# Civil War in Sudan

**Source: TH**

## Why in News?

Recently,the **Sudanese Armed Forces (SAF)** launched a significant offensive against the **Rapid Support Forces (RSF)** in **Khartoum** and **Bahri**, reigniting a conflict that had quieted for several months.

- This renewed offensive comes amid a civil war that has persisted for over 18 months, with more than **20,000 deaths** reported and nearly **11 million** people displaced as of **October 2024**.

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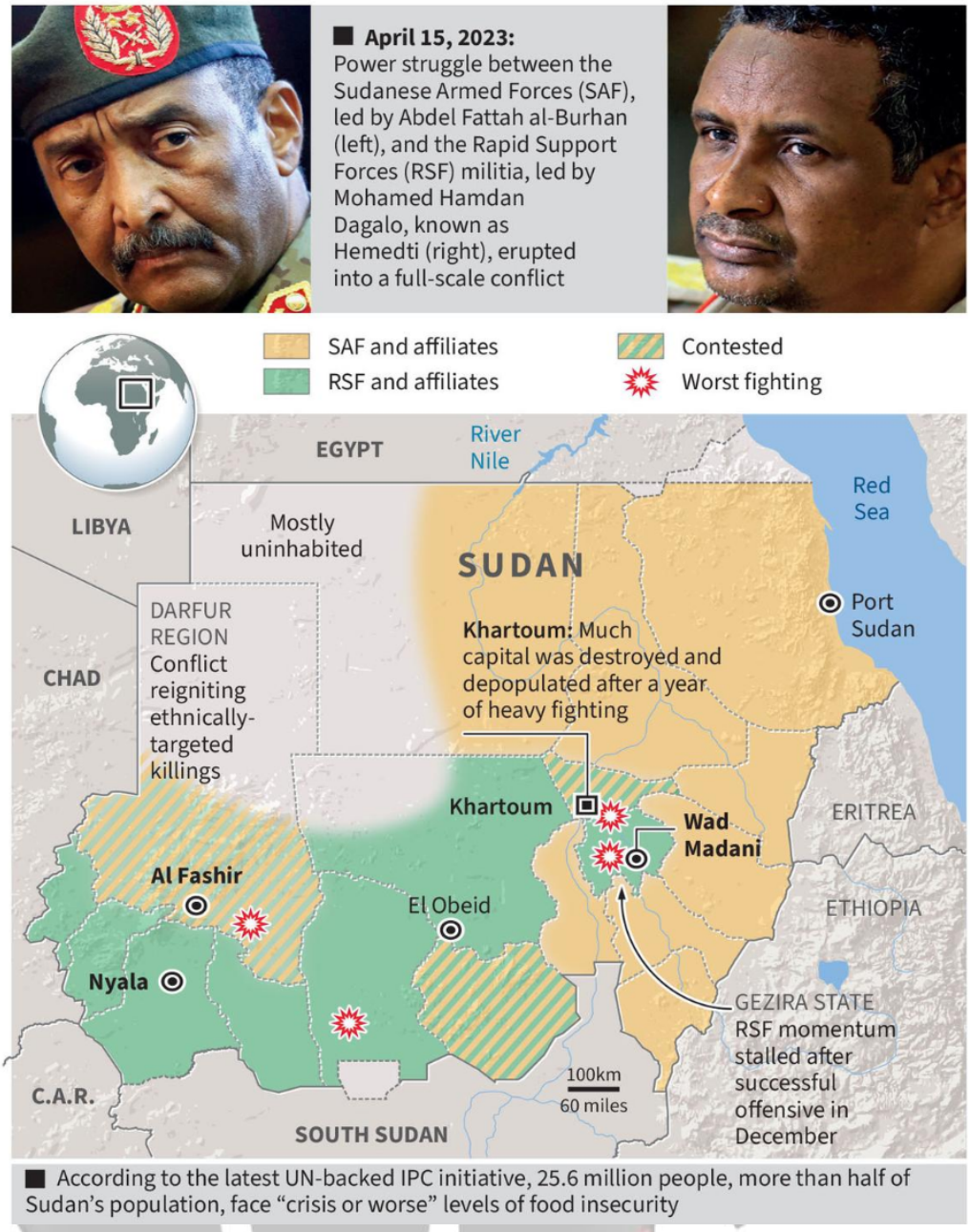


