

NEWS TODAY

NITI Aayog released “Improving the Culture of Research and Development (R&D) in State Universities and Institutes” Report

Status of R&D Ecosystem in India

- **Gross Expenditure on R&D (GERD)** has more than **doubled in 2020-21** (Rs. 127,381 crore) from 2010-11 (Rs. 60,197 crore).
 - ⊕ GERD is primarily driven by government sector including central government (43.7%), State governments (6.7%), Higher Education Institutions (8.8%) during 2020–21.

Significance of R&D in educational institutes

- Through R&D, educational institutions become incubators of creativity and innovation.
- Promotes curriculum development reflecting the needs of contemporary industries.
- Catalyses societal challenges by providing solutions to issues in healthcare, environmental sustainability etc.

Challenges in R&D system in educational Institutes

- **India spends 0.64% of GDP (2020-21) on R&D, much lower** than major world economies i.e. South Korea (4.8%) and the United States (3.5%).
- **Greater emphasis to teaching** over research.
- **Low student enrollment in advanced programs** (Total enrolment in Ph.D. stood at 2.12 lakh in 2021-22- as per All India Survey on Higher Education).

Recommendations to boost R&D culture

- **University/Institute level:** Establishing R&D committee/cell; improving infrastructure through PPP, etc.
- **State level:** Financial and decision making autonomy to universities; aligning thrust areas of research with global/regional challenges; etc.
- **Centre level:** Aligning R&D initiatives with National Educational Policy, 2020; granting special status to universities/institutes in distinctive geographical regions; etc.

Initiatives taken to promote Research

- **National Education Policy 2020** promotes quality and quantity of research in India.
- **Anusandhan National Research Foundation Act 2023.**
- **Innovation in Science Pursuit for Inspired Research (INSPIRE).**
- **Women in Science and Engineering- Knowledge Involvement in Research Advancement through Nurturing (WISE- KIRAN).**

New World Soil Health Index announced by UNESCO at International conference on Soils held in Morocco

Index will **standardise measure for analysing and comparing soil quality** in different regions and ecosystems, and identify trends of degradation or improvement.

- Additionally, UNESCO will **launch a pilot program for sustainable management of soils and landscapes** in ten natural sites under its Biosphere Reserves program.
 - ⊕ Its goal will be to **assess effectiveness of management methods** used on these sites and ensure that best practices are developed and implemented in other parts of the world.

Soil Degradation

- **About:** It is defined as **change in soil health, resulting in diminished capacity** of ecosystem to provide goods and services to its beneficiaries.
- **Status: 75% of land is already degraded**, directly impacting 3.2 billion people (**World Atlas of Desertification**). This will rise to **90% by 2050**.
 - ⊕ **In India, about 32% of land is under degradation and 25% is undergoing desertification.**

- **Causes:** Deforestation, Unsustainable Agricultural Practices, Industrial Pollution, Natural (wind and water) erosion etc.

Impact of Soil Degradation

- **Reduced soil fertility** leading to decreased plant growth and agriculture output.
- **Releases stored carbon**, contributing to greenhouse gas emissions and climate change.
- **Decrease in soil organisms** that contribute to nutrient cycling, pest control, and plant health.

Initiatives taken to prevent Soil Degradation

- **Global**
 - ⊕ **Land Degradation Neutrality** under UNCCD.
 - ⊕ **Bonn Challenge** to restore 350 million hectares degraded and deforested landscapes by 2030.
 - ⊕ **Global Soil Partnership Action Plan 2022-2030** by FAO.
- **India**
 - ⊕ **Soil Health Card Scheme.**
 - ⊕ **National Mission for Sustainable Agriculture.**
 - ⊕ Organic Farming Initiatives like **Paramparagat Krishi Vikas Yojana.**

Scientists discovered naturally existing DNA editing tool - Bridge Recombinase Mechanism

Bridge Recombinase Mechanism (BRM) utilizes mobile genetic elements or “jumping genes”, which cut and paste themselves into genomes, performing on-the-go DNA manipulation and are present in all forms of life.

