

Current Affairs - 26 August 2024

NATIONAL QUANTUM MISSION (NQM)

India's first quantum computer set for launch under National Quantum Mission.

Objective: After a delay of nearly four years, the National Quantum Mission is set to advance India's quantum technologies across four key verticals: **quantum computing, communication, measurement and sensing.**

- **Funding & Structure:** The mission has been allocated nearly ₹6,000 crore, with plans to establish four Section 8 companies under the aegis of premier institutions like IITs and IISc. These companies will spearhead activities across the identified verticals.

About National Quantum Mission (NQM):

The National Quantum Mission (NQM) is a visionary initiative (2023) led by the **Department of Science and Technology (DST)** to fortify India's research and development in the quantum domain.

- Over the next eight years (2023-2031), the mission aims to pioneer the development of intermediate-scale quantum computers with **50-1000 physical qubits** using cutting-edge platforms like **superconducting** and **photonic technology**.
- **Quantum communication:** It seeks to establish satellite-based secure quantum communications. It spans a range of **2000 km** within India and extends to other countries. It seeks to develop **highly sensitive magnetometers in atomic systems** and **precision atomic clocks for timing, communications, and Navigation**.
- **Quantum materials development:** It will provide crucial support for the design and synthesis of quantum materials such as **superconductors, novel semiconductor structures, and topological materials** to fabricate advanced quantum devices.
- **Thematic Hubs (T-Hubs):** To catalyze research and development, **four T-Hubs** will be instituted in premier academic and national research and development institutes, with a focus on **igniting new knowledge through fundamental and applied research**, as well as driving R&D activities forward.

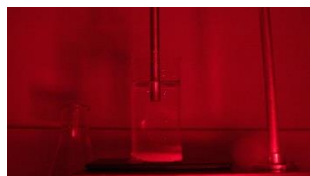
Current Affairs - 26 August 2024

- **Applications:** It will find utility across diverse sectors including **healthcare, diagnostics, defence, energy and data security.**

How do quantum computers work?

- Quantum computing uses the **qubit as the basic unit of information** rather than the conventional bit.
 - The main characteristic of this alternative system is that it permits the coherent **superposition of ones and zeros**, the digits of the binary system around which all computing revolves.
-

WHAT IS SONOLUMINESCENCE?



- It is a fascinating phenomenon where **small gas bubbles in a liquid emit a brief flash of light** when exposed to intense sound waves.
 - This phenomenon was first observed in **1934** by two German engineers studying sonar, a method of using sound waves for navigation similar to how bats operate.

How does sonoluminescence work?

- **Sound wave interaction:** The process begins when a tiny bubble trapped in a liquid is subjected to **powerful sound waves**. These waves cause the bubble to rapidly expand and contract due to alternating high and low-pressure phases.
- **Extreme conditions:** During the contraction phase, the bubble compresses so rapidly that its internal temperature skyrockets to several thousand kelvins.
 - This extreme heat ionizes the gases inside the bubble, resulting in the **emission of light energy** for a fraction of a second—about a trillionth of a second.

Natural occurrence:

- **Pistol Shrimp:** Sonoluminescence is not confined to laboratory settings. In nature, the **pistol shrimp** (family Alpheidae) exhibits a similar effect.

Current Affairs - 26 August 2024

- This shrimp has a **specialized claw** that snaps shut with remarkable speed, creating a high-velocity jet of water.
- This jet forms a low-pressure bubble that, upon collapsing, produces a loud sound, intense heat, and a brief flash of light.

Applications:

- **Scientific curiosity:** Sonoluminescence continues to captivate scientists due to its mysterious nature and potential applications.
 - While the phenomenon is primarily of academic interest, it has sparked discussions about its potential use in fields like **thermonuclear fusion** and **acoustic imaging**.

WHAT IS THE NARCOTICS CONTROL BUREAU (NCB)?



Narcotics Control Bureau (NCB) is the nodal drug law enforcement and intelligence agency under the Ministry of Home Affairs, Government of India.