## What is the Origin of Civil War in Sudan?

- The war is rooted in a **power struggle** between SAF leader **Abdel Fattah al-Burhan** and RSF leader **Hamdan Dagalo (Hemedti)**.
- It started in **Khartoum** but has spread to other regions like **Omdurman**, **Bahri**, **Port Sudan**, and the **Darfur** and **Kordofan** states.
- **Historical Background**:
  - Sudan was a joint protectorate under **Egypt** and the **UK** during the **Anglo-Egyptian Condominium**.
  - Sudan gained independence in **1956**, facing internal challenges between the wealthier **Arab Muslim north** and the **Christian/Animist south**.
  - Two major civil wars, **first** (1955-1972) and **Second** (1983-2005), led to the deaths of millions, atrocities, and eventually leading to the **secession of South Sudan** in 2011.
  - The second civil war ended with a peace agreement in 2005, but tensions and internal conflict remained, particularly in **Darfur**.
- **Omar al-Bashir's Regime:**
  - Bashir took power in a **1989 coup** and ruled Sudan for 30 years.
  - He imposed a strict interpretation of **sharia law**, used **private militias** (**Janjaweed)** to

fight rebels, and persecuted minority religions.
    - Bashir's regime was condemned for **genocide in Darfur**, particularly targeting **non-Arab groups** like the **Fur**, **Zaghawa**, and **Masalit**.
    - **Bashir's Overthrow**:
        - By **2019**, protests against Bashir's oppressive rule intensified, leading to his removal in an April coup supported by both **SAF** and **RSF**.
        - After his overthrow, Sudan entered a transitional phase under military and civilian leadership.
- **RSF's Origin and Power**:
    - RSF emerged from the **Janjaweed militia**, a key force in the **Darfur conflict** responsible for widespread atrocities.
    - Formally organized in **2013**, the RSF gained wealth and influence especially through control over **gold mines**.
- **Transitional Government**:
    - After Bashir's fall, a **Transitional Sovereignty Council** was formed.
    - **Prime Minister Abdalla Hamdok**, a civilian leader, sought economic stability but was ousted in a 2021 coup led by the SAF and RSF. Later his resignation left Sudan without effective civilian leadership.
    - **The December 2022 Deal**:
        - The **December 2022 agreement** outlined a two-year transition to **civilian rule**.
        - However, tensions emerged over **RSF integration** into the armed forces, with **Burhan** and **Hemedti** disagreeing on timelines.
    - The involvement of foreign actors, such as the **Wagner Group** and military support from **UAE**, has complicated the conflict, making it harder to resolve.

## What are the Reasons for Persistent Conflict in Sudan?

- **Power Struggle**: Both the **SAF** and **RSF** are determined to consolidate power, with each faction seeking dominance over the other.
    - The SAF claims to be the legitimate government, while the RSF challenges it.
- **Weapon Supply:** Despite an arms embargo by the **United Nations** since the **2004 Darfur crisis**, weapons continue to flow into the country.
    - Advanced military equipment, often supplied by **Russia, China, and UAE**.
- **Ethnic Tensions**: The conflict has taken on an ethnic dimension.
    - Eg. In **Darfur**, Arab militias support the RSF, while non-Arab communities like the **Masalit** back the SAF.
- **Foreign Interference**: Each side is receiving external support, reducing their incentive to compromise or seek peace.
- **Failed Peace Talks**: Despite numerous ceasefire efforts, particularly led by **Saudi Arabia** and the **US like the Jeddah Declaration (2023)**, none have succeeded.


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## Claim of Juvenility

**Source: HT**

Recently, the **Supreme Court** ruled that **juvenility** can be claimed at **any stage of criminal proceedings**, including **after the conviction** has become final.

- The court pointed out that **juvenility is a right** and not subject to waiver due to **delays or procedural technicalities.**
- The court held that even a final judgement does not prevent a reevaluation of the case if juvenility is in question.
- **Section 94** of the **Juvenile Justice Act, 2015** allows juvenility claims to be raised even **post-conviction**, ensuring that the rights of juveniles are protected regardless of procedural delays.
- Similarly, in the ***Abuzar Hossain Vs State of West Bengal Case***, ***2012,*** the Supreme Court had allowed **juvenility claims at any stage** of legal proceedings.
- As per the Juvenile Justice Act, 2015 a **juvenile** is defined as a person who has **not completed eighteen years of age.**

- Juveniles **aged 16-18 years** would be tried as **adults,** if charged with heinous crimes.

**Read More:** **Issue with the Juvenile Justice Amendment Act, 2021**

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# High-Performance Buildings (HPBs)

**For Prelims:** **High-Performance Buildings**, **HVAC System**, **Daylight Harvesting**, **Green Walls**, **Bureau of Energy Efficiency**, **Carbon Emissions**, **UNEP's 30% Efficiency Improvement Goal,** Unnati Building, Indira Paryavaran Bhawan.

