

Current Affairs 22nd January 2025 by Saurabh Pandey Sir

Indus Water Treaty Dispute Neutral Expert's Role

👤 Michel Lino, appointed by the World Bank, has declared his competence to resolve disputes between India and Pakistan regarding hydroelectric projects on Indus Treaty rivers. India's Position

India has welcomed the Neutral Expert's decision. Continues to seek a renegotiation of the Indus Water Treaty (IWT) from January 2023. Stalled Discussions

🏢 India has halted meetings of the Permanent Indus Commission (PIC) until the IWT is renegotiated. The last meeting occurred in May 2022

Communication Breakdown

✉ India has reached out to Pakistan four times since January 2023 to initiate talks on revising the treaty. No formal response has been received from Pakistan. Dispute Resolution Mechanism

🔊 India believes disputes should be resolved sequentially through the PIC, Neutral Expert, and then a Court of Arbitration. Pakistan has proceeded without India's agreement

Parallel Mechanisms

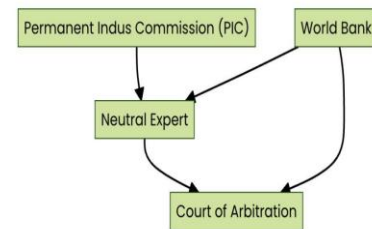
🔗 The World Bank has facilitated both a Neutral Expert and a Court of Arbitration. India argues this contradicts the treaty's provisions. Upcoming Decisions

🔍 The Neutral Expert is expected to assess whether the design parameters of the

Kishenganga and Ratle hydroelectric projects comply with the IWT.

Summary: The Neutral Expert appointed under the Indus Water Treaty has declared his competence to resolve disputes, but India and Pakistan remain at an impasse regarding treaty renegotiation and dispute resolution mechanisms

Dispute Resolution Process:



Indus Water Treaty Overview of the Treaty Definition

A water-sharing agreement between India and Pakistan. Established: 1960, brokered by the World Bank. Rivers Involved: Indus, Jhelum, Chenab (mainly for Pakistan) and Ravi, Beas, Sutlej (mainly for India). Key Points: Regulates water distribution. Aims to resolve disputes over water resources. Provides a framework for cooperation. Recent Developments Neutral Expert's Role: World Bank-appointed expert supports India's stance. Dismisses Pakistan's claims regarding hydro projects.

Challenges and Tensions Political Factors:

Ongoing tensions between India and Pakistan affect treaty implementation. Environmental Concerns: Climate change impacts on water availability. Future Prospects Strengthening Cooperation: Importance of collaboration on water management. Negotiation

Opportunities: Potential for revisiting treaty provisions to address current challenges

The Jaitapur Nuclear Project

The Jaitapur Nuclear Project is poised to be a transformative venture, promising to bolster India's energy capacity while navigating complex geopolitical waters. With the collaboration of French energy giant EDF, this ambitious project aims to install a total of six EPR reactors in Maharashtra, which would significantly enhance the country's nuclear energy output. **Jaitapur Nuclear Project Overview** Location: Situated in Maharashtra, Jaitapur is envisioned as one of the world's largest nuclear power plants. Capacity: The project is expected to generate about 9,900 megawatts (MW) of energy, enough to power millions of homes. Stakeholders: Key players include the Indian government, EDF, and local communities, each with varying interests and concerns.

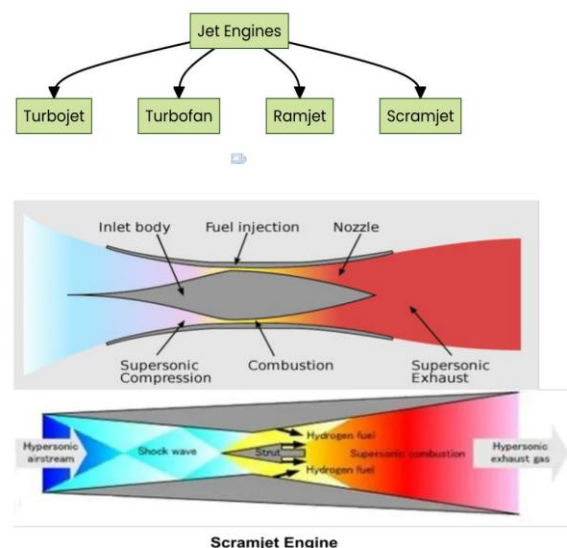
The Implications of Nuclear Energy in India Energy Security: The Jaitapur Nuclear Project represents a strategic move in India's quest for energy diversification, aiming to reduce reliance on fossil fuels. **International Relations:** The project serves as a testament to the strengthening ties between India and France, showcasing a shared vision for energy innovation and sustainability. **Environmental Concerns:** While nuclear energy is touted for its low carbon emissions, safety protocols, and potential ecological ramifications remain hotly debated.

