

## Prelims Exam Topics

### EVOLUTIONARY TREE OF SNAKES

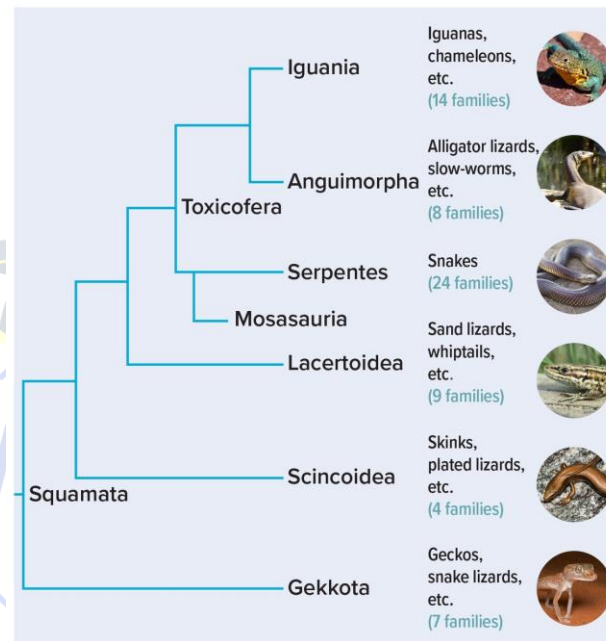
#### Context

Recent fossil discoveries and modern genetic studies are helping scientists trace the evolutionary origins of snakes and their position in the reptilian evolutionary tree.

#### Evolutionary Tree of Snakes

- **Origin of Snakes:** Scientists estimate that ancestral snakes emerged around **160 million years ago** during the dinosaur era (under the reptilian order **Squamata**)
- **Closest Evolutionary Relatives:** Snakes are linked to the reptilian clade **Toxicofera**, which includes **monitor lizards, iguanas and venomous lizards**.
- **Debate on Snake Origins:** Scientists debate whether early snakes evolved in underground burrows, marine environments or terrestrial sandy habitats.
  - New fossil evidence from Patagonia suggests snakes likely evolved in terrestrial or semi-burrowing environments.
- **Important Transitional Fossils:** Fossils such as **Najash rionegrina** (95 million years old) and **Dinilysia patagonica** (80 million years old) provide clues about early snake evolution.
- **Loss of Limbs:** Snakes gradually evolved elongated bodies and lost limbs between **150–125 million years ago**, improving burrowing and slithering efficiency.

#### Evolutionary tree of lizards and snakes



### INCOIS EXPANDS COASTAL FLOOD MONITORING TO TACKLE

#### KALLAKKADAL SURGES

#### Context

Indian National Centre for Ocean Information Services (INCOIS) installed a second **Coastal Flood Monitoring System (CFMS)** near Kollam Harbour to improve forecasting of “Kallakkadal” swell surge events

### About Kallakkadal Surges

- **Meaning:** “Kallakkadal” refers to sudden coastal flooding caused by high-energy swell waves generated by distant storms in the southern Indian Ocean.
- **Cause:** Triggered by long-period ocean swells generated nearly 10,000 km away in the southern Indian Ocean.
- **Scientific Basis:** Linked to low-frequency **infragravity waves** formed through interactions among shorter waves in the open ocean.
  - **Shoaling Effect:** Wave height increases as waves move from deep to shallow waters.
  - **Role of Coastal Bathymetry:** Underwater topography amplifies wave energy near the shore.
- **Wave Characteristics:** These are long-period swells with wave periods ranging from 30–300 seconds.
- **Vulnerable Regions in India:** India’s southwest coast, especially Kerala, is highly vulnerable during the pre-monsoon season.(February–May).
- **Impact:** Threatens fishing communities, harbours, coastal infrastructure and low-lying settlements.

### Coastal Flood Monitoring System (CFMS):

- A monitoring system integrating **weather stations and high-frequency pressure sensors in shallow waters** to track nearshore wave transformation and coastal water-level changes in real time.
- **Developed and operated** by INCOIS under the Ministry of Earth Sciences (MoES)
- **CFMS Locations:** First CFMS was installed at Vizhinjam and the second near Kollam Harbour.
- **Significance of CFMS:** Strengthens early warning systems, improves forecast accuracy and enhances coastal disaster preparedness and resilience.

