Current Affairs by PMF IAS® – July 04, 2024

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{GS2 – Governance – Issues} Industrial accidents

❖ **Context (TH):** A **chemical reactor explosion** in **Dombivli** (MH) resulted in the loss of lives and injuries.

Frequent industrial accidents in Maharashtra

- Reports show **fatal industrial accidents** were frequent in **2016**, **2018**, **2020** and **2023**.

Causes

➢ **Not implementing relocation:** The Maharashtra govt. is guilty of not relocating 156 chemical factories in the Dombivli MIDC area even after "deciding" in 2022 to relocate them to Patalganga.

➢ **Lacunae in enforcement:** The boiler in the chemical factory was not registered under the **Indian Boiler Regulations, 1950**.

➢ **Poor inspection:** The **Directorate General Factory Advice Service & Labour Institutes report, 2022**, indicates poor inspection, possibly due to fewer staff and more workload.

- ❖ In 2021, **23.89%** of hazardous & **8.04%** of registered factories were inspected in Maharashtra.
- ❖ The **all-India figure** of **14.65%** and **26.02%,** respectively, is unsurprising.

➢ **Lower prosecution rate:** With a poor prosecution rate of 6.95% in Gujarat, 13.84% in Maharashtra, and 14.45% in Tamil Nadu, inspections lose their "deterrent effect."

➢ **Corruption in inspection system:** In a report, the **Maharashtra Industry Development Association** admitted an "understanding" between the auditors and factory owners or managers.

➢ **Liberalisation of laws:** Liberal reforms, including Self-certification, randomised inspections, online inspections, and third-party certification, violate several articles in the **International Labour Organization's Labour Inspection Convention (081), 1947**.

Way forward

✓ **Penal system for enforcers:** Penal system for **enforcers** is a must, facilitating complete legal compliance.

✓ Inspectors can "**inspect**" and "**facilitate**" due **compliance** with laws to employers and unions.

{GS2 – Vulnerable Sections – PwDs} Inclusive sports manual for PwD

❖ **Context (TP):** **Kerala** has created an **inclusive sports manual** to promote the sporting talents of **differently abled children**.

- The inclusive sports programme aims to promote sports by allowing individuals with different kinds of **disabilities** and those **without disabilities** to participate.

- This is the **first time** in the country that such a book is being prepared **for parents**.

{GS2 – Governance – Initiatives} Sampoornata Abhiyan

❖ **Context (PIB): NITI Aayog** is launching a **3-month campaign**, '**Sampoornata Abhiyan'**.

Credits: PIB

- Aims to achieve saturation of the six key indicators in Aspirational Districts and Aspirational Blocks.
- **Six** identified **KPIs** across **Aspirational Districts** relate to pregnant women's nutrition and care, immunisation, soil health card, school with functional electricity, and textbook distribution.
- **Six** identified KPIs across **Aspirational Blocks** include Antenatal Care (ANC), Diabetes and Hypertension screening, Supplementary Nutrition under the ICDS Programme, Soil health card and SHG funding.

{GS3 – Agri – Organic Farming} 'Jaiva Gramam' Campaign

❖ **Context (TH):** The **'Jaiva Gramam'** campaign, a new initiative to promote **organic farming**, has been launched in **Karumalloor panchayat**, Ernakulam district, Kerala.

- The campaign was introduced as part of the '**Njattuvela**' observance, with backing from the grama panchayat and **Lions Club** of North Paravur.
- It was launched to encourage households to grow their own **vegetables** for the upcoming **Onam** season.
- It aims to support individuals in organic farming, especially in overcoming **marketing challenges**.
- The program will provide participating farmers with **vegetable saplings**, fertilisers, and **agricultural implements** at subsidised rates. Also, participants will interact with experienced farmers.
- It aims to create a **sustainable agricultural growth** model, promote **self-sufficiency** in vegetable production, and preserve Kerala's rich farming heritage for the **economic benefit** of farmers.

{GS3 – S&T – Bodies} Anusandhan National Research Foundation (ANRF)

❖ **Context (TH):** The recently announced executive and governing boards of the **Anusandhan National Research Foundation (ANRF)** have no representation from Indian industry and state universities.

Current Board Composition

- The board is primarily composed of **government officials** and **department secretaries**.

- The **15-member** Governing Board, as notified, includes only one industrialist and two Universities.
- The **ANRF Act, 2023**, explicitly allows appointing up to **five members** from business organisations or industries onto the governing board.