Key Challenges Ahead for the Jaitapur Nuclear Project **Local Opposition:** The grassroots movements against nuclear energy have raised significant concerns about safety and environmental sustainability, which could derail the project. **Regulatory Hurdles:** Navigating India's complex regulatory

framework poses challenges for project stakeholders, requiring meticulous planning and compliance. **Financial Viability:** Securing investments and funding from international partners is critical for the project's long-term success, particularly in light of prevailing economic uncertainties.

Scramjet vs Ramjet

Unveiling the Future of Hypersonic Flight Introduction to Jet Engines are marvels of modern engineering, propelling aircraft and missiles at astonishing speeds. As the quest for faster, more efficient flight continues, two types of engines have emerged as front-runners in hypersonic travel: ramjets and scramjets. Understanding these technologies isn't just for aerospace engineers; it's essential for anyone intrigued by the future of aviation. **Jet Engine Basics:** These engines operate on the principle of Newton's third law, where thrust is generated by expelling exhaust gases from the engine. **The Evolution of Jet Engines:** From turbojets to turbofans, the aviation industry has seen remarkable advancements. Ramjets and scramjets represent the next step in this evolution, aiming for hypersonic speeds exceeding Mach 5



What is a Ramjet?

Ramjets are air-breathing jet engines that utilize the engine's forward motion to compress incoming air. They are designed for supersonic speeds, operating efficiently at high velocities. Principle of Operation: Air enters the engine, is compressed, mixed with fuel, and ignited. The resulting high-pressure exhaust is expelled, generating thrust. Advantages: Simplicity of design with fewer moving parts. High efficiency at supersonic speeds. Limitations: Ineffective at low speeds; cannot start from a standstill. Operational ceiling typically below Mach 6. Applications of Ramjets: Missiles: Commonly used in military applications, enhancing the speed and range of missiles. Supersonic Aircraft: Some experimental aircraft utilize ramjet technology for high-speed flight

Figure 2.1: Ramjet Structure

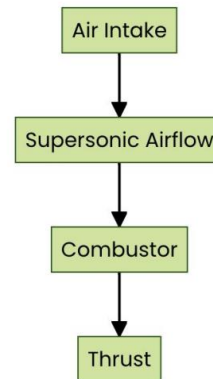


What is a Scramjet?

Scramjets, or supersonic combustion ramjets, take the concept of the ramjet further by allowing combustion to occur while the air is still moving at supersonic speeds. This makes them suitable for hypersonic flight. Principle of Operation: Air is compressed and mixed with fuel, ignited, and combusted without slowing down to subsonic speeds. Advantages: Capable of achieving speeds exceeding Mach 5. More efficient at hypersonic speeds compared to ramjets. Limitations: Complexity in design and fuel delivery. Still in the experimental phase for many applications.

Applications of Scramjets: Hypersonic Missiles: Promising technology for future

military applications. Space Launch Systems: Potential use in launching vehicles into orbit



Comparative Analysis: Scramjet vs Ramjet In comparing scramjets and ramjets, several key factors emerge that highlight their unique characteristics and functionalities. Speed and Efficiency: Ramjets are efficient up to Mach 6, while scramjets excel beyond this, reaching speeds of Mach 10 and beyond. Design Complexity: Ramjets are simpler, making them easier to manufacture, whereas scramjets require intricate designs to manage supersonic combustion. Operational Range: Ramjets can operate effectively at subsonic and supersonic speeds, while scramjets are exclusively for supersonic conditions.

Pressure sensor in fat tissue What Are PIEZO Channels?

