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AUDIBLE ENCLAVES

Audible Enclaves: A New Sound Technology



- Audible Enclaves are small pockets of sound that are not disturbed by surrounding noise.

- They allow **specific individuals to hear a sound privately**, even in **crowded environments**.
- The technology is based on **sound wave manipulation**, ensuring that only **intended listeners** can hear the transmitted sound.

How Does Sound Work?

- **Sound** consists of **waves moving through a medium**, causing **particles to vibrate** back and forth.
- The **speed of vibration** determines the **frequency**:
 - **Higher frequency = Higher pitch sound.**
- When sound waves are emitted from a source, they **diverge in a process called diffraction**.
 - **Higher frequency sounds** diverge **more** than lower frequencies.

How Are Audible Enclaves Created?

- Traditional **parametric array loudspeakers** create **focused sound beams** using **high-frequency waves** modulated with an **audio signal**.
- **Audible enclaves** take this a step further using **two high-frequency waves of different frequencies**:
 - These waves are inaudible on their own.
 - When they intersect, non-linear interactions generate a sound wave audible only at that specific location.
- This method, reported in the **Proceedings of the National Academy of Sciences** ensures that only **individuals within a defined zone** can hear the sound.

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FOREIGN EXCHANGE MANAGEMENT ACT, 1999



- The Foreign Exchange Management Act (FEMA), 1999, came into force on **June 1, 2000**, replacing the Foreign Exchange Regulation Act (FERA), 1973.
- The act was introduced in the backdrop of **India's economic liberalization** to facilitate **external trade and payments** and ensure the **orderly development** of the **foreign exchange market**.

Objectives of FEMA:

- **Regulation & Management of Foreign Exchange:** FEMA governs all aspects of foreign exchange transactions in India, including:
 - **Acquisition & Holding** of foreign exchange
 - **Payment & Settlement** of foreign exchange transactions
 - **Export & Import** of currency.
- **Liberalizing Foreign Exchange Policies:** Unlike FERA, which was **restrictive and criminalized violations**, FEMA is more **transparent and promotes globalization**.
- **Empowerment of RBI:** The **Reserve Bank of India (RBI)** is the key authority under FEMA.
 - The RBI can frame rules, issue guidelines, and regulate foreign exchange transactions.
- **Civil nature of offences:** Violations under FEMA are **civil offences** (unlike FERA, where they were treated as criminal offences).
 - Penalties and fines can be imposed for non-compliance.

Applicability of FEMA:

- **FEMA applies to the whole of India**, including:
 - **Individuals, companies, and firms** operating in India.
 - **Indian agencies & offices abroad** (owned or managed by Indian citizens).

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- **Entities & Transactions Covered Under FEMA:**

- Foreign Exchange & Foreign Securities
- Export & Import of goods and services
- Banking, Financial, and Insurance services
- Overseas companies owned by NRIs (where ownership is 60% or more).
- Indian citizens residing within and outside India (NRIs).

Enforcement & Violations under FEMA:

- The **Enforcement Directorate (ED)** is the primary agency responsible for investigating violations.
- Violations can result in:
 - **Monetary Penalties:** Up to three times the amount involved or ₹2 lakh, whichever is higher
 - **Further Penalties:** ₹5,000 per day for continued contraventions
 - **Seizure of Assets:** In extreme cases, authorities may seize properties linked to FEMA violations

COMPETITION COMMISSION OF INDIA



- **Established in 2009** under the **Competition Act, 2002**, the CCI became fully operational on **May 20, 2009**, when substantive provisions related to anti-trust enforcement and merger regulation came into force.
- **Initially conceptualised in 2003**, it replaced the **Monopolies and Restrictive Trade Practices Act (MRTP), 1969**, aligning with India's post-liberalization economic reforms.

Composition:

- It is headed by a **Chairperson** and **six members** appointed by the **Central Government**, ensuring expertise in law, economics, finance, and international trade.

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- The members must have **at least 15 years of professional experience** and serve a **five-year term**, fostering informed decision-making in complex market cases.