⇨ *The **ANRF replaces** the Science and Engineering Research Board (**SERB**), established in **2008**.*

ANRF's Expanded Scope and Funding Structure

- The ANRF expands the definition of research to include **humanities** and **social sciences**.
- Unlike SERB, ANRF can fund and receive money from **private** and **international sources**.
- It has been allocated ₹2,000 crore for the 2024-2025 financial year.

⇨ *Only **36%** of India's total research expenditure came from the private sector in 2019-20.*

⇨ *India's overall **R&D expenditure** remains low at **0.6% of GDP** (global average - 1.8%).*

Anusandhan National Research Foundation (ANRF)

- The Anusandhan National Research Foundation (ANRF) was created through the ANRF Act 2023.
- The ANRF will act as a **central hub**, seeding, growing, and promoting R&D activities across India's universities, colleges, research institutions, and R&D labs.
- It aligns with the recommendations outlined in the **National Education Policy (NEP)**, ensuring that research efforts align with national educational objectives.
- The ANRF fosters **collaboration** between industry, academia, government departments, and research institutions and creates a **platform** for participation and contribution.

{GS3 – IE – Securities} SEBI's Notice to Hindenburg

❖ **Context (IE): Hindenburg Research** announced receiving a **show cause notice** from the **Securities and Exchange Board of India (SEBI)** regarding its **short-selling** of Adani Enterprises Ltd (AEL) shares.

- In 2023, Hindenburg Research released a report accusing the Adani Group of **stock manipulation** and **accounting fraud**, which led to the cancellation of Adani Enterprises' **follow-on public offer**.

⇨ *A **follow-on public offer (FPO)** is when a company already listed on a stock exchange issues new shares to the public or existing shareholders to raise additional capital after the IPO.*

SEBI's Allegations and Hindenburg's Response

- SEBI issued a show cause notice to Hindenburg Research, alleging **collusion** with certain entities to profit from advance knowledge of their report on Adani.
- Hindenburg dismissed SEBI's notice as an attempt to silence **whistleblowers**. They argued that their short position on Adani was publicly disclosed and denied any wrongdoing.
- Hindenburg earned approximately $4.1 million in gross revenue from **Adani shorts** via their investor relationship and around $31,000 from their **short position** on Adani US bonds.

{GS3 – Envi – CC} Alaskan Glaciers on the Brink

❖ **Context (DTE):** A recent study in **Nature Communications** reveals that the **Juneau Icefield**, spanning **Alaska** and **British Columbia**, is experiencing rapid **glacial retreat**.

> ⇨ ***Glacial retreat*** *is the shrinking or receding of a glacier over time, occurring when the ice melts, or sub-limation exceeds new snow or ice accumulation.*

- Glacier shrinkage between 2015-2019 was **five times faster** compared to the mid-20th century.
- **Alaskan icefields** account for **25%** of global glacier ice loss and are major contributors to global sea level rise. At this pace, all Alaskan ice could disappear within 250 years.

Cause of Acceleration

- The ice loss coincides with a **1.39°C temperature rise** at **Juneau Airport** from 1941 to 2020.
- The researchers link the temperature rise to a shift in the **Pacific Decadal Oscillation (PDO)**, a **long-term fluctuation** in **Pacific Ocean temperatures**, which switched to a **warm phase** around 1976. This increased precipitation and warmer temperatures in Alaska and Juneau, accelerating glacier melt.
- A key factor in this acceleration is the rising **Equilibrium Line Altitude (ELA)**, the zone where snowfall balances melting throughout the year.
- As the **ELA rises**, a greater surface area is exposed to melting, amplifying ice loss across entire ice field.

{GS3 – Envi – Conservation} Global Biodiversity Framework

❖ **Context (DTE):** A report by the IUCN reveals that **Eastern and Southern Africa** is halfway to achieving the coverage goal of the **Global Biodiversity Framework** (GBF) **Target 3** or **30 x 30 target**.

> ⇨ ***30 x 30 target*** *is a global initiative under which countries must* ***at least 30%*** *of their* ***terrestrial, inland water, marine,*** *and* ***coastal areas*** ***by 2030****.*

- Till now, the region has **protected 17.24% of its land**, covering 5,544 protected and conserved areas.
- The report highlights the **increased involvement of indigenous peoples and local communities** in conservation. Of the 316 protected areas they govern, 35.44% are in Namibia, with the rest in Kenya, Madagascar, Mozambique, Tanzania, and one site in Botswana.

Challenges in the Implementation of 30 x 30 Target in the Region

➢ **Variability within the region:** 38% of countries remain below 10% in terrestrial coverage.

