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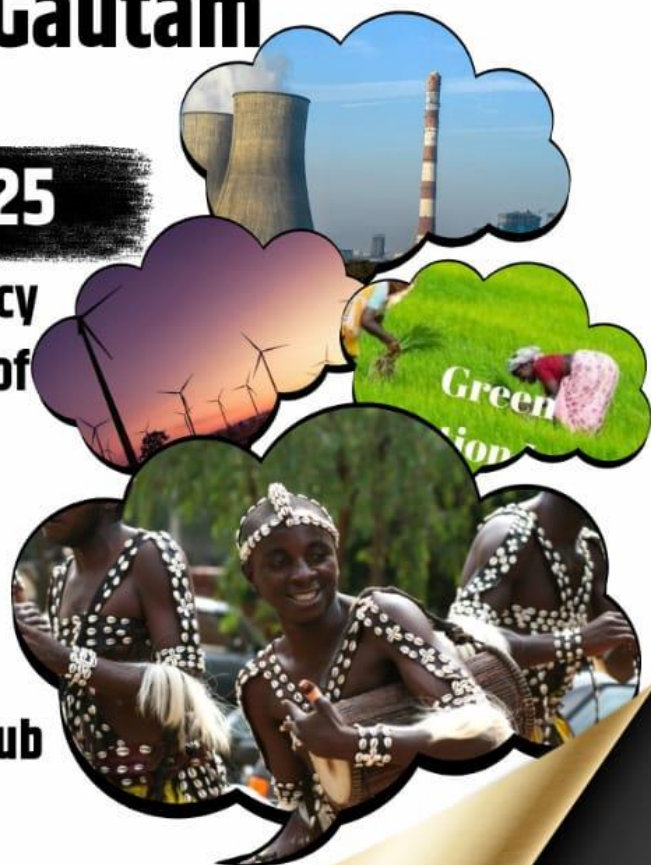


To The Point

by Dhananjay Gautam

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Jarawa Tribe: Guardians of an Ancient Legacy

Context: Amid growing discussions around the upcoming **16th Census of India**, experts have highlighted that **reaching the Jarawa Tribe** of the **Andaman Islands** will not be as challenging as presumed. This is due to the **existing contact points and welfare initiatives** already in place, which ensure minimal disruption to their secluded lifestyle while enabling essential communication.

**Who Are the Jarawas?**

The **Jarawa Tribe** is one of the **world's oldest surviving indigenous communities**, classified by the Indian Government as a **Particularly Vulnerable Tribal Group (PVTG)**. Their estimated population ranges from **250 to 400 individuals**, making their protection both crucial and sensitive.

They inhabit the **Middle and South Andaman Islands**, living in **nomadic bands of 40–50 members**, deep within **tropical rainforests, coastal stretches, and mangrove ecosystems**.

A Glimpse into Their Origins:

Anthropologists believe the Jarawas may be **descendants of the now-extinct Jangil tribe**. Genetic and archaeological evidence suggests they are linked to the **first human migrations out of Africa**, potentially making them among the **earliest settlers in Asia**, dating back over **50,000 years**.

They have withstood waves of external pressures, including **British colonization (since 1789)** and the turbulence of **World War II**, though not without a **sharp decline in population**.

Lifestyle and Culture:

The Jarawas follow a **hunter-gatherer lifestyle**, subsisting on **forest produce, wild game, and coastal fishing**. Their **minimalist attire** is practical for the **humid and warm climate** of the islands. Known for their **strong physiques and good health**, their nutrition-rich, natural diet plays a major role in their wellbeing.

The tribe is also fiercely **protective of their territory**, historically resisting outsiders and preserving their unique way of life. They maintain **oral traditions**, and their language is **unrelated to any other known linguistic family**, making it a subject of interest for anthropologists.

Upcoming 16th Census of India and Its Impact:

India's next census will be conducted in two phases:

- **October 1, 2026** – for **snow-bound regions and the Andaman & Nicobar Islands**
- **March 1, 2027** – for **the rest of the country**

This census is historically significant as it will include **caste-based enumeration** across the nation for the first time since **1931**. It also raises questions about **how to ethically and accurately enumerate indigenous tribes** like the Jarawas without violating their autonomy or disrupting their lives.

Additional Facts:



- **Contact with outsiders** is strictly regulated by the **Andaman & Nicobar Islands Protection of Aboriginal Tribes Regulation (ANPATR), 1956**.
- The **Jarawa Reserve Area** is off-limits to non-tribal people without special permission.
- Despite modern pressures, the tribe has **resisted assimilation**, maintaining a **self-reliant existence**.
- The **Andaman Trunk Road**, which cuts through Jarawa territory, has been controversial due to its impact on their habitat and privacy.