## COAL GASIFICATION SCHEME

### Context

The Union Cabinet approved a **₹37,500 crore Coal Gasification Scheme** to accelerate coal gasification

### About the Scheme

- **Objective:** To promote surface coal gasification and support production of syngas-based downstream products such as urea, methanol, ammonia, fertilisers and Synthetic Natural Gas (SNG).
- **Target:** India aims to gasify 100 million tonnes (MT) of coal by 2030, with the scheme targeting around 75 MT contribution.
- **Incentives Under Scheme**
  - **Financial Incentive:** Provides financial support up to 20% of plant and machinery cost for eligible projects.
  - **Project-Wise Incentive Cap:** Maximum incentive capped at ₹5,000 crore per project, while SNG and urea-based projects can receive up to ₹9,000 crore.

- **Entity-Wise Incentive Cap:** A single entity can avail a maximum of ₹12,000 crore across all categories.
- **Coal Linkage Reform:** Scheme extends coal linkage tenure up to 30 years for syngas/coal gasification projects to provide long-term certainty for investors.
- **Related Initiative:** Builds upon the National Coal Gasification Mission and earlier ₹8,500 crore incentive scheme (2024).
- **Need for the Scheme:** India has high import dependence for products like methanol (80–90%), ammonia (near total dependence), LNG, urea and coking coal. (India's import bill for these was around ₹2.77 lakh crore in FY2025)

#### Coal Gasification:

- Process of converting coal into syngas (synthetic gas) through controlled reaction with oxygen, steam and air.
- Coal gasification is considered relatively cleaner than direct coal combustion and can support cleaner industrial fuel transition.

## STRENGTHENING ROAD SAFETY THROUGH TECHNOLOGY AND LEGAL

### REFORMS

#### Context

The Supreme Court directed States to strictly enforce CMV Rules, 1989, by mandating speed governors, tracking devices, and panic buttons in public transport to reduce road fatalities.

#### Key Directives on Vehicle Safety Devices

- **Speed Governors (Rule 118):** Mandates speed-limiting devices to prevent over-speeding.
- **Vehicle Location Tracking (VLT) Devices:** Uses GPS to transmit real-time location data to government control centers.
- **Emergency Panic Buttons:** Enables passengers to send instant alerts to police or safety command centers during medical distress, abductions, or hijackings.
- **VAHAN Integration:** Compliance data must be integrated with the **VAHAN portal** for real-time monitoring by authorities.

#### Central Motor Vehicles (Second Amendment) Rules, 2026

- **Toll Compliance Enforcement:** Aims to reduce non-payment and boost Electronic Toll Collection (ETC) efficiency by formalizing the definition of "unpaid user fee".
- **Service Restrictions:** Mandates the clearance of all outstanding toll dues before a vehicle owner can access key transport-related services.
- **Ownership and Fitness Blocks:** Prohibits the issuance of No Objection Certificates (NOC) for

transfers and the renewal of Certificates of Fitness if toll payments are pending.

- **Commercial Permit Prerequisites:** Requires commercial vehicles to have zero unpaid highway user fees to qualify for or renew a National Permit.
- **Digital Integration:** Modifies Form 28 for electronic processing of toll records and supports **Multi-Lane Free Flow** systems for barrier-free, non-stop highway travel.

## THAILAND–CAMBODIA TEMPLE DISPUTE

### Context

A dispute has emerged between Thailand and Cambodia after Thailand included several disputed temple ruins in its official registry of ancient monuments.

### Disputed temples at the centre of the conflict

- **Tamone Temple:** Known as Ta Muen in Thailand, the temple lies in a sensitive border region claimed by both countries.
- **Ta Krabey Temple:** Called Ta Kwai in Thailand, this temple has witnessed military presence from both Cambodian and Thai forces in recent years.
- **K'nar Temple:** Also known as Nong Khana in Thailand, the site came under Thai control after border clashes in late 2025.

