM.
- Physicists explored **microscopic physical mechanisms** like **quantum tunnelling** and **thermal emission** at the contact interface, unveiling new physical laws for **silver-plated** and gold-plated microwave components.
- They've created a **physical model** for predicting PIM effects with **exceptional precision** across different contact states, pressures, temperatures, vibrations, and external factors.
- Scientists developed the **world's first universal PIM simulation software**, enabling the numerical analysis and evaluation of PIM generation in **complex microwave components** under external factors like electricity, heat, and stress with minimal error rates.
- Engineers have used this powerful software to develop effective PIM suppression techniques, including **dielectric isolation capacitors** and optimised mesh antenna wire preparation and weaving methods.
- It has enhanced the world's most sensitive PIM detection technology, capable of instantly pinpointing the source of weak PIM emissions, enabling satellites to receive signals from smartphones thousands of kilometers away.

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### Prelims:

**Q. With reference to the Indian Regional Navigation Satellite System (IRNSS), consider the following statements: (2018)**

1. IRNSS has three satellites in geostationary and four satellites in geosynchronous orbits.
2. IRNSS covers entire India and about 5500 sq. km beyond its borders.
3. India will have its own satellite navigation system with full global coverage by the middle of 2019.

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) None

**Ans: (a)**

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## Fourth Global Mass Coral Bleaching Event

**Source: DTE**

Coral Reef Watch (CRW) of the United States and the International Coral Reef Initiative (ICRI) have confirmed the **fourth global mass coral bleaching** event in 2023-2024.

- This is the **second such event in the last 10 years** and comes at a time when global oceans have also recorded **unprecedented heat** in 2023 and 2024.



- The **El Nino conditions** in the equatorial Pacific Ocean **added** onto the general trend of **warming** over land and oceans.
  - During El Niño events, warm ocean currents from the central and eastern Pacific Ocean move towards the western Pacific, causing sea surface temperatures to rise in many regions.
- Among long-term patterns, ocean heating and mass **coral bleaching** are closely tied to the occurrence of **El Nino events**.
  - This warming effect of El Niño contributes to ocean heating, which stresses coral reefs.
- The various **factors responsible** for coral bleaching are **increasing sea surface temperatures, extensive marine heatwaves, ocean acidification and pollution**.
- When sea surface temperatures and ocean heat in general rise, the **algae on the hard corals die off**. This makes the corals white.
- This process is known as '**coral bleaching**'. Once bleached, the corals can become vulnerable to diseases and eventually die.



# Coral Reefs

(Rainforests of the seas)



## About

- ✦ **Large underwater structures** – made of skeletons of **colonial marine invertebrates** ‘coral’ – individually called **polyp**
- ✦ **Symbiotic** Relationship with **algae** ‘**zooxanthellae**’ (responsible for beautiful colours of corals)
- ✦ Support over 25% of marine biodiversity

## Hard Corals vs Soft Corals

- ✦ **Hard Corals** - Rigid skeleton **made of  $\text{CaCO}_3$**  - **reef-building** corals
- ✦ **Soft Corals** - Non reef-building

## Great Barrier Reef (Australia)

- ✦ Largest Coral Reef in the World
- ✦ World Heritage Site (1981)
- ✦ Endures Mass Coral Bleaching



## Corals in India

- ✦ Present in the areas of Gulf of Kutch, Gulf of Mannar, Andaman & Nicobar, Lakshadweep Islands and Malvan



## Significance

- ✦ Coral reefs **protect coastlines from storms/erosion**, provide jobs, offer opportunities for recreation
- ✦ Source of **food/medicines**

## Threats

- ✦ **Natural:** Temperature, Sediment Deposition, Salinity, pH, etc.
- ✦ **Anthropogenic:** Mining, Bottom Fishing, Tourism, pollution, etc.

## Coral Bleaching

- ✦ Corals under stress - expel algae – thus turning white (bleached)
- ✦ Bleached corals - not dead – but, more risk of starvation/disease



## Initiatives to Protect Corals

### Technology

- ✦ **Cyromesh:** Storage of the coral larvae at (-196°C) - Can be later reintroduced to the wild
- ✦ **Biorock:** Creating artificial reefs on which coral can grow rapidly

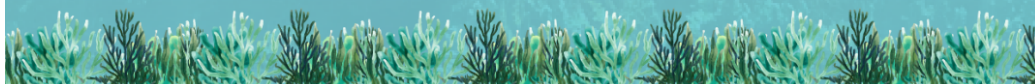


### Global

- ✦ International Coral Reef Initiative
- ✦ The Global Coral Reef R&D Accelerator Platform

### Indian

National Coastal Mission Programme



Read more: [Coral Bleaching in Great Barrier Reef](#)

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## Environmental Movement in Indonesia

Source: [NYT](#)

**Religious leaders in Indonesia** are responding to the threats posed by [rising sea levels](#) and extreme weather events by actively shaping the [environmental movement](#).