- **Jumping Genes** are small DNA segments with a recombinase enzyme along with extra DNA segments at the ends of the genes that binds and manipulates DNA.
- **Gene editing** is alteration of genetic material of a living organism by inserting, replacing, or deleting a DNA sequence, with the aim of improving some characteristic of a plant/ animal or correcting a genetic disorder.

About BRM

- **Extra DNA** at the ends of jumping genes gets joined together and converts the DNA double helix structure into a single-stranded RNA molecule.
- This bridge RNA molecule can bind to two DNA segments (donor and target), allowing for flexible DNA modifications.
- **Donor and target loop can be programmed independently**, offering great flexibility in inserting or recombining sequences to DNA.

Significance of BRM

- It will allow researchers to rearrange, recombine, invert, duplicate, move, and perform other editing operations on very long DNA sequences.
- It can lead to development of more advanced gene editing therapeutics and treatments for diseases.

Other Gene-editing technologies

- **CRISPR-Cas9:** It is a customizable tool that lets scientists cut and insert small pieces of DNA at precise areas along a DNA strand.
- **TALE nucleases:** Nucleases that cleave unique genomic sequences in living cells can be used for targeted gene editing.
- **Zinc-finger nucleases:** Targeted to cleave a chosen genomic sequence and provokes cellular repair processes that in turn mediate efficient modification of the targeted location.
- **RNA interference (RNAi):** Targets RNA molecules to block or activate gene expression.

Stampede at Religious Event in Uttar Pradesh Claims Multiple Lives

Stampede can be described as disruption of orderly movement of crowds leading to injuries and fatalities.

- Some examples of such disasters include Sabrimala stampede, 2011; Kalkaji temple’s platform collapse 2024, etc.

Causes and Triggers for Crowd Disasters

- **Structural:** Collapse of barricades, slippery roads, difficult terrain, etc. Example, five bridges collapsed in 9 days in Bihar in 2024.
- **Fire/Electricity:** Fire code violations, non-availability of fire extinguisher, etc. Example, Uphaar Cinema Fire in 1997 due to fire code violations.
- **Under deployment of security personnel** to regulate crowd, absence of CCTV, etc.
- **Coordination gap between agencies** (e.g. District Magistrate, Fire Service, etc.).

Crowd Management

- It means a public security practice in which crowds are managed to prevent the outbreak of crowd disasters, affrays, fights or riots etc.

NDMA Guidelines on Crowd Management

- **Capacity Planning:** Long Term Perspectives for infrastructure development should depend on popularity, periodicity of event, weather, terrain, local population etc.
- **Local Government should establish safety codes** by determining existing capacity and other essential attributes.
- **Risk Analysis and Preparedness:** Event organizers/planners conduct Failure Mode and Effect Analysis which involves rating every possible hazard.
- **Information dissemination:** Communicating with visitors and providing them with correct information.

RBI's Draft Foreign Exchange Management Regulation, 2024

RBI released **Draft Foreign Exchange Management (Export and Import of Goods and Services) Regulations, 2024** and **direction** for public response under **section 47** of the **Foreign Exchange Management Act (FEMA), 1999**.

Key Highlights of the draft regulation

- Every exporter shall furnish to the specified authority a **declaration specifying the amount representing the full export value of the goods or services**.
- Amount representing the full export value of goods and services shall be realized and repatriated to India **within nine months** from the date of shipment (goods) and invoice (services).
 - ⊕ **Authorized Dealer may extend** the specified period for reasonable and sufficient cause.
- **No advance remittance for the import of gold and silver** shall be permitted unless specifically approved by RBI.

Significance of the draft

- Intended to **promote ease of doing business**, especially for small exporters and importers.
- **Empowers Authorized Dealer banks** to provide quicker and more efficient service to their foreign exchange customers.
- Regulations are in line with the **progressive liberalization policies** governing foreign exchange transactions, under FEMA.

