

## DAILY CURRENT AFFAIRS (DCA)

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## BAYESIAN CONVOLUTIONAL NEURAL NETWORK (BCNN)

### Context

- Recently, **Indian National Centre for Ocean Information Services (INCOIS)** has developed the **Bayesian Convolutional Neural Network (BCNN)** to predict the emergence of El Niño and La Niña conditions up to 15 months in advance.

### About the Bayesian Convolutional Neural Network (BCNN)

- It is cutting-edge technology that harnesses the power of **Artificial Intelligence (AI), deep learning, and machine learning (ML)** to enhance **predictions** related to the **El Niño-Southern Oscillation (ENSO)** phases.
- The **BCNN model** is particularly adept at **predicting El Niño or La Niña events** due to its **ability to account for the slow oceanic variations** and their atmospheric coupling.
- It calculates the **Niño3.4 Index Value**, a critical metric **used in ENSO phase prediction**, with improved precision which is obtained by averaging the sea surface temperature (SST) anomaly in the central equatorial Pacific, extending from 5°N to 5°S, and 170°W to 120°W.
- It offers a promising **future** for more **reliable and timely weather predictions**, which are vital for agriculture, fisheries, and disaster management.

- It is a combination of the **dynamic model with AI that** helps it forecast the emergence of El Niño and La Niña conditions with a **15-month lead time** — unlike **other models** which can give a **prediction up to six to nine months in advance**.

### INCOIS

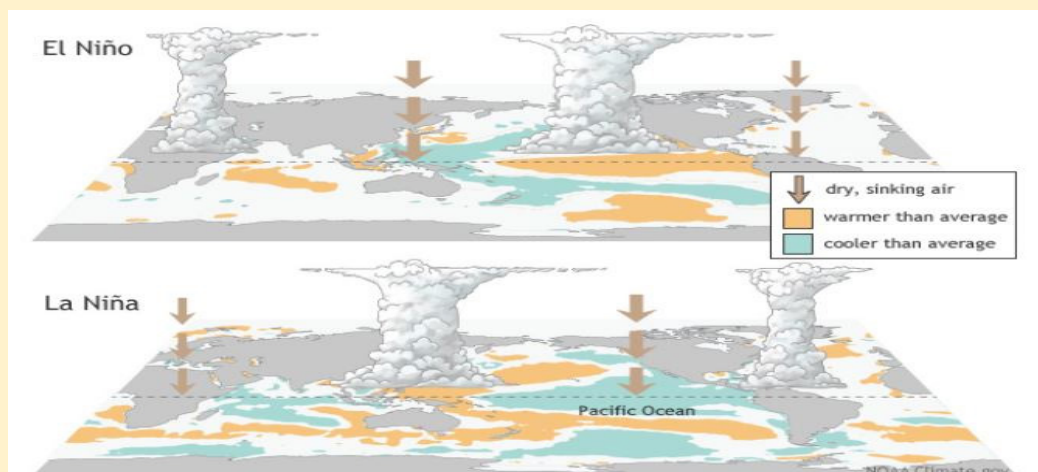
- It was established as **an autonomous body** in 1999 under the **Ministry of Earth Sciences (MoES)** and is a unit of the **Earth System Science Organisation (ESSO)**.
- It is mandated to provide the best possible ocean information and advisory services to society, industry, government agencies and the scientific community through sustained ocean observations and constant improvements through systematic and focussed research.

### Weather Models

- There are largely **two kinds of weather models** used for forecasting, ie:
  - Statistical Model:** It generates forecasts based on various information sets received from different countries and regions
  - Dynamic Model:** It involves a 3D mathematical simulation of the atmosphere done using **High Performance Computers (HPC)**.
    - It is much **more accurate** than the statistical model.

### El Niño-Southern Oscillation (ENSO)

- It is a climate phenomenon which involves changes in the temperature of waters in the central and eastern tropical Pacific Ocean, coupled with fluctuations in the overlying atmosphere.
  - It can alter the global atmospheric circulation, which, in turn, influences weather across the world.
- It occurs in irregular cycles of 2-7 years and has **three different phases** — **warm (El Niño), cold (La Niña), and neutral**.