➢ **Government-driven initiative:** Stakeholders, including Indigenous peoples, local communities & private sector, are less involved.

➢ **Dispersion of mandates across various ministries:** It leads to inefficiencies and coordination difficulties.

{GS3 – S&T – Innovation} Anti-Insecticide Fabric*

❖ **Context (TH):** The **Institute for Stem Cell Science and Regenerative Medicine (inStem)**, in Bengaluru, have developed an **anti-insecticide fabric** that neutralises **organophosphate-based pesticides**.

- The **nucleophilic small molecules** covalently bonded to the fabric can **detoxify pesticides** through nucleophile-mediated hydrolysis upon contact.
- The fabric retains the anti-insecticide property even after washing 150 times.

✓ **Advantage:** It will protect farmers from chronic toxicity due to repeated pesticide exposure.

Nucleophile

- A nucleophile is a chemical species that **donates an electron pair to form a chemical bond** in a reaction.
- It is typically **attracted to positively charged or electron-deficient areas** in molecules, allowing it to react with and neutralise substances such as pesticides.

Organophosphate-Based Pesticides

- Organophosphate-based pesticides are a class of insecticides that work by **inhibiting an enzyme** in insects' nervous systems called **acetylcholinesterase** (AChE), **critical for neuromuscular function**.
- When this enzyme is inhibited, it leads to a **buildup of acetylcholine** (ACh), which disrupts the normal transmission of nerve impulses and leads to paralysis and death in insects.
- Commonly used such pesticides include parathion, chlorpyrifos, diazinon, dichlorvos, phosmet, fenitrothion, tetrachlorvinphos, azamethiphos, azinphos-methyl, malathion, and methyl parathion.
- **Toxicity:** These pesticides can be toxic to humans and animals with repeated exposure. It causes **learning deficits, suffocation, paralysis, muscle weakness,** etc.

{GS3 – S&T – Space} Spiral Galaxy

❖ **Context (TH):** Study using **NASA's James Webb Space Telescope** has found evidence of **spiral galaxies** only half a billion years after the **Big Bang**.

- A **spiral galaxy** features **a flat, rotating disk of stars, gas, and dust**, with a **central bulge of older stars**. **Spiral arms** extend outward from the bulge, often hosting **active star formation**. For e.g., **Milky Way** and Andromeda Galaxy.

Galaxy

- Galaxy is a system of **millions or billions of stars**, together with **gas** and **dust**, **held together by gravitational attraction**. They are the major building blocks of the universe.
- The 13.8-billion-year-old universe hosts various galaxy types, including spiral, elliptical, and those with or without bulges. **Younger galaxies** tend to be **spiral**, while **older ones** have **various shapes**.
- Astronomers study galaxies to understand their formation and evolution, but **older galaxies are harder to study due to their fainter light**.

Earlier Belief

- As the universe cooled down from a **dense plasma state**, it contained more and more hot gas. They formed clumps of matter that eventually gravitated to become galaxies.
- These **early galaxies** had **irregular shapes** and **lacked disks**. But over billions of years, they **cooled into hot, thick disks** that eventually **thinned into spiral arms**.
- But the new study shows that this cooling down and spiral formation occur around the same cosmic time.

{GS3 – S&T – Tech} Top Quark *

❖ **Context (TH):** Scientists at the **Large Hadron Collider** have reported the most precise measurement of the **most massive subatomic particle known**, the **top quark**.

- Physicists discovered the top quark in **1995** at a particle accelerator in the US called the **Tevatron**.
- The top quark is **10 times heavier than a water molecule**, roughly 3 times heavier than a copper atom, and about 95% as heavy as a caffeine molecule.
- The **high mass makes the top quark so unstable** that it could break up into lighter, more stable particles in less than 10^{-25} seconds.
- **Measuring** a top quark's **mass** is **difficult** because of its **short lifetime of less than 10^{-25} seconds**.
- **Higgs bosons** interact most **strongly** with it**,** which is why it is the most massive subatomic particle.

How a Particle Acquires Mass

- A particle's mass is equal to the **sum of masses contributed from multiple sources**.
- An important source for all elementary particles is the **Higgs field**, which pervades the entire universe.
- A **'field'** is like a **sea of energy**, and **excitations in the field** are called **particles**. For e.g., an excitation of the Higgs field is called the **Higgs boson**, while an 'electron field' is called the electron.
- All these fields engage with each other in specific ways. For e.g., when the 'electron field' interacts with the Higgs field at energies much less than 100 GeV, the electron particle will acquire some mass.