About FEMA, 1999

- Aimed to **consolidate and amend the law relating to foreign exchange**, facilitate external trade and payments for promoting the orderly development and maintenance of foreign exchange market in India.
- It also established **Directorate of Enforcement (ED)** to investigate cases under the Act.

Indian Navy certified a new explosive named 'SEBEX 2'

Developed by **Economic Explosives Limited (EEL)**, a subsidiary of Solar Industries, under **Make in India initiative**, **SEBEX 2** is a cutting-edge explosive formulation and is among the **most potent non-nuclear explosives globally**.

- New formulation of **SEBEX 2** was tested under the **Defence Export Promotion Scheme (DEPS)** of the Navy.
- According to reports, Indian Navy has also certified **SITBEX 1 (Thermobaric explosive)** and **SIMEX 4**.

About SEBEX 2, SITBEX 1, and SIMEX 4

- **SEBEX 2** is based on **high-melting explosives (HMX)** and offers **approximately 2.01 times the lethality of standard TNT**.
 - ⊕ **Trinitrotoluene (TNT)** is an explosive used in military shells, bombs, and grenades, in industrial uses, and in underwater blasting.
 - ⊕ **Conventional explosives** like **DENTEX/TORPEX**, which are generally used in conventional warheads, aerial bombs and various other types of ammunition, **have TNT equivalence of 1.25-1.30**.
- **SITBEX 1 (Thermobaric explosive)** generates **extended blast duration with intense heat**, is suited to target enemy bunkers, tunnels, and other fortified positions.
 - ⊕ **Thermobaric explosive compositions** are fuel rich formulations capable to create sustained high temperature and longer duration overpressure as compared to conventional high explosives.
- **SIMEX 4** is a munition which is safer than standard explosives when it comes to storage, transportation and handling and is more likely to accidentally go off.

Also in News



Palm Tree

Odisha will plant palm tree to combat lightning deaths.

About Palm Tree

- Belongs to **Tropical Forest Ecosystem**.
- **Varieties of palm Tress:** Coconut, Oil Palm, Arecanut, Palmyrah etc.
 - ⊕ Palmyrah is declared as **State Tree** of Tamil Nadu.
- **Characteristics of Palm trees:**
 - ⊕ Act as **natural conductors during lightning strikes** and prevent loss of lives.
 - ⊕ Male palm tree produces only flowers, while female tree produces fruits as well.
- **Benefits:**
 - ⊕ Palm leaf is **common writing medium** extensively used in Southeast Asian countries.
 - ⊕ Palm leaves are used as **construction materials for fences, walls, and roofs**.
 - ⊕ Provide **edible and non- edible products**.



Top Quarks

Physicists have reported the most precise estimate yet of the Top Quarks' mass.

About Quarks

- It is **one of the two (other being lepton) basic types of fundamental particles** described under **Standard Model of Physics**.
- There are **6 quarks paired in three generations** (increasing order of their weight and instability):
 - ⊕ **Up quark and down quark**,
 - ⊕ **Charm quark and strange quark**,
 - ⊕ **Top quark and bottom quark**

About Top Quarks

- It is the **most massive elementary particle** that exists, outweighing even the Higgs boson.
- It is **difficult to measure its mass** due to its **unstable nature**, where it breaks into lighter, more stable particles in **less than 10⁻²⁵ seconds**.



Expunction in Parliament

Certain portions of speech from opposition leaders were expunged from the record of parliament.

- **Expunction** means **deletion of words, phrases or expressions from the proceedings or records** for being defamatory or indecent or unparliamentary or undignified.

About Expunction

- **Presiding officer** of the house (Speaker in Lok Sabha and Chairman in Rajya Sabha) has the **authority to decide** which portion will be expunged.
- **Rule 380 and 381 of the Rules of Procedure in Lok Sabha and Rule 261 and 262 of the Rules of Procedure in Rajya Sabha** details provisions related to expunction to prevent misuse of **freedom of speech guaranteed inside Parliament**.
- ⊕ **Article 105(2)** of the Constitution protects Members of Parliament from any court proceeding for anything said in parliament.