- **Neutral Phase:** The eastern side of the Pacific Ocean (near the northwestern coast of South America) is cooler than the western side (near the Philippines and Indonesia). This is due to the prevailing wind systems that move from east to west, sweeping the warmer surface waters towards the Indonesian coast. The relatively cooler waters from below come up to replace the displaced water.
  - **El Nino (Warm Phase):** Wind systems weaken, leading to lesser displacement of warmer waters. As a result, the eastern side of the Pacific becomes warmer than usual, and trade winds — east-west winds that blow near the Equator — weaken. Normally, easterly trade winds blow from the Americas towards Asia. Due to El Niño, they falter and change direction to turn into westerlies, bringing warm water from the western Pacific towards the Americas.
  - **La Nina (Cold Phase):** La Nina is the opposite of El Nino. It is cooler than average sea surface temperature (SST) in the equatorial Pacific region. Trade winds are stronger than usual, pushing warmer water towards Asia.
- **In India, while El Nino conditions usually lead to a weak monsoon and intense heat waves, La Nina conditions result in a strong monsoon.**

Source: IE

## INITIATIVE ON CRITICAL AND EMERGING TECHNOLOGY

### Context

- National Security Advisors of India and U.S. **discuss iCET, defence ties, and regional security**, focusing on emerging technologies and partnerships.
  - ♦ They chaired the second meeting of the **initiative on Critical and Emerging Technology (iCET)**.

### About iCET

- It was announced by India and USA on the **sidelines of the Quad Summit** in Tokyo in **2022** and was launched by the **NSAs in 2023**.
- It comprises **key technology sectors** such as space, semiconductors, advanced telecommunications, artificial intelligence, quantum, biotechnology, and clean energy.
- Subsequently, **new areas were included:** biotechnology, critical minerals and rare earths processing technologies, digital connectivity and digital public infrastructure and advanced materials.
- **Key takeaways include:**
  - ♦ setting up a research agency partnership to drive collaboration in areas like AI;
  - ♦ developing a new defence industrial cooperation roadmap to accelerate technological cooperation for joint development and production;
  - ♦ developing common standards in AI;

- ♦ developing a roadmap to accelerate defence technological cooperation and 'innovation bridge' to connect defence startups;
- ♦ supporting the development of a semiconductor ecosystem;
- ♦ strengthening cooperation on human spaceflight;
- ♦ advancing cooperation on development in 5G and 6G;
- ♦ and adopting OpenRAN network technology in India.

### Progress Made so Far

- The two countries have already put in place the **Quantum Coordination Mechanism**, launched a public-private dialogue (PDD) on telecommunication to drive collaboration in OpenRAN, 5G and 6G.
- Both countries signed an MoU on establishing a **semiconductor supply chain** that paved the way for creating a semiconductor sub-committee to review recommendations from an industry-led task force launched in connection with the iCET.
- A new initiative to advance cutting-edge technology cooperation, known as the **India-U.S. Defence Acceleration Ecosystem (INDUS-X)** was launched.
- India and the U.S. have also concluded a **roadmap for 'Defence Industrial Cooperation'** to guide the policy direction for the next few years.
- The two countries have also established a **Strategic Trade Dialogue** to remove regulatory "barriers" and review existing export control norms to take forward strategic technology and trade collaborations envisaged under iCET.

### Significance

- **Depth to the relationship:** iCET could lend a new strategic depth and breadth to the expanding engagement between India and the United States.
- **Against the rising and assertive China:** Lending urgency to the iCET is the growing convergence of Indian and US interests in managing the security, economic, and technological challenges presented by a rising and assertive China.
- **Reducing dependence on Russia:** India is also looking to reduce its over-dependence on Russian weapons and military technology and to produce more weapons at home in partnership with western countries.

### Conclusion

- Both the NSAs express optimism that the initiative will achieve more specific and tangible results in the near future.

Source: TH

## TRAIN ACCIDENTS IN INDIA

### In News

- Several train accidents have occurred in India over the last decade for multiple reasons, ranging from mechanical failures to human negligence.

### About

- Indian Railways is one of the largest rail networks in the world, spanning over **67,000 kilometers and connecting every corner of the country.**
  - ♦ It serves as the lifeline of transportation for millions.
- There has been an average of **44 consequential train accidents** every year in the five-year period ending 2022-23 (FY23).