### Important Indian-origin temples abroad

Temple	Country	Significance
Angkor Wat	Cambodia	Originally built as a Hindu temple dedicated to Vishnu during the Khmer Empire; later transformed into a Buddhist site.
Prambanan Temple	Indonesia	One of the largest Hindu temple complexes in Southeast Asia, dedicated to Shiva, Vishnu, and Brahma.
Pashupatinath Temple	Nepal	A major Hindu pilgrimage site dedicated to Lord Shiva.
Batu Caves	Malaysia	Important Hindu religious complex associated with Lord Murugan.
My Son Sanctuary	Vietnam	Ancient Hindu temple complex influenced by Indian civilisation and Champa culture.
Wat Phou	Laos	Khmer-era Hindu temple dedicated to Shiva and influenced by Indian religious traditions.

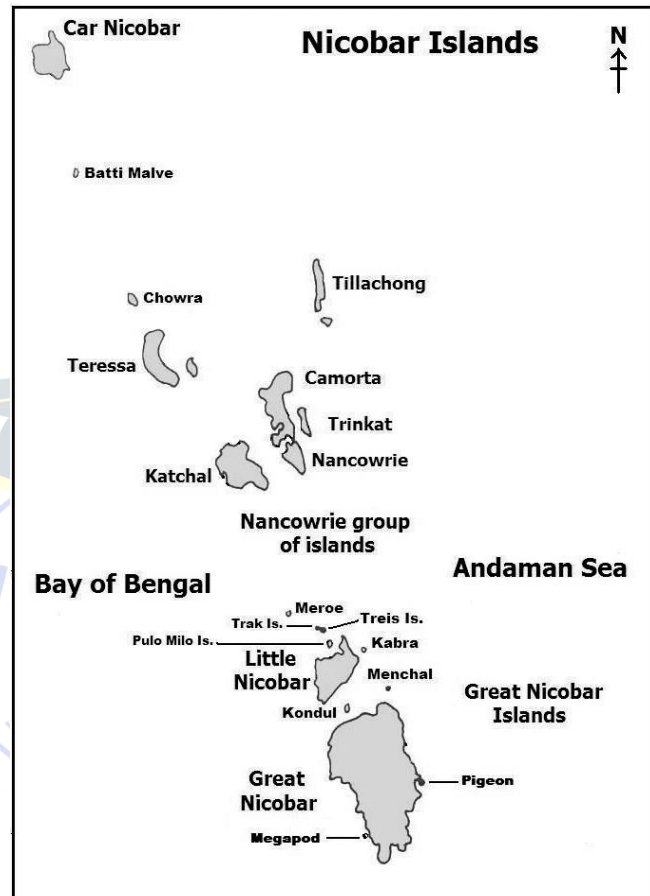
## PLACES IN NEWS: NICOBAR ISLANDS

### Context

Three wildlife sanctuaries proposed in the Nicobar Islands — on Little Nicobar, Meroe and Menchal Islands — triggered opposition from the Nicobarese Tribal Council

### Little Nicobar Island

- **Location:** Island located north of Great Nicobar Island in the southern Nicobar group.
- **Proposed Sanctuary:** Parts of the island proposed as **Leatherback Turtle Sanctuary**.
  - Major nesting site of the **Leatherback Turtle** (*IUCN: Vulnerable; WPA 1972: Schedule I; CITES Appendix I*).
- **Endemic Species:** Supports endemic fauna such as Nicobar long-tailed macaque (*IUCN: Vulnerable; WPA: Schedule I*) and Nicobar tree shrew.
- **Tribal Importance:** Traditional Nicobarese settlements and plantation areas located in villages such as Bahua, Muhincoin and Kiyang.



### Menchal Island

- **Location:** Small island situated near Great Nicobar in the southern Nicobar archipelago.
- **Proposed Sanctuary:** Entire island proposed as **Megapode Sanctuary**
- **Megapode (Nicobar Scrubfowl):** *IUCN: Vulnerable; WPA: Schedule I*, an endemic mound-building bird found only in Nicobar Islands.
  - **Unique Bird Behaviour:** Nicobar megapodes build incubation mounds using sand and vegetation instead of directly incubating eggs.