District Mineral Foundation (DMF)

Minister of mines inaugurated the DMF Gallery at Shastri Bhawan in New Delhi.

About DMF

- Ministry of Mines, through amendment in **Mines & Minerals (Development & Regulation) (MMDR) Act, in 2015**, has made a provision for **establishment of DMF in all districts affected by mining**.
- **DMF's objective** is to work for the interest and benefit of persons and areas affected by mining related operations.
- **Composition and functions of DMF** shall be such as may be prescribed by **State Government**.
- DMF is also given the responsibility to **implement Pradhan Mantri Khanij Kshetra Kalyan Yojana**.



Rudram-1

India successfully test-fires **first indigenous anti-radiation missile 'Rudram-1'**.

About Rudram-1

- **Air-to-Surface missile** developed by **DRDO** for Indian Air Force (IAF).
- **Features:**
 - ⊕ **Launch platform:** Sukhoi-30MKI fighter jets.
 - ⊕ It has **Inertial Navigation Systems (INS)-GPS navigation** and **Passive Homing Head** for final attack, allowing it to **accurately hit radiation-emitting targets**.
 - ⊕ **Range:** Height ranging from **500 meters to 15 km**, and can hit **radiation-emitting targets within 250 km**
- **Significance:** Allows IAF to conduct **Suppression of Enemy Air Defence (SEAD) operations deep within enemy territory**, neutralizing critical air defense installations.



Exercises in news

Nomadic Elephant

- Joint Military Exercise **between armies of India and Mongolia** will be conducted in Meghalaya.

Exercise MAITREE

- Joint military Exercise between **India-Thailand** was conducted in Thailand.



Sytrichia Caninervis

Scientists have found a **desert moss - Sytrichia Caninervis** - which is able to withstand Mars-like environment conditions.

- **Mosses** are **small, non-vascular flowerless plants** in the taxonomic division **Bryophyta**.
- Mosses are commonly found in **moist-shady locations** and are **distributed throughout the world except in salt water**.

About Sytrichia Caninervis

- It is **widespread in some of Earth's harshest locations** including Antarctica and the Mojave Desert.
- It could be the **first possible pioneer species for the colonization of Mars**.



UN Convention on the Rights of Persons with Disabilities (UN-CRPD)

17th session of the Conference of State Parties to UN-CRPD took place in New York with the theme **"Rethinking disability inclusion in the current international juncture and ahead of the Summit of the Future"**.

About CRPD

- **Adopted in New York in 2006 and entered into force in 2008**.
- **Objective:** To promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity.
- **Persons with disabilities** include those who have long-term physical, mental, intellectual or sensory impairments.
- **Members:** It has **164 Signatories (including India)**.



IEEE 2061-2024

IEEE 2061-2024 wireless network standard for affordable broadband access in rural areas has been approved by Institute of Electrical and Electronics Engineers (IEEE) last month.

- It is based on solutions developed by a **research group at IIT-Bombay**.

About IEEE 2061-2024

- IEEE-2061 network includes the **Access Network (AN) and Core Network (CN)** similar to cellular networks.
 - ⊕ **CN connect continents, countries and major national network nodes** whereas **AN links end-users' equipment** to the core network via a local exchange or local radio node.
- However, **IEEE-2061 AN is heterogenous** wherein different types of base stations coexist as against **5G network, where the AN is homogeneous** comprising base stations of the same type.



Mars Odyssey Orbiter

Recently, **NASA's Mars Odyssey Orbiter** captured the view of largest volcano in our solar system, Olympus Mons, located on Mars.

About Mars Odyssey

- Launched in **2001**, it is the longest continually active orbital mission.
- It was the first spacecraft to make a **global map of chemical elements and minerals that make up Martian surface**.
- **Objectives of Mars Odyssey**
 - ⊕ **Determine abundance of hydrogen** in shallow subsurface.
 - ⊕ **Acquire high spatial and spectral resolution images** of surface mineralogy.
 - ⊕ **Characterize Martian near-space radiation environment** as related to radiation-induced risk to human explorers.



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