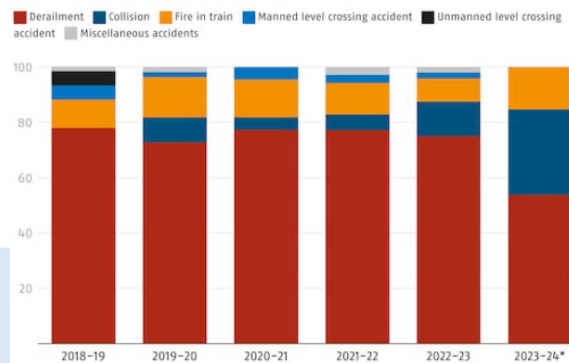
### Train Accidents

- It is an occurrence in the course of working of Railway which does or may affect the safety of the Railway, its engine, rolling stock, permanent way and works, fixed installations, passengers or servant or which affect the safety of others or which does or may cause delay to train or loss to the Railway
- Despite advancements in **technology and infrastructure**, these incidents continue to impact passengers, infrastructure, and the overall economy.

### Types

- **Derailments** : where a train goes off the tracks, are the most common.
  - ♦ These can be caused by a variety of factors including track defects, equipment failure, human error, or even sabotage.
- **Collisions:** It occurs when two or more trains collide on the same track, often due to signal failures or errors in communication between railway personnel.
- **Level crossing accidents** : It involves collisions between trains and vehicles or pedestrians at rail crossings, highlighting the need for better safety mechanisms at these points.

Reasons for consequential train accidents (in %)



\*Data as of July 2023

### India's Worst Train Disasters

- **2024: Kanchanjunga Express train accident** occurred near Rangapani station in the Katihar Railway Division, ahead of New Jalpaiguri Junction
- **2023:** Coromandel Express hit a goods train in Balasore after hitting **Bengaluru-Howrah Superfast Express**, resulting in a tragic triple train crash.
  - ♦ Over 300 people were killed, and well over 1,000 were injured.
- **2016:** At least 146 people died when an **Indore-Patna Express train** derailed in Uttar Pradesh on 20 November, causing carriages to crash into each other.
- **2010:** On 28 May, a train derailed and crashed into a freight train about 83 miles west of Kolkata in Bengal, killing 146 and injuring over 200.
- **2002: The luxury Rajdhani Express** from Calcutta to New Delhi plunged into the swollen Dhabri river, killing at least 120 people.
- **1999:** On 2 August, 285 people were killed and 312 injured in a collision between two trains in Gaisal, West Bengal.

- **1998:** At least 210 people were killed when the **Sealdah Express** collided with a derailed train in Punjab.
- **1995:** More than 300 died and 344 were injured on 20 August in a collision between two trains at Firozabad, near Agra.
- **1981:** More than **800 people were killed in India's deadliest rail accident** on 6 June when a train derailed in Bihar and plunged into the river below.
- **1954:** On 28 September, a train travelling between Madras and New Delhi derailed after the collapse of a bridge, leaving at least 137 people dead and 100 injured.

### Impacts

- **Casualties and hampers functioning** : The impact of train accidents extends beyond immediate casualties and injuries.
  - ◆ Each incident disrupts the smooth operation of the railway network, leading to delays, cancellations, and financial losses.
- **Trust related issues:** It erodes public trust in the safety of train travel, affecting passenger confidence and ridership.
- **Economic cost** : the cost of infrastructure damage, compensation payouts, and the investment required for safety upgrades are substantial.
  - ◆ These accidents also have broader implications for industries relying on efficient freight transport, impacting supply chains and logistics

### Challenges

- The vast railway network faces significant challenges when it comes to safety, with train accidents being a recurring concern.
- The scale of the railway network makes it difficult to monitor and maintain every section of track effectively.
- Issues such as overcrowded trains, inadequate maintenance, and human error continue to pose significant threats to safety.

### Safety Initiatives

- The Indian Railways has been proactive in implementing safety measures to mitigate the risk of accidents.
  - ◆ This includes regular track inspections, the introduction of modern signaling systems, and the adoption of technology-driven solutions like train collision avoidance systems (TCAS).

- The Supreme Court directed the Indian government to outline preventive measures, including the **'Kavach' train protection system**, following a catastrophic three-train collision in Odisha's Balasore district that claimed nearly 300 lives.
  - ◆ It urged immediate action and sought a detailed plan to bolster railway safety, emphasizing the need for expert evaluation, system enhancements, and the 'Kavach' system's swift implementation to avert future accidents.