⇨ ***GeV**, or **giga-electron-volt**, is a unit of energy used in the context of subatomic particles.*

⇨ *1 joule = 6.24 billion GeV*

- The same thing goes for other elementary particles.
- Elucidating this mechanism won **François Englert** and **Peter Higgs** the **2013 Nobel Prize in physics**.

Why Top Quark's Mass is Important

- **Testing the Standard Model:** An accurately measured top quark mass allows physicists to verify the Standard Model's internal consistency and identify potential areas where it might be incomplete, hinting at new physics beyond it.

⇨ *The **Standard Model of Particle Physics** is currently the best theory for **describing the universe's most basic building blocks**. It explains how particles called quarks (which make up protons and neutrons) and leptons (which include electrons) make up all known matter.*

- **Higgs Boson Interaction:** Because of its strong interaction with the **Higgs field**, studying its mass helps physicists indirectly probe the properties of the **Higgs boson** itself and further our understanding of how particles acquire mass.
- **The Fate of the Universe:** Even if the Higgs field is slightly stronger than it is now, the atoms of most chemical elements will be destroyed, taking stars, galaxies, and earthlife with them.

Large Hadron Collider (LHC)

- LHC is the **world's largest science experiment,** built by the **European Organisation for Nuclear Research (CERN)**. It is located outside **Geneva**.
- It is a collider which accelerates two beams of particles (**hadrons**) in opposite directions and smashes them head-on. A hadron is a subatomic particle made up of smaller particles.
- The LHC typically uses **protons**, which are made up of **quarks** and gluons.
- It energises the protons by accelerating them through a **narrow circular pipe that is 27 km long**.

Achievements of LHC

- **Discovered** the **Higgs boson or God's Particle** in 2012.
- Tested the predictions of the **Standard Model of particle physics.**
- Observed exotic particles like **pentaquarks** and **tetraquarks.**

{Prelims – Geo – Evolution} Ancient Ostrich Nest Unearthed in Andhra Pradesh

❖ **Context (IE):** Archaeologists have unearthed a 41,000-year-old **ostrich nest** in Prakasam, **Andhra Pradesh**. This discovery is considered the world's **oldest known** ostrich nest.

Megafauna

- **Megafauna** refers to animals weighing **over 50 kg**, a term first coined by **Alfred Russel Wallace** in 1876.
- These large animals are classified as **megaherbivores**, **mega carnivores**, or **mega omnivores** based on their diets. **Ostriches**, weighing 90-140 kg and 7-9 feet tall, fall into the mega omnivore category.

Co-evolution hypothesis

- A study by **Yale** and the Smithsonian's **National Museum of Natural History** (2020) suggests large animal extinction in India began around **30,000 years ago**, coinciding with **human arrival**.
- This research supports the "**co-evolution hypothesis**," which proposes that fauna's resilience to extinction may have resulted from coevolution with **hominins** (humans and their relatives).
- It proposes that **geographic isolation** and **environmental changes** may have accelerated extinction.

Previous Evidence of Ostriches in India

- 1884: Richard Lydekker found evidence of the **extinct Asian ostrich** (Struthio asiaticus) in the Dhok Pathan deposits of the **Upper Siwalik Hills** (now in Pakistan).

- 1989: Archaeologist S. A. Sali discovered **ostrich eggshell beads** and engravings (50,000-40,000 years old) at an Upper Palaeolithic site in **Patne, Maharashtra**.
- 2017: **CCMB** researchers in Hyderabad identified ostrich presence in Rajasthan, Madhya Pradesh, and Gujarat 25,000 years ago through fossilised eggshells linked to **continental drift** from **Gondwanaland**.

About Ostrich

- The ostrich is a **flightless bird** and the **world's largest** avian species.
- The ostrich is the **tallest** and **heaviest** bird in the world.
- They inhabit the **savannas** and **desert regions of Africa**.
- It derives most of its hydration from its plant-based diet.
- Ostriches are **exceptional runners** and can achieve sprint speeds of up to 43 miles per hour.
- Ostriches live in **small herds**, typically of fewer than a dozen birds. These groups are led by **alpha males** who mate primarily with the dominant hen.
- **IUCN Status:** **Least Concern**.

Credits: Wikipedia

{Prelims – In News} PLI Scheme for Critical Mineral Recycling

❖ **Context (IE):** The **Ministry of Mines** is considering a **Production Linked Incentive (PLI) scheme** to promote the recycling of **critical minerals** in India.