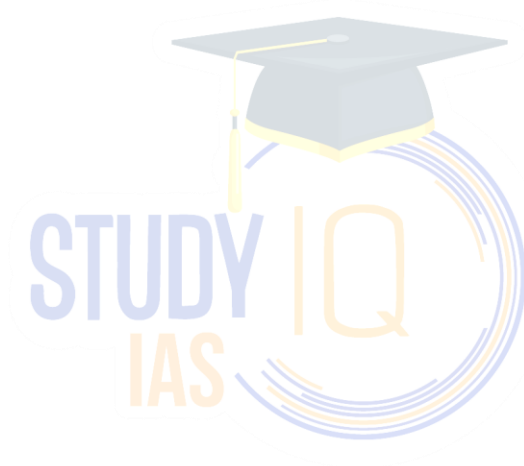
### Meroe Island

- **Location:** Island situated north of Great Nicobar and close to Menchal Island in the Nicobar group.
- **Proposed Sanctuary:** Entire island proposed as **Coral Sanctuary**.

- **Marine Significance:** Supports marine species such as reef fish, crustaceans and sea turtles associated with Nicobar reef ecosystems.
- **Cultural Significance:** Regarded as a sacred island linked to ancestral spirits in Nicobarese traditional belief systems.

#### Broader Ecological Significance

- **Great Nicobar Biosphere Reserve:** These islands form part of the ecologically sensitive Nicobar landscape associated with the Great Nicobar Biosphere Reserve (UNESCO MAB Reserve).
- **Biodiversity Hotspot:** Region supports endemic and threatened species such as dugong, saltwater crocodile, robber crab and Nicobar macaque.



## Mains Exam Topics

### GOLD AND SILVER IMPORT DUTIES

#### Context

The India government has sharply raised import duties on gold, silver, and platinum to curb precious metal imports and protect foreign exchange reserves amid economic pressure from the West Asia crisis.

#### New Duty Structures

- **Gold and Silver:** The effective customs duty has been raised from **6% to 15%**.
- **Related Products:** Higher duties now apply to gold and silver **doré, coins, and jewellery components**.
- **Platinum:** Duties on platinum have also been increased as part of this comprehensive effort to reduce the precious metal import bill.

#### Why was it necessary?

- **West Asia Conflict:** Geopolitical tensions have led to soaring crude oil prices and threats to shipping routes in the **Strait of Hormuz**, vastly increasing India's mandatory energy import bill.
- **Forex Reserve Depletion:** India's foreign exchange reserves have fallen significantly since the conflict began, raising concerns about the ability to manage rising costs.
- **Prioritizing Essentials:** Precious metals are classified as **discretionary imports**. The duty hike ensures that limited foreign exchange is preserved for "critical needs" such as crude oil, fertilisers, defence equipment, and industrial raw materials.

#### Impact of the Policy Shift

##### Domestic Market and Consumers

- **Increased Retail Prices:** Jewellers are expected to pass the higher landed costs directly to buyers, making jewellery and bullion significantly more expensive.
- **Immediate Market Volatility:** Following the announcement, gold and silver prices saw a sharp surge in domestic commodity markets.
- **Industry Setback:** This move reverses earlier policy efforts intended to support the gems and jewellery industry and discourage smuggling through lower duties.



#### Macroeconomic Indicators

- **Rupee Stabilization:** By reducing the demand for U.S. dollars used to purchase gold, the government hopes to ease pressure on the rupee, which recently fell to record lows.

- **Current Account Deficit (CAD):** Moderating gold imports viewed as a major "dollar drain" is intended to prevent further widening of the trade and current account deficits.
- **Inflation Control:** While domestic gold prices rise, stabilizing the currency can help mitigate broader "imported inflation" caused by high energy costs.

### India's Import Landscape

Category	Status & Impact
<b>Gold Demand</b>	India is the world's second-largest consumer; reliance on imports is nearly absolute.
<b>Energy Dependence</b>	India imports the vast majority of its crude oil and LPG, much of which passes through the Gulf region.
<b>Import Bill Trend</b>	The gold import bill surged in 2025–26 due to high global prices, despite lower physical volumes.