Conclusion:

The **Jarawa Tribe stands as a living testament** to the resilience of ancient cultures. As India approaches a new phase of demographic analysis through its census, it must **balance data collection with respect for indigenous autonomy**. Preserving the Jarawas' **heritage, habitat, and human rights** remains a critical responsibility—not only for India but for global humanity.



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Patriot Air Defence Missile System: Shield of the Skies

Context: In a significant move to bolster Ukraine's defenses, the **President of the United States** has confirmed the deployment of **Patriot Air Defence Missile Systems** to **Ukraine**, amid escalating **Russian military aggression**. This step underscores Washington's commitment to supporting Kyiv with advanced defense capabilities in the face of ongoing threats.

**Overview of the Patriot Air Defence System:**

The **Patriot Missile System (MIM-104)**, short for **Phased Array Tracking Radar to Intercept on Target**, is a state-of-the-art **surface-to-air missile (SAM)** defense platform. Designed to **operate in all weather conditions and at all altitudes**, the Patriot is one of the **most advanced and combat-tested missile defense systems** in the world.

Initially developed to **intercept enemy aircraft**, the system has evolved to **neutralize ballistic missiles, cruise missiles, loitering munitions, and unmanned aerial vehicles (UAVs)**.

Key Manufacturer and Operators:

- **Developed by:** Raytheon Technologies Corporation, a leading US defense and aerospace company.
- **Primary user:** United States Army
- **Global operators:** The Patriot system is fielded by numerous U.S. allies, including **Germany, Japan, Israel, South Korea, Saudi Arabia, Poland, Romania, Sweden, Taiwan**, and others, making it a symbol of **shared defense strategy**.

Combat History:

The Patriot first saw combat during the **1991 Gulf War**, protecting territories such as **Saudi Arabia, Kuwait, and Israel**. It was later used extensively during the **2003 U.S. invasion of Iraq**. Since then, it has become a critical element of **air defense strategies across multiple continents**.

System Components and Structure:

A **Patriot battery**—the basic combat unit—includes:

- A **phased-array radar** for target detection and tracking
- An **engagement control station (ECS)**
- Advanced **computer systems** and **power generators**
- Up to **eight launchers**, each carrying **four ready-to-fire missiles**

Typically, around **90 soldiers** are assigned to one battery, but during operations, only **three personnel** are needed in the ECS to manage combat engagement.

Advanced Features and Technology:

- **Guidance System:** Utilizes **Track-Via-Missile (TVM)** technology, allowing the system to **transmit mid-course guidance** updates from the control center directly to the missile.
- **Interceptor Variants:**
 - **PAC-2:** Employs a **blast-fragmentation warhead**



- **PAC-3:** Features cutting-edge **hit-to-kill kinetic energy technology** for direct target interception
- **Radar Range:** Over **150 kilometers (93 miles)**
- **Interceptor Range:** Can destroy targets up to **160 kilometers** away and at altitudes exceeding **24 kilometers**

Extra Facts and Global Relevance:

- The **Patriot system's flexibility** allows integration into **NATO's missile defense network**.
- It has successfully **intercepted missiles in live combat scenarios**, including recent attacks involving **drones and hypersonic threats**.
- The **PAC-3 Missile Segment Enhancement (MSE)** variant offers **improved range, speed, and maneuverability**, making it effective against **high-speed ballistic missile threats**.
- As global missile threats become more sophisticated, the **Patriot remains a cornerstone** in the evolving **multi-layered air defense strategy** of both the United States and its allies.

Conclusion: The **Patriot Air Defence System** stands as a symbol of **technological superiority and global defense collaboration**. Its deployment to **Ukraine** signals a strategic escalation in Western support and reflects the system's critical role in **modern warfare and deterrence**. With evolving interceptor technology and combat-proven reliability, Patriot continues to be a **trusted shield in the skies**.

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3 Flue Gas Desulphurisation (FGD): Balancing Clean Air and Energy Demands

Context: In a controversial policy shift, the **Ministry of Environment, Forest and Climate Change** has recently **exempted most coal-based power plants** in India from the mandatory installation of **Flue Gas Desulphurisation (FGD)** systems. These systems are designed to control **sulphur dioxide (SO₂) emissions**, a major contributor to **air pollution** and **acid rain**.



What is Flue Gas Desulphurisation (FGD)?

Flue Gas Desulphurisation (FGD) refers to a **pollution-control technology** that removes **sulphur dioxide (SO₂)** from the exhaust gases released by burning **fossil fuels**, especially **coal**. The primary objective of FGD is to **reduce SO₂ emissions**, which contribute to:

- Acid rain
- Smog formation
- Soil and water acidification
- Human respiratory diseases
- Infrastructure corrosion

How Does FGD Work?