The Discovery of PIEZO Channels Back in 2010, Patapoutian and his then-postdoctoral researcher, Bertrand Coste, made a significant discovery: the PIEZO ion channels. These channels are proteins with a unique structure that allows them to respond to mechanical stimuli, such as pressure. The Role of Ion Channels Ion channels are like tiny gates in our cells. When they open, ions flow through, changing the voltage across a cell's membrane. This is how neurons

communicate with each other, forming the basis of our nervous system. **Mechanosensitive Ion Channels Explained** How PIEZO Channels Work Unlike other ion channels that respond to voltage changes, PIEZO channels are mechanosensitive, meaning they open in response to pressure. This unique property allows them to play a vital role in our ability to feel touch, pain, and even our body's position in space

The Importance of Pressure Sensation The name "PIEZO" comes from the Greek word "piezi," which means pressure. Since their discovery, PIEZO channels have been linked to various bodily functions, including respiration, urination, and even wound healing. **Expanding Functions of PIEZO Channels** Recent Studies and Their Findings Two recent studies have expanded our understanding of PIEZO channels. One study from Patapoutian's lab explored how PIEZO2 helps in sensing mechanical changes in fat tissue. The other, published in Science, examined the role of PIEZO channels in regulating stem cells in the intestines. **PIEZO2 and Fat Tissue** The first study revealed that PIEZO2 plays a crucial role in how our body communicates with fat tissue. This communication is essential for regulating metabolism, showcasing that our body's fat isn't just a storage unit but an active participant in our physiological processes.

PIEZO Channels in Stem Cell Regulation The second study highlighted the importance of PIEZO channels in intestinal stem cells. These channels help stem cells sense their environment, which is vital for maintaining gut health and function. **The Connection Between Fat and the Brain** Sensory Afferents and Their Role The research also delved into how sensory afferents, a type of neuron,

connect the brain to adipose (fat) tissue. These neurons are responsible for sensing mechanical changes in fat, which is crucial for metabolic regulation. **The Gut Connection** Understanding Intestinal Stem Cells Intestinal stem cells (ISCs) are essential for regenerating the gut lining. They rely on mechanical signals from their environment to determine their fate and function.

The Role of Mechanical Forces Recent experiments showed that PIEZO channels in ISCs are vital for sensing mechanical changes. When these channels are inhibited, the ISCs struggle to maintain their function, leading to severe consequences for gut health. **Conclusion** The discoveries surrounding PIEZO channels are not just fascinating; they are pivotal in understanding how our bodies interact with the environment. From sensing pressure to regulating stem cells, these channels are at the forefront of biological research. As scientists continue to explore their functions, we can expect to uncover even more about the intricate connections between our body's systems.

What are PIEZO channels?

PIEZO channels are mechanosensitive ion channels that respond to pressure, playing a crucial role in our ability to sense touch and pain. **Who discovered PIEZO channels?** Ardem Patapoutian and Bertrand Coste discovered PIEZO channels in 2010. **What is the significance of the recent studies on PIEZO channels?** Recent studies have shown that PIEZO channels are involved in sensing mechanical changes in fat tissue and regulating stem cells in the intestines. **How do PIEZO channels affect metabolism?** PIEZO channels help communicate mechanical changes in fat tissue to the brain,

which is essential for regulating metabolism. Why are PIEZO channels important for gut health? PIEZO channels in intestinal stem cells help them sense their environment, which is crucial for maintaining gut architecture and function

Introduction to Stucco as a Fire-Resistant Material Stucco, a time-honored material in home construction, is often overlooked when discussing fire safety. Yet, its properties make it an exceptional choice for homeowners seeking to protect their investments. **The Science Behind Stucco's Fire Resistance** The fire-resistant nature of stucco lies in its unique composition, predominantly made of cement, sand, and lime. This blend results in a material that can withstand high temperatures and prevents the spread of flames. **Composition:** Cement: Acts as a binding agent, providing strength. Sand: Contributes to durability and texture. Lime: Adds flexibility and resistance to cracking. **Temperature Resistance:** Stucco can endure temperatures exceeding 1,000°F, crucial for fire safety.

Benefits of Using Stucco in Fire-Prone Areas In fire-prone locales, stucco emerges as a smart choice for several reasons: **Durability:** Stucco is resistant to rot and mold, which can be exacerbated by water damage. **Aesthetic Versatility:** Available in various textures and colors, it complements diverse architectural styles. **Cost-Effectiveness:** While initial installation might be higher, its longevity and minimal maintenance reduce overall costs.