### Way Forward

- **Promoting Financialization:** Strengthen the **Sovereign Gold Bond (SGB)** scheme to redirect physical gold demand into financial instruments, reducing the need for physical imports.
- **Energy Diversification:** Accelerate the transition to public transport and **electric mobility** as mentioned in recent austerity calls to reduce the structural reliance on imported crude oil.
- **Enhanced Smuggling Surveillance:** Because high duties can incentivize illegal trade, the government must increase vigilance at borders and strengthen the enforcement capabilities of the Directorate of Revenue Intelligence (DRI).
- **Recycling Incentives:** Improve the efficiency of the **Gold Monetization Scheme** to bring idle domestic gold back into the circular economy, thereby reducing the dependency on fresh imports.

## INDIA'S AGRI-EXPORT SURGE

### Context

The financial year 2025-26 has emerged as a landmark period for Indian agriculture. Despite the geopolitical and economic headwinds triggered by a more protectionist United States under the Trump administration, India's farm sector has demonstrated remarkable agility.

### Factsheet

- **Total Agri-Exports:** \$53.1 billion (a 2.3% year-on-year increase).
- **Growth Benchmark:** Agri-exports outpaced India's overall merchandise export growth (0.9%).
- **Market Shifts:** Marine exports to the US dropped by \$400 million, while exports to China

and Vietnam rose by a combined \$660 million+.

- **Star Performers:**
  - **Marine Products:** \$8.4 billion (up 13.9%).
  - **Buffalo Meat:** \$5.1 billion (up 25.6% – a new record).
  - **Coffee:** \$2.0 billion+ (nearly trebled since 2020-21).
- **Import Concentration:** Vegetable oils remained the top import (\$19.5 billion), followed by pulses (\$3.6 billion).

### Why did Farm Exports grow despite US Tariffs?

- **Aggressive Market Diversification:** When the US imposed tariffs (peaking at 50% before settling at 10%), Indian exporters didn't wait for a policy reversal. Marine exporters pivoted toward Southeast Asia (Vietnam, Thailand) and Europe (Belgium, Italy), effectively neutralizing the "Trump shock."
- **Capitalizing on Global Supply Shocks:** India's coffee exports surged because major competitors like Brazil (Arabica) and Vietnam (Robusta) faced subpar harvests. India stepped in to meet the demand of the European and Russian markets.
- **Strategic Demand in Emerging Markets:** The buffalo meat industry tapped into high demand from Egypt, Vietnam, and West Asian countries. New markets like Uzbekistan saw a massive jump from \$97 million to \$307 million in just one year.
- **Favorable Commodity Prices:** High global prices for specific commodities helped maintain value growth even when quantity growth was modest in certain sectors.

### Persistent Challenges

- **"Tree Nut" Dependency:** India remains heavily reliant on the US for fresh fruit and nut imports (almonds/walnuts), which saw a value increase to \$1.4 billion, worsening the trade balance in that specific sub-sector.
- **Decline in Traditional Staples:** Exports of basmati rice, spices, and processed fruits/vegetables actually declined, suggesting that tariff impacts were felt more heavily in these high-value, branded categories.
- **Import Vulnerability:** India still lacks self-sufficiency in edible oils and pulses, meeting only 40% of its oil demand domestically. This leaves the economy vulnerable to global price volatility.
- **Cotton Crisis:** Once a major exporter, India is now seeing an import surge in raw cotton, indicating a potential decline in domestic yield or quality compared to global textile requirements.

### Way Ahead: A Roadmap for 2027 and Beyond

- **Strengthening Value Chains:** Focus on processed agri-products rather than raw commodities to insulate exports from direct tariff shocks on primary goods.
- **Expanding the "Look East" Policy:** Given the success in China and Vietnam, India should formalize deeper agricultural trade agreements with ASEAN nations to create a permanent buffer against Western protectionism.

- **Investing in Edible Oil & Pulses:** To reduce the massive \$23 billion import bill, a mission-mode approach to domestic oilseed production is critical for "Atmanirbharta" (self-reliance).
- **Logistics and Cold Chain Infrastructure:** To maintain the record-breaking streak in marine and fresh produce, India must invest in state-of-the-art cold storage at ports to reduce wastage and meet the stringent phytosanitary standards of the EU and Japan.
- **Cotton Rejuvenation:** Research into high-yielding, pest-resistant cotton varieties is needed to reverse the trend of becoming a net importer of fiber.