FGD systems rely on chemical reactions that **neutralise SO₂** using substances like:

- Limestone (CaCO₃)
- Lime (CaO)
- Ammonia (NH₃)

These chemicals **absorb or react** with sulphur dioxide, forming compounds like **gypsum (CaSO₄·2H₂O)**, which can be used in **cement and construction industries**.

Types of FGD Technologies:

1. **Dry Sorbent Injection (DSI)**
 - Injects **lime or limestone** directly into the flue gas stream.
 - Suitable for **small to medium plants** with **lower upfront costs**.
2. **Wet Limestone Scrubbing**
 - The most widely used method.
 - A **limestone slurry** reacts with SO₂, forming **gypsum**.
 - Effective but requires **larger infrastructure** and **water usage**.
3. **Seawater FGD**
 - Utilises the **alkalinity of seawater** to absorb SO₂.
 - Cost-effective for **coastal power stations**.
 - Generates **no solid waste**, but is **limited to marine locations**.

Policy Evolution and Present Scenario:

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In **2015**, India introduced new emission standards, mandating **all thermal power plants** to install FGD systems by **2017**. The directive applied to around **180 coal-fired plants** (approximately **600 individual units**). However, progress has been sluggish:

- As of now, **only about 8%** of units have installed FGDs.
- Most completed installations are by **NTPC**, India's largest public-sector power utility.

Reasons Behind the Exemption:

Recent studies cited by the Environment Ministry include:

- **Low sulphur content** in Indian coal.
- **SO₂ concentrations** around plants with and without FGDs show **minor differences**.
- **Sulphates** in the atmosphere may have a **cooling effect**, counteracting some aspects of **global warming**.

Practical challenges also played a role:

- **Shortage of global FGD vendors**
- **High capital and operational costs**
- **COVID-19 disruptions**
- **Concerns over rising electricity tariffs**

Additional Facts and Global Context:

- Globally, countries like **China, the U.S., and Germany** have made **FGD systems mandatory**, drastically cutting down SO₂ emissions.
- **Gypsum** produced from FGDs is a valuable byproduct used in **wallboard manufacturing** and **cement production**.
- According to the **World Health Organization (WHO)**, prolonged exposure to SO₂ can cause **asthma, bronchitis**, and other **lung diseases**.
- Lack of FGD installation may **impact India's international climate commitments**, especially under the **Paris Agreement**.

Conclusion:

The exemption from FGD installation raises critical questions about the **trade-off between environmental responsibility and economic practicality**. While cost and feasibility challenges are real, **neglecting SO₂ control** could lead to long-term public health and ecological costs. As India continues to pursue energy security, there is a need for **cleaner coal technologies, increased renewable energy integration**, and **sustainable pollution control policies** that balance development with environmental protection.

4 Why India Must Back CIMMYT and IRRI: Honouring the Legacy of the Green Revolution

Context: The term "Green Revolution" was first introduced in 1968 by William S. Gaud of USAID, referring to a sweeping global effort to boost agricultural productivity through scientific innovation. At the heart of this transformation were **high-yielding wheat and rice varieties**, which played a decisive role in **averting famines** in countries like **India**.



Recently, the **United States Agency for International Development (USAID)**—a key driver of global agricultural development—was **shut down** under a U.S. policy overhaul. This closure has left institutions like **CIMMYT** (International Maize and Wheat Improvement Center) facing a significant **funding shortfall**. In 2024, **USAID contributed \$83 million** of CIMMYT's **\$211 million** annual revenue.

Now, with U.S. support gone, **CIMMYT is turning to India**, one of its **biggest beneficiaries**, to secure its future.

What Is CIMMYT? Why Does It Matter?

CIMMYT, based in **Mexico**, is a **global leader in maize and wheat research**. It is to wheat what the **International Rice Research Institute (IRRI)**, based in the **Philippines**, is to rice. Both were created with support from the **Rockefeller and Ford Foundations**, and both were part of a broader **Cold War-era strategy** to combat food insecurity and prevent social unrest in developing nations.

Legendary agronomist **Norman Borlaug**, often called the "**Father of the Green Revolution**," was closely associated with CIMMYT. His team developed **semi-dwarf wheat varieties** like **Lerma Rojo 64A** and **Sonora 63**, which were first sown in India in **1964–65**—ushering in a **new era of food self-sufficiency**.