**For Mains:** Need for high-performance buildings in India in light of rising urbanisation and carbon emissions.

**Source: TH**

## Why in News?

In recent years, the importance of **high-performance buildings (HPBs)** have increased that promote **energy efficiency** and **healthier indoor environments.**

- HPBs means a building that **integrates and optimises** all major high-performance building attributes, including **energy efficiency, durability, life-cycle performance, and occupant productivity.**

## What are the Key Features of HPBs?

- **Energy Efficiency:**
  - **Maintain HVAC Systems (Heating, Ventilation, and Air Conditioning)**: Regular maintenance, such as **replacing filters, cleaning coils, and calibrating sensors**, can help maintain their efficiency and reduce unnecessary energy consumption.
  - **Demand-Controlled Ventilation**: **IoT**-based **air quality sensors** can automatically adjust **ventilation systems** making buildings more efficient and responsive to environmental conditions.
  - **Lighting Systems**: **Energy-efficient LED** options can reduce energy consumption. **Daylight harvesting,** which makes use of natural light, can further lower the need for artificial lighting.
  - **Invest in Insulation**: Adequate **insulation for walls, roofs, and floors** can reduce the need for heating and cooling by minimising heat transfer.
- **Healthy Indoor Environment:**
  - **Prioritise Indoor Air Quality**: It uses indoor **air filtration** systems to reduce pollutants.
  - **Sound and Acoustics**: **Sound-absorbing materials** and effective partitioning can help reduce noise pollution in buildings.
  - **Biophilic Design**: Incorporating natural elements, such as **green walls, indoor plants, and wate**r features enhance the mental well-being of occupants.
- **Sustainability and Environmental Impact:**
  - **Sustainable Materials**: **Recycled steel,** sustainably-sourced timber, and **low-impact concrete** is key to reducing the environmental impact of buildings.
  - **Water Conservation and Efficiency**: Rainwater harvesting and **greywater recycling** systems enhance water conservation.
  - **Waste Reduction and Management**: Reducing, recycling, and properly managing waste

are essential for sustainable building operations.

## What is the Need of High-Performance Buildings?

- **Carbon Emissions**: Globally, buildings account for **nearly 40% of total final energy consumption** over their lifespan.
    - It leads to approximately **28%** of energy-related **carbon emissions.**
    - According to the **Bureau of Energy Efficiency**, in India, buildings account for more than **30% of the national energy use and 20% of its carbon emissions.**
- **Quadrupling Power System by 2040**: India's power system will need to **quadruple in size by 2040** to meet growing electricity demand.
    - Also, Indian buildings are experiencing a **surge in energy use** due to **higher urban temperatures**, glazed facades, and higher occupant density.
    - HPBs can significantly reduce energy demands through **innovative solutions.**
- **Rising Urbanisation:** India's urban population is expected to **reach 600 million by 2030.**
    - As cities expand, the demand for new construction rises, and without intervention, the sector's **carbon footprint** is set to grow significantly.
- **Achieving Global Goals:** With increasing energy demand and a booming construction sector, India risks exceeding **global energy efficiency and carbon emission standards** for buildings set by the **International Energy Agency,** building certification programs, and the EU's Energy Performance of Buildings Directive.
    - **UNEP's 30% efficiency improvement goal** emphasises that the global building sector must improve its **energy efficiency by 30% by 2030** to meet climate targets.
- **Lower Operating Costs:** HPBs optimisations can result in **23% lower energy use, 28% lower water use,** and 23% lower building operating expenses.
- **Improved Productivity:** Providing a healthy indoor environment has been linked to higher **occupant satisfaction,** increased productivity, and reduced absenteeism due to illness.


## What are the Tools Associated With HPBs?

- **Ladybug:** It offers detailed **climate analysis** and data in **2D and 3D interactive graphics** to assess design options through view, sunpath, and radiation analysis.
- **Green Building Studio:** It is a **cloud-based service** that can run building performance simulations for energy optimisation.
- **Cove.Tools:** It allows architects and engineers to use data-driven design to achieve **sustainable design solutions.**
- **ClimateStudio:** It works best for simulations for **daylighting, energy efficiency, thermal comfort** and other measures of occupant wellbeing.

## Notable Examples of HPBs in India

- **Unnati Building in Greater Noida**: This HPB features a **façade** designed according to the **Sun's path to improve thermal comfort and energy efficiency**. The building uses high-performance glass with a low solar heat gain coefficient to reduce glare and enhance energy performance.
- **Indira Paryavaran Bhawan in New Delhi**: This building employs an **advanced HVAC system** that circulates **chilled water** through beams in the ceiling, utilising natural convection to reduce energy consumption.
- **Net-Zero and Grid-Interactive Buildings**: HPBs in India are also paving the way for **net-zero buildings,** which generate as much energy and water as they consume, and grid-interactive buildings that manage energy demand dynamically.

## What are the Challenges in Delivering High-Performance Buildings?

- **Operational Overlook:** Developers typically prioritise **initial project costs, schedules, and design scope**, overlooking the operational phase and long-term energy, waste management, and maintenance.
- **Diverse Building Typologies**: Office buildings vary greatly in terms of **types, costs, services, and comfort levels.**
    - Some buildings have **decentralised cooling systems** that are energy inefficient while some buildings are **centrally air-conditioned,** have high glazing, and come with higher energy consumption.
- **Split Incentives**: Energy savings projects often receive little support due to differences in who benefits from energy efficiency improvements. Eg, Maintenance by owners or tenants.
- **Erosion of Indigenous Knowledge**: Region-specific methods that are **cost-effective and well-suited to local conditions** are being lost due to **overreliance** on foreign technologies that may not be as efficient in the Indian context.
- **Siloed Building Systems**: Building design, construction, and operation are often treated in isolation. This **fragmented approach** prevents the integration of technologies that can improve overall building performance.