Day Zero: A Critical Water Crisis **Understanding Day Zero** Definition of Day Zero: The point at which a city depletes its water resources, unable to sustain its residents. Ⓢ **Consequences:** When water demand exceeds supply, municipal water

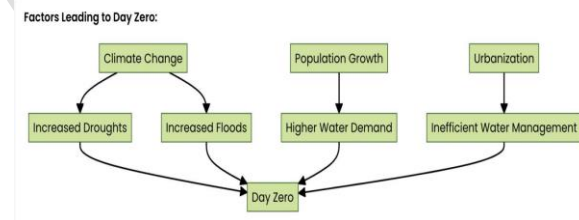
systems may be shut down. **Water Rationing:** Residents might have to line up for limited water allocations during Day Zero. Ⓢ **Enforced Restrictions:** Municipalities impose restrictions to maintain hygiene, sanitation, and essential needs

Causes and Contributing Factors

☁ **Causes of Day Zero:** Primarily driven by climate change, with increased droughts and floods over the last two decades.

👤 **Population Growth:** Growing populations result in higher water demand.

🏙 **Urbanization and Management:** Expanding urban areas and inefficient water management practices exacerbate shortages. **Summary:** Day Zero represents a severe water shortage in urban areas, influenced by climate change, population growth, and inadequate management practices.



Navigating the Digital Personal Data Protection Act: Insights on the Draft Rules Introduction

The Ministry of Electronics and Information Technology has recently unveiled the draft rules for the Digital Personal Data Protection (DPDP) Act, 2023. This pivotal legislation aims to reshape the landscape of data privacy in India. Released on January 3, 2025, these rules emerge 16 months post the law's notification, stirring a whirlwind of discussions regarding data protection, governmental oversight, and individual rights.

Understanding Data Localization Mandate
Data localization is a pressing topic in the realm of digital privacy. The draft rules propose a data localization mandate that extends beyond what the initial legislation outlined. **Definition of Data Localisation:** Measures that confine data within a jurisdiction's borders. Ensures that the personal data of Indian citizens is stored domestically. **Impact on Significant Data Fiduciaries (SDFs):** Major tech giants like Meta, Google, and Amazon will likely fall under this classification. The government aims to establish a committee to determine which data classes cannot be exported.

Challenges for Tech Companies: Companies face substantial operational hurdles in segmenting different datasets. The need for local data storage could inflate operational costs and restrict business agility

Concerns over Executive Overreach The DPDP Act's Section 36, in conjunction with Rule 22, grants the government significant powers to demand information from data fiduciaries. **Potential for Misuse:** Experts warn that such powers could lead to surveillance and suppression of dissent. The broad discretionary authority can be exploited, infringing on individual privacy rights. **Impact on Encryption:** The provisions may compel social media platforms to compromise end-to-end encryption, threatening user privacy. The stipulation against disclosing government requests adds another layer of concern. Such expansive governmental discretion could significantly undermine commercial interests and individual freedoms.

Expert Opinions and Recommendations
Legal experts and industry leaders emphasize the importance of refining the draft rules to

safeguard citizens' rights. **Insights from Experts:** Amar Patnaik and other advocates suggest that the draft rules fail to establish a robust data privacy framework. The absence of adequate checks on governmental powers raises alarms about potential misuse. **Recommendations:** Experts advocate for the submission of these rules to a parliamentary standing committee for a thorough examination. Implementing safeguards akin to those in the Information Technology Act, of 2000, is crucial to protect citizens.

Addressing the Draft Rules: Feedback Mechanism The current feedback mechanism regarding the draft rules raises significant questions about transparency and public involvement. **Fiduciary Framework:** The government is soliciting feedback in a manner that limits public disclosure. This approach may hinder constructive criticism and discourse surrounding the rules. **Call for Transparency:** Advocates argue that a more open process is necessary to ensure that the rules reflect the interests of citizens and industry stakeholders. Public hearings and consultations could provide valuable insights and foster a collaborative atmosphere. An inclusive feedback mechanism is vital for crafting regulations that genuinely serve the public interest

Conclusion

- The draft rules for the Digital Personal Data Protection Act present a complex interplay of privacy rights, governmental authority, and industry compliance.
- While the intent to enhance data protection is commendable, the proposed measures necessitate careful consideration and revisions to ensure a balanced approach.

- Stakeholders must advocate for transparency, public engagement, and robust safeguards against potential overreach.
- The future of data privacy in India hinges on a collaborative effort to refine these regulations for the benefit of all.

The Hindu

SAURABH PANDEY CSE