### Suggestions and Way Forward

- **Continued investment in upgrading tracks**, signaling systems, and rolling stock is crucial.
  - ◆ Modernizing aging infrastructure can significantly reduce the risk of accidents.
- **Strengthening safety protocols** through better training of railway staff, stricter adherence to operating procedures, and leveraging technology for real-time monitoring and response.
- **Increasing public awareness** about railway safety, including rules at level crossings and onboard safety measures, can prevent accidents involving pedestrians and vehicles.
- **Improved coordination between different stakeholders**—government agencies, railway authorities, and the public—ensures accountability and timely response to safety issues
- **Encouraging research into innovative safety technologies** and practices tailored to Indian conditions can lead to breakthroughs in accident prevention.
- As India continues to develop the demand for safe and reliable rail transport, it is imperative that safety measures evolve to protect passengers and ensure the continued viability of the railway system.

#### Do you know ?

**KAVACH** is an indigenously developed ATP system by Research Design and Standards Organisation (RDSO) in collaboration with Indian industry and trials facilitated by **South Central Railway** to achieve the corporate objective of safety in train operations across Indian Railways.

- It is a state of the art electronic system of Safety Integrity Level - 4 standards.

- It is meant to provide protection by preventing trains from passing the signal at Danger (Red) and avoiding collisions.
- It activates the train braking system automatically if the driver fails to control the train as per the speed restrictions. In addition, it prevents collision between two Locomotives equipped with a functional KAVACH system.

Source:IE

## INDIA-ITALY STRATEGIC PARTNERSHIP

### Context

- Prime Minister Narendra Modi met his Italian counterpart with a focus on a free and open Indo-Pacific and India-Middle East-Europe Economic Corridor.

### About

- Both the leaders reviewed the progress of the bilateral strategic partnership and agreed to strengthen cooperation in global fora and multilateral initiatives, including the India-Middle East-Europe Economic Corridor.

### India-Italy Strategic Partnership

- India and Italy elevated their Relations into **Strategic Partnership in 2023**.
- Italy is the next country in Europe after France, Germany and The Netherlands, to be taking a keen interest in engagements in the Indo-Pacific region and a gradual upswing in its ties with India is an **important part of its recent Indo-Pacific pivot**.
- In 2021, the **'India-Italy-Japan' trilateral was launched**, with an aim to work towards the security, stability, prosperity and multilateralism of the Indo-Pacific region.
  - ♦ It is the second trilateral that India has, in the Indo-Pacific region, involving a European country, after the 'India-France-Australia' trilateral.
- **Global Forums:** Italy joined both the significant initiatives, launched on the margins of the G20 Summit, the **'Global Biofuel Alliance'** and the **'India-Middle East-Europe Economic Corridor'**.
  - ♦ Italy has also joined the **'International Solar Alliance' (ISA)**, in 2021, which was the year of the Italian Presidency of G20 and co-Presidency of COP26.

- **Bilateral trade** between India and Italy has substantially increased; it was estimated at 4.9 billion Euros in 2022, with a 42% growth over 2021.
  - ♦ Italy is the fifth largest trading partner of India in the EU.
  - ♦ Italy, which is looking at supply chain consolidation and diversification in its post-pandemic recovery, sees India as an important partner in the region.
- The two countries are looking forwards to strengthen **cooperation in defence technology, maritime security and space**, with similar concerns in maritime domain.
- **Relations with China:** At the same time, there is also Italy's growing concern about China in the broader European and Indo-Pacific region.
  - ♦ There are reports about Italy's intention to exit China's BRI. In case this happens, it will be a significant policy shift for Italy.
  - ♦ Geopolitical necessities are resulting in Italian policy makers, shaping and reshaping their relationships in Asia.

### Way Ahead

- Recent developments show that there is a renewed interest in the relationship from both sides.
- India and Italy can leverage their strategic positions in the Indian Ocean and in the Mediterranean, respectively, to promote connectivity, stability, energy security, freedom of navigation in the two maritime geographies, and therefore in the wider Indo-Pacific region.

Source: TH

## NEWS IN SHORT

### ALAKNANDA RIVER

#### Context

- Fourteen people were killed after a traveler plunged into Alaknanda River in Uttarakhand's Rudraprayag district.

#### Alaknanda River

- It rises at the confluence and foot of the Satopanth and Bhagirath Kharak glaciers in Uttarakhand.
  - ♦ It is one of the two headstreams of the river Ganga.