Functions of CCI:

- **Preventing anti-competitive practices:** It investigates and penalizes **cartels, price-fixing and market manipulation**.
 - In 2022, the CCI imposed a ₹1,337 crore penalty on Google for abusing its dominance in the Android ecosystem.
- **Regulating abuse of dominance:** It also prevents companies from **using market power unfairly**, such as through **predatory pricing or restrictive trade practices**.
 - CCI's probe into Apple's in-app payment monopoly.
- **Controlling mergers & acquisitions:** It ensures mergers **do not create monopolies or reduce competition**.
 - CCI's scrutiny of Jio-Star India merger to prevent media dominance.
- **Ensuring consumer protection:** It monitors unfair trade practices to **protect consumer rights and market fairness**.
- **Advising the Government:** It provides opinions on competition issues when referred by **statutory authorities**.

INDO-PACIFIC OCEANS INITIATIVE (IPOI)



- IPOI was **launched by India** in November **2019** at the **ASEAN-led East Asia Summit (EAS)** in Bangkok.
- It **builds upon** the “Security and Growth for All in the Region” (**SAGAR**) **initiative** announced by the Prime Minister in 2015.
- Its objective was to **promote cooperation** for a **free and open Indo-Pacific** and the **rules-based regional order**, which will contribute towards strengthening safety, stability and development in the maritime domain.

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- As a **non-treaty-based voluntary arrangement**, it aims to achieve greater cohesion and **integration through common understanding and actions** related to shared interests.
- It **does not envisage a new institutional framework** and **leans heavily on the EAS mechanism**, which includes ASEAN member states and its eight dialogue partners.
- The IPOI **outlined seven pillars**, and it was indicated that **one or two countries could take the lead for a pillar** with others joining in voluntarily. The seven IPOI pillars are:
 - **Maritime Security: The United Kingdom (UK) and India**
 - **Maritime Ecology: Australia and Thailand**
 - **Maritime Resources: France and Indonesia**
 - **Capacity Building and Resource Sharing: Germany**
 - **Disaster Risk Reduction and Management: India and Bangladesh**
 - **Science, Technology, and Academic Cooperation: Italy and Singapore**
 - **Trade, Connectivity, and Maritime Transport: Japan and the United States (US).**

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)



- It is the world's foremost **intergovernmental forum** for scientific and technical **cooperation in the nuclear field**.
- It works for the **safe, secure, and peaceful uses of nuclear science** and technology.
- An **autonomous organization within the United Nations** system, the IAEA carries out programmes to maximize the contribution of nuclear technology to society while verifying its peaceful use.
- It is widely known as the world's "**Atoms for Peace and Development**" organization within the United Nations family.
- IAEA reports to both the United Nations General Assembly and Security Council.

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- **Statute:**
 - The Statute of the IAEA was approved on 23 October 1956 by the Conference on the Statute of the International Atomic Energy Agency, which was held at the Headquarters of the United Nations.
 - It came into force on **29 July 1957**.
- **Headquarters: Vienna,**
- **Membership:** Currently, it has 178 member states.
- **Structure:**
 - The **General Conference**, consisting of all members, **meets annually** to approve the budget and programs and to debate the IAEA's general policies.
 - The **Board of Governors**, which consists of **35 members** who meet about five times per year, is charged with **carrying out the agency's statutory functions, approving safeguards agreements, and appointing the director general**. The day-to-day affairs of the IAEA are run by the **Secretariat**, which is **headed by the director general**.
- **Functions of IAEA:**
 - It works with its member states and multiple partners worldwide to promote the safe, secure, and peaceful use of nuclear technologies.
 - It **applies nuclear safeguards** – consisting of monitoring, inspection, information analysis, and other activities – to **verify that nuclear activities remain peaceful and detect and deter their diversion**, including to weapons-related purposes.
 - In particular, the IAEA **implements comprehensive safeguards agreements mandated by the Nuclear Non-Proliferation Treaty (NPT)**, which serve as a first line of defense against nuclear weapons proliferation.
 - IAEA **enhances national, regional, and international capacities to respond to nuclear and radiological incidents**, which is essential to minimizing their impact.

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NATIONAL WILDLIFE HEALTH POLICY TAKES SHAPE

Five years after the Covid-19 pandemic, the Centre is reviewing a draft National Wildlife Health Policy (NWHP) to strengthen wildlife disease surveillance and research.