- It aims to strengthen **domestic supply chains** and foster a **circular economy**, especially in light of the slight response to recent critical mineral block auctions.
- It aligns with NITI Aayog's policy recommendations and complements the **Battery Waste Management Rules (BWMR) 2022**, which mandate phased recycling of used EV lithium-ion batteries from 2026.

⇨ *NITI Aayog suggests parameters such as cell chemistry, recovery efficiency, and domestic utilisation benchmarks for developing the incentive structure.*

- The scheme aims to incentivise **e-waste recycling** or "**urban mining**" to recover critical minerals such as lithium, copper, cobalt, graphite, chromium, and silicon.
- India's e-waste generation, especially **solar PV module waste** and **EV batteries** is expected to surge due to growth in renewable energy infrastructure and EV adoption.

Battery Waste Management Rules (BWMR), 2022

- The Battery Waste Management Rules (BWMR) addresses **battery waste management** due to the rise of electric vehicles (EVs) and renewable energy storage.
- It applies to **all batteries**, including lead-acid and lithium-ion, and covers **manufacturers, importers, assemblers,** and **re-conditioners**.
- **Extended Producer Responsibility (EPR):** Manufacturers and importers must collect and **recycle** end-of-life batteries, setting up collection mechanisms from consumers and dealers.
- The rules include provisions for **penalties** in case of non-compliance with the EPR obligations.
- **Phased targets** for battery collection, starting at **30%** for lithium-ion batteries in the **first two years**, increasing to **70%** by the **seventh year**.
- The rules mandate **minimum recovery rates** for various materials in batteries. Lithium-ion batteries' recovery rates are set at 70% for cobalt, 95% for copper, and 90% for nickel.
- Battery manufacturers and importers must register with the **Central Pollution Control Board (CPCB)**. They must submit **annual returns** on the collection and recycling of used batteries.

{Prelims – Envi – Species} New Horned Frog Species

❖ **Context (TH):** Researchers from the **Zoological Survey of India (ZSI)** have discovered a new species of forest-dwelling **horned frog** in **Talle Wildlife Sanctuary**, Arunachal Pradesh.

Credits: The Hindu

- The frog, named **Xenophrys apatani**, represents a significant addition to India's herpetofaunal (reptiles and amphibians) diversity. The new species has been named after the **Apatani community**.
- **Xenophrys** is a genus of frogs commonly known as **horned frogs** or **megophryid frogs**.

Talle Wildlife Sanctuary

- It is located in the Lower Subansiri district of **Arunachal Pradesh**.
- It is part of the **Eastern Himalayas biodiversity hotspot**.
- The sanctuary is close to areas inhabited by the **Apatani** and **Nishi** tribes.
- The river **Subansiri** flows through this sanctuary.
- It is rich in diverse flora, including **bamboo, orchids,** and **rhododendrons**.
- **Clouded leopards**, Himalayan black bears, **red panda**, and barking deer are important faunal species.

⇨ *The **Apatani** are a tribal group in the **Ziro Valley** (**Lower Subansiri district** of **Arunachal Pradesh**).*

⇨ ***Nyishi tribes** spread across parts of **Arunachal Pradesh** and **Assam**.*

{Prelims – In News} Havildar Abdul Hamid *

❖ **Context (IE):** The **RSS chief** released a book on **Hamid**, '**Mere Papa Paramvir**,' & '**Bharat ka Musalman**.'

- Abdul Hamid laid his life down while fighting Pakistan Army's Patton tanks in the Battle of Asal Uttar.

Battle of Asal Uttar

- **Location:** Situated in **Punjab**, **Asal Uttar**, near the **India-Pakistan border**.
- Pakistan Army launched an offensive capturing many parts of **Khem Karan** in Septemeber **1965**.
- They aimed to reach the bridge over the **Beas River** and cut off large areas of **Punjab**, including **Amritsar**, from the **rest of India**.
- Indian army **Lt. Gen Harbaksh Singh** advised **stout defence** of the **Asal Uttar road junction**.
- It was one of the largest **tank battles** fought during the **1965 India-Pakistan War**.

Contribution of Abdul Hamid

- At the time, Hamid served with the 4th Grenadiers Battalion of the Indian Army.
- He led a detachment of Recoilless Guns, hunting for enemy tanks in the villages around Asal Uttar.
- In doing so, Hamid came under fire from another Pakistani tank and lost his life.
- Hamid was awarded **Param Vir Chakra** — **India's highest gallantry award** — **posthumously**.