- As the world's **largest exporter of coal and palm oil**, the country wields significant influence over the global [climate crisis](#).
- The archipelago nation is vulnerable to rising sea levels and [extreme weather events](#), while rural communities are affected by climate change-induced [droughts](#).
- In 2007, during the [UN Climate Summit in Bali](#), Indonesian religious leaders from diverse faiths presented an interfaith statement that emphasised the role of religious teachings and local wisdom in inspiring **grassroots action**.
  - This growing trend in Indonesia is the emergence of **“Green Mosques”** and **“Green Churches.”**
  - To reduce the **ecological footprint** a number of other steps have also been taken such as:
    - Installation of Solar Panels
    - Implementing Water Recycling Systems
    - Using Energy-Efficient Faucets
- **Indonesia** is also planning to [relocate its capital](#) from **Island of Jakarta to Borneo** due to severe congestion, [pollution](#), and rapid sinking, which is projected to submerge a significant portion of the city by 2050.

Read more: [Environmental Movements](#)

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## NASA's Mars Sample Return Program

Source: [IE](#)

Recently, **NASA's Perseverance Rover**, nicknamed Percy, created the **first “sample depot on another world”** by putting down **ten rock sample tubes** that were supposed to be returned to Earth as part of the **Mars Sample Return Campaign**.

- However, the plan is **too expensive** costing \$11 billion, and will only be executed by the **year 2040**.
- **Perseverance rover:**
  - It is a **robotic explorer** part of NASA's Mars 2020 mission.
  - Launched in July 2020, it **landed on [Mars' Jezero Crater](#)** in February 2021.
  - It is a [Mars rover](#) about the size of a car but weighs only about **1,025 kilograms** with all instruments on board.
  - It **collects rock and soil samples, encasing them in tubes** for a future return to Earth.
  - A **Multi-Mission Radioisotope Thermoelectric Generator**, which uses heat from plutonium decay to generate electricity, acts as the power source for the rover.

Read more: [Perseverance Rover, Mars](#)

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## Kandukuri Veeresalingam

16<sup>th</sup> April was the birth anniversary of reformer Kandukuri Veeresalingam.

- **Kandukuri Veeresalingam (16<sup>th</sup> April 1848 - 27<sup>th</sup> May 1919) :**
  - He was a [social reformer](#) and [writer](#) from the **Madras Presidency** of British India. He was influenced by the ideals of [Brahmo Samaj](#).
  - He is considered as the **father of the Telugu Renaissance movement**.
  - He was one of the **early social reformers** who **encouraged the education of women** and the **remarriage of widows** (which was not supported by society during his time).
  - He also **fought against child marriage and the dowry system**.
  - He **started a school in Dowlaiswaram** in 1874.
  - He constructed the '**Brahmo Mandir**' in 1887 and built the '**Hithakarini School**' in 1908 in [Andhra Pradesh](#).
  - His **novel Rajasekhara Charitramu** is considered to be the **first novel in Telugu literature**.



Read More: [Socio-Religious Reform Movements Part:I](#) , [Part:II](#)

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## Russian Peacekeepers' Withdrawal from Nagorno-Karabakh

Source: [TH](#)

Russian peacekeepers have initiated their withdrawal from [Nagorno-Karabakh](#) following Azerbaijan's recapture of the disputed territory from Armenian separatists in September 2023.

- The decision for the withdrawal was agreed between Baku (Azerbaijan) and Moscow at the "highest levels."
- Nagorno-Karabakh, is a mountainous region in the **Caucasus (the transcontinental region between the [Black Sea](#) and the [Caspian Sea](#))**, internationally recognized as part of Azerbaijan but predominantly inhabited by ethnic Armenians.
  - The conflict began in the late 1980s when the region declared independence from Azerbaijan, leading to a war between Armenia and Azerbaijan.
  - A ceasefire in 1994 left Nagorno-Karabakh and surrounding areas under Armenian control, but frequent violations and failed negotiations followed.
  - In 2020, Azerbaijan won the Second Karabakh War, regaining control of seven surrounding districts and a third of Nagorno-Karabakh. **Russia brokered a peace deal and deployed peacekeepers** in the region.
- The conflict has strained relations between Russia and Armenia, as Moscow maintains warm ties with Baku.
  - Armenia announced that it has effectively suspended its participation in the **Moscow-led Collective Security Treaty Organisation (CSTO)**, a defense alliance.



Read more: [Nagorno-Karabakh Conflict](#)

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