- It was **constituted** on 14th November, 1985, **under the provisions of the Narcotic Drugs and Psychotropic Substances Act, 1985** (NDPS Act).
- It has its **headquarters** located in **Delhi**.
- The NCB exercises the **powers and functions** of the Central Government for taking measures with respect to:
 - **Coordination of actions by various offices**, State Governments, and other authorities **under the N.D.P.S. Act, Customs Act, Drugs and Cosmetics Act**, and any other law for the time being in force in connection with the enforcement provisions of the NDPS Act, 1985.
 - **Implementation of the obligation** in respect of countermeasures against illicit traffic **under the various international conventions and protocols** that are in force at present or which may be ratified or acceded to by India in the future.

Current Affairs - 26 August 2024

- Assistance to concerned authorities in foreign countries and concerned international organisations to facilitate coordination and universal action for prevention and suppression of illicit traffic in these drugs and substances.
 - Coordination of actions taken by the other concerned ministries, departments, and organizations in respect of matters relating to drug abuse.
 - It also functions as an enforcement agency through its zonal offices.
 - The zonal offices collect and analyse data related to seizures of narcotic drugs and psychotropic substances, study trends, modus operandi, collect and disseminate intelligence, and work in close cooperation with the Customs, State Police, and other law enforcement agencies.
-

CHILD ADOPTION IN INDIA

What is Adoption in legal terms?

- Adoption is the formal process through which a child is permanently separated from his biological parents to become the lawful child of his adoptive parents.
- The adopted child enjoys all rights, privileges and responsibilities attached to a biological child.

Legal Provisions w.r.t Adoption in India:

- In India, two legislations deal with the adoption of a child:
 - The **Hindu Adoption and Maintenance Act, 1956** (HAMA)
 - The **Juvenile Justice (Care and Protection of Children) Act, 2015**
 - This includes Juvenile Justice (Care and Protection of Children) Model Rules, 2016 and Adoption Regulations, 2017.
 - CARA functions as the nodal agency for adoption in India.
- CARA is a statutory body established under the Juvenile Justice (Care and Protection of Children) Act, 2015.

Current Affairs - 26 August 2024

- CARA functions as the nodal body for adoption of Indian children and is mandated to monitor and regulate in-country and inter-country adoptions.

Who can be Adopted?

- An orphan, abandoned, or surrendered child who has been declared legally free for adoption by the Child Welfare Committee (CWC) can be adopted.
 - This only happens under the provisions of the JJ Act 2015.
- A child of a relative — paternal uncle or aunt, a maternal uncle or aunt or paternal and maternal grandparents — can be adopted.

Who can Adopt?

- The Ministry of Woman and Child Development states that irrespective of marital status and whether or not they have a biological son or daughter, a person can adopt if:
 - The prospective adoptive parent (PAP) is physically, mentally stable, financially capable and should not have any life-threatening medical condition,
 - In the case of a married couple, two years of stable marital relationship and consent of both spouses are required for adoption.
 - While a single woman can adopt a child of any gender, a single male is not eligible to adopt a girl child.

Reasons Behind Low Level Adoption in India:

- **Lengthy and Exhausting Process:**
- **Systemic Delays:**
- **Social and Cultural Barriers:**
- **Special Needs and Older Children:**

While there is an increasing awareness and acceptance of adoption in India, the process remains fraught with delays and systemic issues that need urgent reforms.



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

CROSS & CLIMB ROHTAK

School of Research Based Learning & Competition



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

Current Affairs - 26 August 2024

FALLOUTS OF LITHIUM MINING

Why in News?

According to a new study, Chile's Atacama salt flat (flat expanses of ground covered with salt and other minerals) is sinking at a rate of 1 to 2 cm per year due to lithium brine extraction.

The process of extracting lithium from brine involves pumping salt-rich water to the top and through a sequence of evaporation ponds in order to recover lithium.

What is Lithium Mining?

Country	Production (metric tons)	Known Reserves (tons)
Australia	86,000	6.3 million
Chile	44,000	9.3 million
China	33,000	5.1 million
Argentina	9,600	19 million
Brazil	4,900	0.47 million
Zimbabwe	3,400	0.50 Million

- Lithium mining refers to the extraction of lithium primarily from brine water and hard-rock (spodumene) deposits.