## What are India's Initiatives Regarding the Energy Efficiency in Buildings?

- **Eco-Niwas Samhita**
- **Energy Conservation Building Code (ECBC)**
- **Energy Conservation (Amendment) Act, 2022**
- **NEERMAN Awards**
- **Green Rating for Integrated Habitat Assessment (GRIHA)**

## How High-Performance Buildings Can be Promoted in India?

- **Envelope and Passive Systems:** Envelope strategies like **wall, windows, roof assemblies, reflective white surfaces and shading** can avoid exposures to solar heat gain and glare, and support natural ventilation where possible.
- **Integrated Approach:** A lifecycle performance assurance process that emphasises the **integration of building systems** should replace conventional and siloed methodologies.
- **Holistic Evaluation**: Adopt a **triple-bottom-line framework** that evaluates building technologies and systems based on **operational, environmental, and human benefits**.
    - This framework should consider energy savings, reduced carbon footprint, and improved occupant health and productivity.
- **Collaborative Energy Efficiency Initiatives**: Encourage collaborative initiatives between owners and tenants that align their interests in energy efficiency upgrades, creating a shared commitment to sustainability goals.
- **Tailored Strategies**: Advocate for **region-specific, climate-responsive** solutions such as high-performance envelope design, low-energy cooling strategies, and adaptive comfort techniques.
- **Heating Ventilation and Air Conditioning Systems (HVAC):** Separate the spaces that could be **naturally ventilated** and develop mixed-mode opportunities, rather than fully air conditioning all built spaces at all times.

***Drishti Mains Question:***

Critically analyse the need for high-performance buildings in India, considering the challenges posed by rising urbanisation and carbon emissions.

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

***Mains:***

**Q.** “Investment in infrastructure is essential for more rapid and inclusive economic growth.” Discuss in the light of India’s experience. **(2021)**

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## Rare Rain in the Sahara Desert

**Source: BS**

Recently, a rare **deluge of rainfall** has **flooded** palm trees and **sand dunes** of the **Sahara desert in Morocco.**

- The rain was triggered by the **northward shift** of the **Intertropical Convergence Zone (ITCZ)**, which has moved further north than usual, resulting in **equatorial-like downpours** in the Sahara.
    - ITCZ has produced a powerful **extratropical cyclone** that swept through northwestern Africa.
    - An extra-tropical cyclone is a **low-pressure system** which develops in latitudes **outside the tropics** which can bring heavy rainfall.
- Repositioning of ITCZ may be linked to **record-high ocean temperatures** and **climate change.**
- **Sahara Desert:** It is the **world's largest hot desert** having a **length of approximately 4,800 km** and a maximum **width of 1,800 km.**
    - It occupies about **31%** of the entire **African continent.**
    - It stretches among **11 North African nations** including Algeria, Egypt, Mali, Morocco, Western Sahara, Tunisia, Chad, Libya, Mauritania, Niger, and Sudan.


**Read More:** [Deserts in the World]

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## World Cerebral Palsy Day

[Source: PIB]

The **National Trust** for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation, and Multiple Disability organised a National Meet to mark **World Cerebral Palsy Day (WCPD),** focusing on innovation and inclusion for individuals with Cerebral palsy (CP).

- **WCPD (6th October every year)** is a global movement that started in 2012, uniting individuals with **cerebral palsy** from over 100 countries to advocate for equal rights, access, and opportunities in society.
    - The theme for 2024 WCPD is **"Uniquely CP",** which emphasises that a person's disability does not define their entire identity.
- CP is a group of disorders that **affect movement, balance, and posture** due to abnormal brain development or damage. It is the most common **motor disability in childhood,** with symptoms varying significantly among individuals.
    - **Causes:** Majority (85-90%) of CP is congenital, occurring before (during brain development) or during birth. Acquired CP is less common and often linked to infections or head injuries after birth.
    - **Treatment:** It is a permanent, non-progressive condition with no cure, but treatments can enhance symptoms, functioning, and quality of life.

- The **National Trust,** a statutory body under the **Ministry of Social Justice and Empowerment,** was established under the **"National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation, and Multiple Disabilities" Act (1999).**
    - Its aim is to create an inclusive society that empowers **Persons with Disabilities** to live independently with dignity and equal rights.

**Read more: Empowering Persons with Disabilities**

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## India Eliminates Trachoma as a Public Health Problem

**Source: PIB**

The **World Health Organization (WHO)** has officially recognized India for eliminating **Trachoma as a public health issue**.