- **At Vishnuprayag** it meets **Dhauliganga**, a left bank tributary, and travels west to the town of Joshimath.
  - **At Nandprayag** it meets Nandakini River, a left bank tributary, meets with the Alaknanda River.
  - **At Karanprayag**, the Pindar River, a left bank tributary, meets with the Alaknanda River.
  - **At Rudraprayag**, it meets with the Mandakini River, a right bank tributary.
  - **At Devprayag** the Alaknanda River converges with the **Bhagirathi River** and travels onward as the Ganges River.
- **Aim:** to promote digital health transactions and to provide a **boost to the healthcare providers for adopting digital health.**
  - Under the scheme, government and private hospitals, clinics, nursing homes, diagnostic labs, and pharmacies are paid Rs 20 for each additional record they digitise, over and above the threshold of 100 transactions a month.
  - The scheme is **applicable to both public and private hospitals** and **digital solution companies (DSCs)** creating digital health records.
    - ♦ Under it, each facility or digital solution company **can earn incentives up to Rs 4 crores.**

Source: IE

## STREPTOCOCCAL TOXIC SHOCK SYNDROME (STSS)

### In News

- Japan is facing a significant health crisis due to the spread of Streptococcal Toxic Shock Syndrome (STSS).

### About Streptococcal Toxic Shock Syndrome (STSS)

- STSS is a severe illness caused by group **A Streptococcus bacteria**, triggers an intense inflammatory response that can damage multiple organs.
- Early symptoms like fever, muscle pain, and nausea can quickly escalate to organ failure if not promptly treated.
- Timely medical intervention with antibiotics, fluids, and sometimes surgery is crucial to save lives and prevent serious complications.

Source: TH

## DIGITAL HEALTH INCENTIVE SCHEME

### Context

- The Union Government has given a **year-long extension to the Digital Health Incentive Scheme (DHIS).**

### Digital Health Incentive Scheme

- The scheme was launched by the **National Health Authority (NHA)** in **2023** and will now remain in effect till June 30, 2025.
- It was meant for **digitising patients' health records** and linking them with the **Ayushman Bharat Digital Health Account (ABHA ID).**

### Significance

- The scheme helps **reimburse hospitals** their expenditure on digitising their facility.
  - ♦ This expenditure was often reported as a **significant bottleneck for hospitals to move to digital health.**
- A behaviour change component is also involved in moving from **physical mode of working to digital.**
- DHIS enables better healthcare services and more convenience for patients.

### ABHA ID

- It is a unique identity for people that allows **one to store and share their medical records digitally.**
- Once the ID is created – whenever a patient avails a healthcare service at centres linked to the digital framework – all their records are linked to it.
- This ID can then be used to securely store, access, and share the healthcare records, such as doctor's prescriptions, diagnostic test results.

Source: IE

## BIOLUMINESCENT MUSHROOMS

### Context

- Recently, scientists discovered the **Filoboletus Manipularis**, a rare bioluminescent mushroom emitting a bright green glow at night in **Western Ghats region in Kerala.**

### About the *Filoboletus Manipularis*

- It is part of the **Mycenaceae Family Fungi** and stands out for its **unique ability to produce light**.



- It exhibits this trait most prominently in its **stipe (stem) and pileus (cap)**, which emit a **greenish light** that can be observed during the night.
- The **high humidity and low light conditions** in the forests of Western Ghat create an **ideal environment for many bioluminescent species**.
- In general, **mushrooms** constitute **secondary saprophytic fungi** of the forest ecosystem that play a very important role in the **decomposition of plant litter**.

### Biochemical Process in *Filoboletus Manipularis*

- **Bioluminescence in fungi** is believed to attract insects that aid in spore dispersal, thus playing a crucial role in the **life cycle of these fungi**.
- The **glow** produced by the **chemical reaction** involving **luciferin (a pigment)** and **luciferase (an enzyme)**, with **oxygen** playing a critical role.
  - ♦ It is a trait shared with other bioluminescent organisms like **fireflies and certain marine creatures**.

Source: IE

## ENVIRONMENTAL FLOWS MONITORING SYSTEM

### Context

- Recently, the Union Ministry of Jal Shakti launched the **Environmental Flows Monitoring System** developed by the **National Mission for Clean Ganga (NMCG)**

### About the Environmental Flows (E-flows) Monitoring System

- It is a part of the comprehensive **PRAYAG Portal**, designed **to facilitate real-time analysis** and monitoring of water quality in rivers, particularly the **Ganga and its tributaries**.