- Brine extraction**, which accounts for 66% of the total lithium production, involves pumping underground brine to the surface and allowing the water to evaporate, leaving behind lithium carbonate.
- Hard-rock mining** involves extracting lithium-bearing minerals from rock through traditional mining techniques.
- Lithium production** has dramatically increased over the past decade.
 - The global output surpassed 100,000 tonnes (tonne = metric ton) for the first time in 2021, a fourfold increase from 2010.
 - In 2022, global lithium mines produced an estimated 130,000 metric tons.



Lithium Reserves and Mining in India:

The Geological Survey of India (GSI) had for the **first time in India's history** established Lithium inferred resources of 5.9 million tonnes in **Jammu and Kashmir's Reasi district**.



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

CROSS & CLIMB ROHTAK

School of Research Based Learning & Competition



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

Current Affairs - 26 August 2024

- Months after India's first lithium reserves, **the GSI has found another reserve of the crucial mineral** in Degana in Rajasthan's Nagaur district.
 - These reserves are believed to be much bigger in quantity (than found in J&K) and **can meet 80% of the total country's demand.**
- The Ministry of Mines successfully **auctioned off India's first lithium block** in Chhattisgarh's **Korba** district (Katghora region) recently.

Environmental Challenges Posed by Lithium Mining:

- **Deplete water resources:** Extracting one ton of lithium requires approximately 500,000 litres of water, which can deplete water resources in arid regions and impact local communities and ecosystems.
- **Contaminate soil and water sources:** The chemicals used in lithium extraction, such as sulfuric acid, can contaminate soil and water sources, posing risks to human health and wildlife.
- **Carbon emissions:**
 - Lithium mining, particularly from hard rock sources, is energy-intensive, requiring substantial electricity for crushing, grinding, and chemical separation processes.
 - This energy often comes from **non-renewable sources**, exacerbating carbon emissions and the carbon footprint of lithium production.

Fallouts of Lithium Mining in Chile:



- The research has shown that lithium mining (over the years) has had severe environmental fallouts, especially in countries such as Chile.
- The satellite data collected between 2020 and 2023 shows **deformations in the Earth's crust of Atacama salt flat** - one of the largest sources of lithium in the world.



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

CROSS & CLIMB ROHTAK

School of Research Based Learning & Competition



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

Current Affairs - 26 August 2024

- The worst affected areas are those where mining companies are doing most of their pumping of lithium-rich brine.
- That is happening because the **pumping takes place at a faster rate than the recharge** of aquifers, leading to **subsidence** or the downward vertical movement of the Earth's surface.

WHAT IS MASS WASTING?



A new study on the high frequency of mass wasting events in the Sedongpu Gully of the Tibetan Plateau since 2017 and the rapid warming of the area, could be bad signs for India, specifically the country's Northeast.

- It is the **movement of rock and soil down slope** under the **influence of gravity**.
- **Causes:**
 - It occurs **when a slope is too steep to remain stable** with existing material and conditions.
 - **Slope stability is determined** by two factors: the **angle of the slope** and the **shear strength of the accumulated materials**.
 - Mass-wasting events are **triggered by changes that oversteepened slope angles and weaken slope stability**, such as rapid snow melt, intense rainfall, earthquake shaking, volcanic eruptions, storm waves, stream erosion, and human activities.
 - **Excessive precipitation** is the most **common trigger**.

Mass-wasting events are **classified by their type of movement and material**, and they share common morphological surface features.

- The most **common types** of mass-wasting events are **rockfalls, slides, flows, and creep**.



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

CROSS & CLIMB ROHTAK

School of Research Based Learning & Competition



CROSS & CLIMB
MAKING THE ELIGIBLE ENTITLED

Current Affairs - 26 August 2024

- Geologically, **landslide** is a general term for mass wasting that involves fast-moving geologic material.
 - **Loose material along with overlying soils** are what typically move during a mass-wasting event.
 - **Moving blocks of bedrock** are called **rock topples, rock slides, or rock falls**, depending on the dominant motion of the blocks.
 - **Movements of dominantly liquid material** are called **flows**.
 - Movement by mass wasting can be **slow or rapid**. **Rapid movement** can be **dangerous, such as during debris flows**.
-