- Trachoma is a contagious bacterial eye infection caused by ***Chlamydia Trachomatis,*** which can lead to **irreversible blindness if left untreated.**
    - It spreads through contact with the eyes, eyelids, nose, or throat secretions of infected individuals.
    - It is categorised as a **neglected tropical disease** and affects around **150 million people** globally, with **6 million** at risk of blindness.
- Trachoma was a leading cause of blindness in India during the **1950s-60s**. India launched the **National Trachoma Control Program** in **1963**, which was later integrated into the **National Program for Control of Blindness (NPCB)**.
- In 1971, Trachoma caused **5% of blindness in India**, now reduced to less than 1% through the **National Programme for Control of Blindness & Visual Impairment (NPCBVI)** and the **WHO SAFE strategy**.
    - India was declared free from **infective Trachoma in 2017,** with ongoing surveillance from 2019 to 2024.
- The **National Trachomatous Trichiasis (TT only) Survey** was conducted in **200 endemic districts** from **2021-24** as part of WHO's mandate.
    - Reports compiled by the **NPCBVI team** were submitted to WHO for final verification, leading to the declaration that India has eliminated Trachoma as a public health problem.


**Read more:** [Global Report on Neglected Tropical Diseases 2024]

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## Floriculture in India

**For Prelims:** [Floriculture], [Paddy], [National Botanical Research Institute], [APEDA], [National Horticulture Board], [Per Drop More Crop]

**For Mains:** Floriculture Sector, Agricultural Marketing, Economic Transformation through Crop Diversification

[Source: TH]

### Why in News?

The Jujumara region in Odisha's Sambalpur district is home to one of the **first Farmer Producer Organizations (FPO)** in the state dedicated **exclusively to [floriculture],** transitioning from **traditional [paddy] farming**.

- With support from the [National Botanical Research Institute (NBRI),] local farmers are adopting flower cultivation, resulting in significant economic improvements.

### How is Floriculture Transforming Jujumara's Economy?

- **Diversification of Income Sources:** Farmers are transitioning from traditional paddy farming to flower cultivation, reducing **dependence on a single crop** and enhancing income stability.
- **Economic Benefits:** Profits from flower cultivation **can exceed Rs 1 lakh per acre,** compared to around Rs 40,000 per acre from paddy farming, significantly boosting farmers' incomes.
- **Market Adaptation:** Through platforms like **WhatsApp groups**, farmers receive updates on market trends, enabling them to make informed decisions about production and sales.
- **Sustainable Practices:** The integration of **beekeeping** alongside floriculture promotes biodiversity and provides an additional income stream for farmers.

## What is Floriculture?

- **About:** Floriculture involves the **cultivation of flowering and ornamental plants** for various purposes, such as direct sale, cosmetics, perfume, and pharmaceutical industries.
    - It includes **seed and plant material production** through techniques like cutting, grafting, and budding.
    - The **Agricultural and Processed Food Products Export Development Authority (APEDA),** the nodal organisation for promotion of agri-exports including flowers.
- **Market of Floriculture in India:** The government of India has identified floriculture as a **"sunrise industry".**
    - About **297 thousand hectares** of the area were under Cultivation for floriculture in 2023-24 (2nd Advance Estimate).
    - India exported around 20,000 metric tonnes of floriculture products worth Rs 717.83 crores in 2023-24, with major importers including the **United States of America (USA), the Netherlands, the United Arab Emirates, the United Kingdom, Canada, and Malaysia.**
    - Due to the exceptional performance of the sector, it is expected to grow to USD 5.9 billion by 2030 with a **Compounded Annual Growth Rate (CAGR)** of 7.4% (2021-2030).
- **Varieties:** India's floriculture industry covers cut flowers, pot plants, bulbs, tubers, and dried flowers.
    - The important floricultural crops in the **international cut flower trade** are Rose, Carnation, Chrysanthemum, Gargera, Gladiolus, Gypsophila, Liatris, Nerine, Orchids, Archilea, Anthurium, Tulip, and Lilies.
    - Floriculture crops like **Gerberas, Carnation, etc. are grown in greenhouses.** The **open field crops** are Chrysanthemum, Roses, Gaillardia, Lily Marigold, Aster, Tuberose, etc.
        - **Greenhouses are inflated structures** covered with transparent material, where crops are grown under controlled environmental conditions.
- **Leading Floriculture Regions:** Karnataka, Tamil Nadu, Madhya Pradesh, West Bengal, Chhattisgarh, Andhra Pradesh, Gujarat, Uttar Pradesh, Assam and Maharashtra have emerged as major floriculture centres.

## What are the Key Challenges in India's Floriculture Industry?

- **Low Knowledge Base**: Floriculture being a relatively new concept, scientific and commercial floriculture is not well-understood, leading to **inefficiencies in production and marketing.**
- **Small Land Holdings**: Most floriculture farmers have **small land holdings**, limiting their ability to invest in large-scale, modern cultivation practices.
- **Unorganised Marketing**: The marketing system is fragmented and lacks organised platforms like **auction yards and controlled condition storage facilities,** making it difficult for farmers to get fair prices.
    - Although India has a large domestic market, it lacks modernised marketing systems to handle surplus production and meet increasing quality demands.
- **Inadequate Infrastructure**: Poor post-harvest management and lack of cold storage lead to quality degradation, especially in flowers grown for domestic markets.
- **Biotic and Abiotic Stresses**: Flower production in open fields exposes crops to various stresses, making the produce **less suitable for high-quality export markets.**
- **High Initial Costs**: Commercial floriculture requires heavy investments in infrastructure, and **farmers struggle to access affordable finance options**. More schemes like the **soft loan initiative by the National Horticulture Board are needed.**
- **Export Barriers**: **High air freight rates, low cargo capacity,** reduce the global

competitiveness of Indian floriculture products.