The policy proposes integrated monitoring systems, new diagnostic laboratories, and enhanced research efforts to track and prevent zoonotic diseases.

National Referral Centre for Wildlife (NRC-W)

- Zoonotic diseases account for 60% of emerging infectious diseases worldwide, with 72% originating from wildlife.
- India has experienced several localized but severe outbreaks, such as Kyasanur Forest Disease and Nipah virus.
- These incidents highlight the urgent need for efficient disease monitoring in wild animal populations and continuous health surveillance of captive wild animals in zoological institutions across the country.
- Against this backdrop, Centre has established the NRC-W.
- **NRC-W: An Ambitious Wildlife Health Initiative**
 - The NRC-W has been established in Junagadh, Gujarat.
 - The Central Zoo Authority (CZA) under the Union Environment Ministry has prepared blueprints for its development, focusing on emerging infectious diseases, wildlife disease surveillance, and outbreak management.

National Wildlife Health Policy (NWHP) Under Review

- Five years after the Covid-19 pandemic, the Centre is reviewing an interim draft of the NWHP to enhance wildlife disease monitoring and research.
- The policy proposes integrated surveillance systems, new diagnostic labs, and cross-sectoral collaborations to address zoonotic disease risks.
- It aims to mitigate risks of wildlife-origin pathogens, like SARS-CoV-2, by improving early detection and response mechanisms.

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- **Alignment with One Health Approach**
 - Over 60% of emerging infectious diseases in humans originate from animals.
 - In this context, the NWHP aligns with the National One Health Mission, which integrates efforts across human, animal, and environmental health sectors.
 - Monitoring wildlife, both in the wild and in captivity, has become crucial for pandemic preparedness.

NASA ASTRONAUTS SAFELY RETURN TO EARTH AFTER DELAYED INTERNATIONAL SPACE STATION MISSION

NASA astronauts Butch Wilmore and Sunita Williams returned to Earth after a nine-month delay due to issues with Boeing's spacecraft.

Both the astronauts had travelled to the International Space Station (ISS) in June 2024. They were initially supposed to return within a week, but their spacecraft, Boeing's Starliner, developed issues, making it unsafe for their return.

Nine Months in Space

- Williams and Wilmore's 286-day stay is one of the longest but not a record.
- Soviet cosmonaut Valeri Polyakov holds the record for the longest continuous stay in space at 438 days.
- Other astronauts, including Russia's Oleg Kononenko and US astronaut Peggy Whitson, have spent extensive time in space over multiple missions.

Boeing's Starliner Test Mission

- Their mission was primarily to test Boeing's Starliner CST-100, a spacecraft developed under NASA's Commercial Crew Program to transport astronauts to the ISS.
- The spacecraft encountered technical issues, including a helium leak, even before launch but was allowed to proceed.
- Further problems arose en-route to the ISS, preventing its safe return journey.

Delay in Return Arrangements

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- NASA had no immediate alternative to bring them back, as missions are planned well in advance.
- The next scheduled return mission was set for February 2025, but with no urgent medical concerns, NASA allowed them to stay aboard the ISS, which can accommodate up to 12 astronauts.

A Mission Marked by Uncertainty

- Their extended stay drew global attention, redefining the idea of being stuck at work.
- While longer space missions have occurred, none had experienced such an unexpected extension and uncertainty regarding their return.
- **Active Contributions During Extended Stay**
 - Despite their situation, Wilmore and Williams fully integrated into the ISS crew, conducting experiments, repairing equipment, and even participating in spacewalks.
- **Williams' Spacewalking Record**
 - With 62 hours over nine spacewalks, Williams set a new record for the most time spent in spacewalking by a female astronaut.
- **Leadership Role in Space**
 - Having prior experience on the ISS, both astronauts adapted quickly.
 - Williams took on the role of station commander three months into their stay and held the position until earlier this month.

Scientific Opportunity in Prolonged Stay

- Their extended stay provides valuable data for NASA's research on the effects of long-duration space missions.
 - The findings will contribute to studies on muscle and bone loss, brain fluid changes, heart disease risks, and psychological impacts—key concerns for future Moon and deep-space missions.
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