- It enables authorities **to monitor river water quality, assess the impact of projects, and plan future initiatives** with greater precision and ecological consideration.
- It aims to evaluate **both natural influences and human-induced impacts** on water quality along India's coastline, addressing concerns related to industrial effluents, urbanisation, river discharge, and agricultural runoff.
- It is instrumental in **overseeing the activities of the Namami Gange Programme**, aimed at cleaning and protecting the Ganga.
  - ♦ It includes monitoring the performance of Sewage Treatment Plants (STPs) and other infrastructure critical to maintaining river health.
- It aligns with broader environmental efforts, such as those undertaken by INCOIS, which has unveiled a coastal water quality monitoring system.

### Environmental Flows (E-flows)

- It is the **water regime** provided within a **river, wetland or coastal zone** to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated.
- It is any managed change in a river's flow pattern intended to maintain or improve river health.

Source: AIR

## DIRECT SEEDING OF RICE (DSR)

### In News

- The Punjab government has been actively promoting the direct seeding of rice (DSR), or 'tar-wattar' technique.

### About Direct Seeding of rice (DSR)

- DSR is a relatively new technique that **involves direct seeding** of paddy seeds against the traditional practice of raising nurseries before planting the seedlings in the field.
- It requires **no nursery preparation or transplantation**.
  - ♦ Paddy seeds are directly sown, roughly 20-30 days prior to when they would have been transplanted.
  - ♦ The field is irrigated and laser leveled prior to the seeding process which is carried out using a seed drill or lucky seeder.



- **Benefits:** It saves groundwater, as opposed to the traditional water-intensive method, under which rice seedlings are transplanted from a nursery to waterlogged field
  - ♦ It is seen to be most productive, environmentally friendly and financially feasible rice production systems
  - ♦ It boosts yields, reduces costs, and addresses labour shortages for farmers.

Source: IE

## BONN CLIMATE CHANGE CONFERENCE

### In News

- The Bonn Climate Change Conference concluded after two weeks of intensive work across a range of issues where progress is needed on the path to the **UN Climate Change Conference (COP29)** in Baku, Azerbaijan.

### About Bonn Conference

- Bonn is the headquarters of the **United Nations Framework Convention on Climate Change (UNFCCC)** – the secretariat of the international treaty fighting climate change.
  - ♦ Discussions on **carbon markets** at the UNFCCC fora are grouped under Articles 6.2 and 6.4 of the Paris Agreement.
- This year's Bonn session follows COP28 in Dubai, where countries worked to finalise the first Global Stocktake of the Paris Agreement.

### Areas of progress in Bonn include:

- Parties streamlined content going into the [New Collective Quantified Goal on Climate Finance](#). Clear options and the substantive framework of a draft decision must be finalized before COP29.
- Parties took steps towards adaptation indicators that are forward-looking, effective, and scientifically sound.
- Progress was made towards a better functioning international carbon market, but further work remains to be done.
- Parties worked together for transparency and supported each other in planning stronger climate action plans.

### Do you know ?

- The UNFCCC (or the Convention) and the Paris Agreement do not include a legal definition of 'developed' and 'developing' countries.
- The interpretation of the terms within these contexts has primarily been based on the grouping into 'Annex II' and 'Non-Annex I' Parties, set in 1992 at the time of the adoption of the Convention.
  - ♦ The former are the developed countries that must provide financial assistance to developing countries under the Convention.
  - ♦ Several of these Annex II nations are currently arguing that this categorisation is outdated in the NCQG context.

Source: DTE

## KERALA MIGRATION SURVEY

### Context

- **The Kerala Migration Survey (KMS) 2023 report** was unveiled at the Lok Kerala Sabha.

### About

- Prepared by the **International Institute of Migration and Development (IIMD)** and Gulati Institute of Finance and Taxation, the report reveals the findings of the sixth KMS, **conducted every five years since 1998**.
- The survey looked at 20,000 households from all 14 districts of Kerala, selected via a stratified multistage random sampling method.

### Key Findings

- Number of emigrants from Kerala is slightly more than recorded in **2018**. But the number of emigrants returning home has also gone up.
- **Preference for destinations beyond the Gulf Cooperation Council (GCC)** countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) has grown from 10.8% in 2018 to 19.5% in 2023.
- **Women are another category of emigrants** who have seen a rise in their numbers and proportion, up from 15.8% in 2018 to 19.1% in 2023.
- **Muslims**, who make up 26% of Kerala's population (according to the 2011 census), make up 41.9% of the state's emigrants.
- Total remittances to Kerala saw a significant **increase of 154.9% since 2018**.

Source: IE