## What are India's Initiatives for Floriculture?

- **APEDA (Agricultural and Processed Food Products Export Development Authority):** Supports floriculture exporters with cold storage, freight subsidies, and infrastructure development.
- **Council of Scientific & Industrial Research (CSIR) Floriculture Mission:** It is a nation-wide mission being implemented in 22 states with an aim to enhance the income of farmers and develop **entrepreneurship through high value floriculture** utilising **CSIR technologies.**
- **FDI in Floriculture:** 100% **foreign direct investment (FDI)** under the automatic route is allowed in the Floriculture sector making the investment process much easier for the foreign investor.
- **Integrated Development of Commercial Floriculture Scheme**: Provides access to quality planting material, promotes off-season cultivation, and enhances post-harvest management.

## Way Forward

- **Essential Service and Market Modernization**: Flowers should be classified as essential services, like fruits and vegetables, to ensure uninterrupted supply and sales during crises such as lockdowns.
    - Floriculture markets need modernization through **solar-powered air-cooled pushcarts,** and improved packaging with foldable crates.
- **Micro-Irrigation and Mulching**: Extend the **"Per Drop More Crop"** initiative to floriculture by bringing all flower cultivation under micro-irrigation.
    - Mulching (covering the topsoil) techniques should be promoted to reduce labour, improve water use efficiency, and minimise weed.
- **Skilling**: Train **tribal women and unemployed youth** in dry flower production under **"Skilling India" and "Standup India."**
- **Support for Quality Planting Materials**: Promote **certified nurseries and tissue culture labs** to ensure virus-free planting materials. Strengthen biosecurity standards and ensure the availability of quality planting stock for commercial floriculture.
- **Flori-Malls and Value Addition**: Create integrated **"Flori-Malls"** with cold chains, essential oil extraction, pigment extraction, and vermicompost units.
    - This will help farmers turn excess flowers into products like dyes, gulkand (the sweet preserve of rose petals), and dry flowers, adding value and reducing wastage.

***Drishti Mains Question:***

Discuss the significance of floriculture and its role in transforming the rural economy.

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

***Mains:***

**Q. What are the present challenges before crop diversification? How do emerging technologies provide an opportunity for crop diversification? (2021)**

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# Nobel Prize 2024 in Physiology or Medicine

**Source: TH**

## Why in News?

Recently, the **2024 Nobel Prize in Physiology or Medicine** was awarded to **Victor Ambros and Gary Ruvkun** by the **Nobel Assembly at Karolinska Institutet in Stockholm**, Sweden.

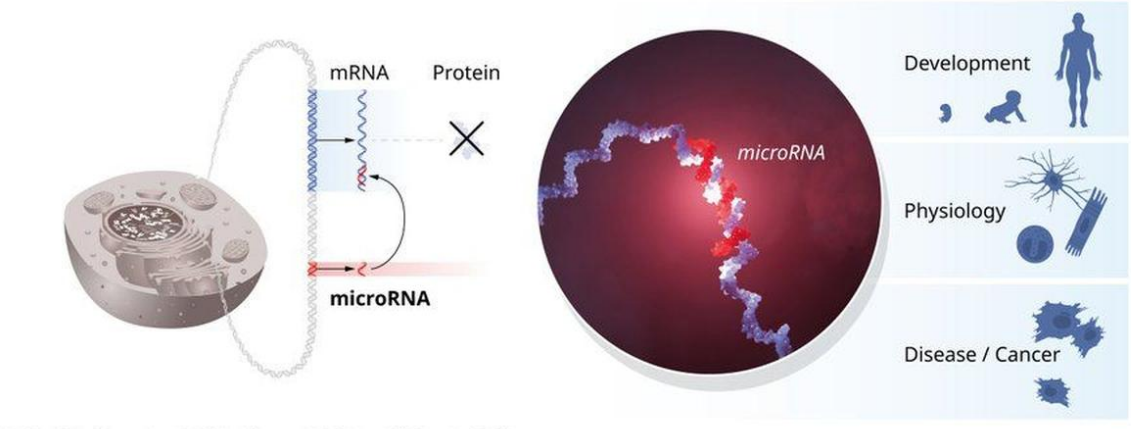
- The scientists won the esteemed prize for the **discovery of microRNA** and **its role in post-transcriptional gene regulation.**

## Note:

- The **2023 Nobel Prize in Physiology or Medicine** was awarded to **Katalin Karikó and Drew Weissman** for their work on **messenger Ribonucleic Acid (mRNA).**
- The **2024 Nobel Prize in Physics** has been awarded to **John J. Hopfield** and **Geoffrey E. Hinton**, for modern **artificial neural networks (ANNs)** and **machine learning (ML)**.

## What Discovery of microRNA led to the Nobel Prize?

- **Early Research:**
  - **C. elegans Model:** Ambros and Ruvkun studied the **roundworm C. elegans** to understand tissue development.
  - **Mutant Strains:** They **analyzed mutant strains lin-4 and lin-14 with abnormalities** in their genetic programming.
- **Ambros' Research:**
  - Ambros found that **lin-4 suppressed lin-14 activity** but couldn't determine how.
  - He cloned **lin-4 and discovered a short RNA molecule** without protein-coding potential. It suggested the **RNA molecule might inhibit lin-14.**
- **Ruvkun's Research:**
  - He found that **lin-4 didn't block lin-14 mRNA production but regulated it later by inhibiting protein production.** A short lin-4 sequence matched key complementary segments in lin-14 mRNA.
- Ambros and Ruvkun found that **lin-4 microRNA attaches to lin-14 mRNA and blocks protein production.**
- **Significance:**
  - **let-7 discovery:** Ruvkun's group later discovered let-7, a microRNA present throughout the animal kingdom.
  - **Current understanding:** The microRNAs are abundant and play a crucial role in gene regulation across multicellular organisms.

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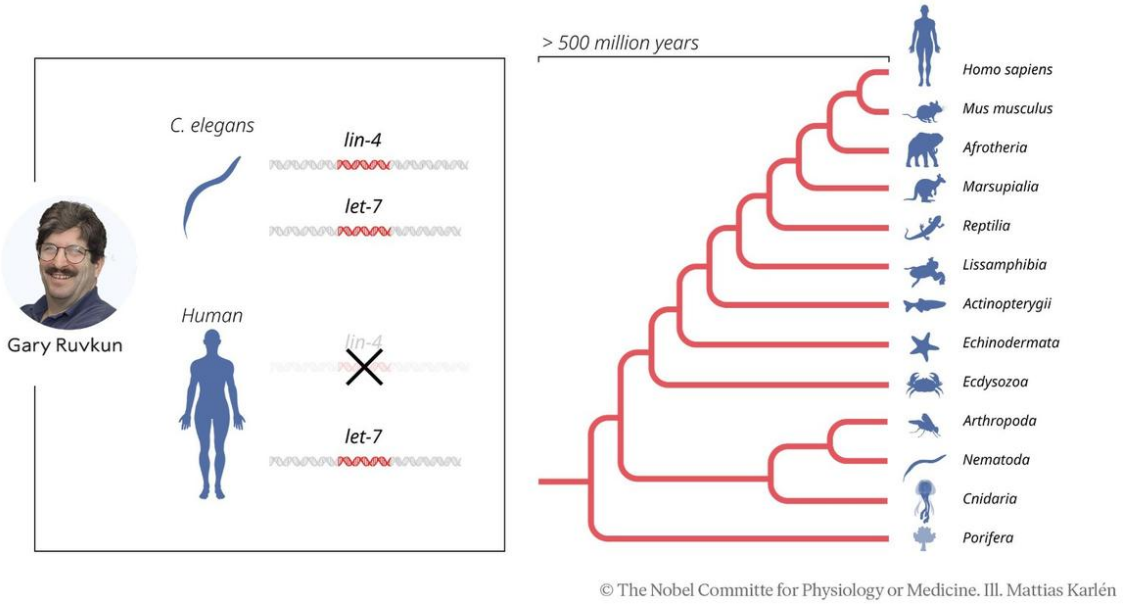
## Note:

- **Lin-4:** It is a microRNA, identified from a study of **developmental timing in the nematode *Caenorhabditis elegans***. It was the first to be discovered of the miRNAs, a class of **non-coding RNAs involved in gene regulation.**
- **lin-14:** It is a **heterochronic gene that controls the timing of developmental events** in the nematode ***Caenorhabditis elegans.***
    - **Heterochronic genes** are genes that control the timing of cell and tissue development in an organism.




## What are microRNAs?

- The **body synthesizes proteins** through a complex process involving two main steps: **transcription and translation.**
- In the **transcription step**, a **Deoxyribonucleic acid (DNA) sequence** in the **cell nucleus is copied** into messenger **Ribonucleic Acid** (mRNA).
    - The mRNA then exits the nucleus, moves through the cell fluid, and **attaches to a ribosome.**
- In the **translation step,** transfer RNA **(tRNA) delivers specific amino acids to the ribosome,** where they are linked together in the sequence dictated by the mRNA to form the protein.
- **Micro RNA (miRNA) plays a regulatory role** in protein production by binding to and **silencing mRNA at a specific stage** in the process.
    - This regulation occurs through a mechanism called **post-transcriptional gene regulation,** ensuring protein synthesis is controlled.

## About the Winners

- Ambros and Ruvkun are **both American biologists**. **Ambros** currently works at the Programme in **Molecular Medicine at the University of Massachusetts.**
- **Ruvkun** is a **professor of genetics at Harvard Medical School** and conducts research on microRNA and RNA interference.
- **H. Robert Horvitz,** under whom both biologists worked as postdoctoral fellows, **won the Nobel Prize in Physiology or Medicine in 2002.**
- **Ambros** was the **first to clone a microRNA, and Ruvkun cloned the second,** marking significant milestones in the field.

## What are the applications of the Discovery?

- **Abnormal Regulation and Diseases:**
  - **Cancer: Abnormal microRNA** regulation can contribute to **cancer development.**
  - **Mutations:** Mutations in microRNA genes have been linked to conditions like **hearing loss, eye, and skeletal disorders.**
- **Future Applications:**
  - While **microRNAs hold great potential,** there are **currently no direct clinical applications.**
  - **Further research and a deeper understanding** of microRNAs are necessary for future applications.

# Nobel Prize

- Established by the will of Alfred Nobel (inventor of Dynamite)
- Awarded to those who have conferred the greatest benefit to humankind, during the preceding year
- First awards were handed out in 1901


**PHYSICS**
Royal Swedish Academy of Sciences

**CHEMISTRY**
Royal Swedish Academy of Sciences

**PHYSIOLOGY OR MEDICINE**
The Nobel Assembly at Karolinska Institutet

**LITERATURE**
The Swedish Academy

**PEACE**
Norwegian Nobel Committee

**ECONOMIC SCIENCES**
(created in 1968 by Sweden's Central Bank)
Royal Swedish Academy of Sciences

- The Prize Ceremony is held in Stockholm, Sweden, in December every year
  - The Peace Prize is not awarded at Stockholm ceremony but presented annually in Oslo, Norway, on the same day
- Each Nobel laureate receives a gold medal, a diploma, and a monetary award
- Nobel Prize cannot be given posthumously (after death). Also, up to 3 people can share a Nobel Prize award between them
- **First Indian Nobel Laureate:** Rabindranath Tagore for Literature, 1913
  - **First Indian Woman Nobel Laureate:** Mother Teresa for Peace, 1979

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

**Q. Who among the following discovered heavy water? (2008)**

**(a)** Heinrich Hertz

**(b)** H.C. Urey

**(c)** G. Mendel

**(d)** Joseph Priestley

**Ans: (b)**

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# Financial Institution

# Microfinance Institutions (MFIs)

## About MFIs

- Provides financial services & small-value loans
- **Targets** – Low-income households, small businesses, & entrepreneurs in rural & urban areas
- Maximum annual income criteria – **Rs 3 lakh** (for collateral-free microloans)

## Evolution of Microfinance Sector


- **Initial Period (1974–1984):**
  - Shri Mahila Sewa Sahakari Bank established for women
  - NABARD promoted SHG linkage
- **Change Period (2002–2006):**
  - Unsecured lending norms for SHGs were aligned with secured loans
  - RBI included microfinance in the priority sector
- **Growth and Crisis (2007–2010):**
  - Private equity investments→ Rapid MFI growth
  - Microfinance Institutions Network (MFIN) formed
- **Consolidation and Maturity (2012–2015):**
  - Malegam Committee (2012) recommended regulatory changes
  - New Category of NBFCs – Non Banking Financial Company-Micro Finance Institutions (NBFC-MFIs)
  - Universal banking license to Bandhan Bank (largest microlender) by RBI (2014)
  - MUDRA Bank launched (2015)

*MFIs in India are regulated by the RBI through the NBFC-MFIs framework 2014.*

## Business Models

- **Self Help Groups (SHGs):**
  - Informal groups (10-20 members) saving together & accessing credit
  - Linked to banks through the SHG-Bank Linkage Programme
- **Microfinance Institutions (MFIs):**
  - Offer micro-credit & financial services
  - Loans through Joint Lending Groups (JLGs) of 4-10 members

## Types of MFIs

- **NGO-MFIs** (under Society Registration Act 1860 or Indian Trust Act 1880)
- **Co-operative Societies**
- **Section 8 Companies** (under Companies Act, 2013)
- **NBFC-MFIs** (accounts for 80% of microfinance market)

## Benefits

- Digitization and financial inclusion
- Self-sufficiency (entrepreneurship and improved livelihoods)
- Steady income (assets building)
- Women entrepreneurship

| Challenges of MFIs | Way Forward |
|---|---|
| High Interest Rates | Improve regulatory oversight and encourage interest rate caps |
| Over-Indebtedness of Borrowers | Strengthen credit risk assessment and promote financial literacy |
| Dependency on External Funding | Diversify funding sources through partnerships and capital markets |
| Low Financial Literacy Among Borrowers | Promoting financial education programs/campaigns |

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