India's Green Revolution: A Debt Owed

India reaped enormous benefits from research at **CIMMYT** and **IRRI**. Indian scientists adapted their breeding materials to create iconic wheat and rice varieties, such as:

- **Wheat:**
 - *Kalyan Sona* and *Sonalika* (1967–68)
 - *HD 2285* (1982), *HD 2329* (1985), *HD 2967* (2011)
- **Rice:**
 - *Swarna* (1982), *Samba Mahsuri* (1986) by Andhra Pradesh Agricultural University
 - *Pusa Basmati 1* (1989), *1121* (2003), *1509* (2013) by IARI

In **2024–25**, India exported **6.1 million tonnes** of **basmati rice** worth nearly **\$6 billion**, with over **90% of varieties developed at IARI**.

Norman Borlaug praised **India's scientific strength**, pointing to institutions like **IARI** and visionary leaders like **M.S. Swaminathan**, who steered the country from famine to food surplus.

CIMMYT and IRRI: Still Vital for India's Future

The need for **international research support** has not faded. In **2024–25**, **six of the top 10 wheat varieties** in India—covering **over 20 million hectares** out of 32 million—originated from **CIMMYT breeding material**.



Since the peak of **HD 2967** (a wholly Indian-bred variety) in 2017–19, most new wheat varieties released in India are still heavily reliant on **CIMMYT** germplasm.

Likewise, **IRRI** continues to support rice research in areas such as:

- **Drought and heat tolerance**
- **Pest and disease resistance**
- **Shorter maturity cycles**
- **Nutritional quality improvement (e.g., zinc and iron-rich rice)**

Strategic Research Areas for the Future:

To ensure **long-term food security** and resilience in the face of **climate change**, India must invest in **cutting-edge agricultural research**, including:

- **Heat- and drought-tolerant crop varieties**
- **Nitrogen-use efficiency** to reduce fertilizer dependency
- **Gene-editing tools like CRISPR** for precision breeding
- **AI and remote sensing** for smart farming and yield prediction

India's Investment: Too Little, Too Late?

Despite the immense benefits derived over decades, India's recent funding is **surprisingly modest**:

- **\$0.8 million** to CIMMYT
- **\$18.3 million** to IRRI

Given India's pivotal role in **global food trade** and its dependence on international breeding research, this level of support is **inadequate and unsustainable**.

Conclusion: A Debt India Must Repay

India owes much of its food security, agricultural prosperity, and scientific progress to the foundational work done by **CIMMYT** and **IRRI**. With **USAID funding no longer available**, India must step up—not just out of gratitude, but out of strategic necessity.

Supporting these institutions is **not a donation—it is an investment** in:

- **Future crop resilience**
- **Global leadership in food systems**
- **Strengthened scientific collaboration**

However, this global support must go **hand-in-hand with strengthening India's own agricultural research system**, ensuring a **balanced, self-reliant yet globally connected food future**.

5 Recognising India's Open Ecosystems: A Call for Ecological Justice and Policy Transformation

Context: In a landmark move to reduce emissions and promote sustainable logistics, the Government of India has officially launched its first dedicated electric truck incentive scheme under the newly unveiled PM E-DRIVE (Electric-Drive for Rapid Innovation & Vehicle Electrification) initiative. This marks a significant shift in India's electric mobility policy, especially for the commercial and heavy-duty vehicle sector, which had been previously overlooked under earlier programs like FAME (Faster Adoption and Manufacturing of Electric Vehicles).



500 Crore Allocated for Electrifying India's Truck Fleet:

A total outlay of 500 crore has been sanctioned for this scheme to support the procurement of 5,600 electric trucks across the country. In a focused effort to tackle urban pollution, 20% of this fund is reserved for vehicles registered in Delhi, one of the world's most polluted cities.

Key Highlights of the Electric Truck Incentive Scheme:

- **Eligibility Criteria:**
 - Manufacturers must offer a battery warranty of 5 years or 5 lakh kilometres, whichever comes earlier.
 - The motor and vehicle must carry a warranty of 5 years or 2.5 lakh kilometres.
 - **Mandatory scrapping of old diesel trucks** is required to avail the incentive, promoting fleet modernization and reduced emissions.
- **Implementation Period:**
 - The scheme will be active from October 1, 2024, to March 31, 2026.
 - It subsumes the existing EMPS-2024 (Electric Mobility Promotion Scheme), making PM E-DRIVE the umbrella scheme for EV subsidies in India.

Extended Subsidy Structure for Other EV Categories:

The PM E-DRIVE scheme also revamps the subsidy structure for other categories of electric vehicles:

- **Electric Two-Wheelers:**
 - **Year 1:** 5,000 per kWh (maximum incentive 10,000).
 - **Year 2:** 2,500 per kWh (maximum incentive 5,000).
- **Electric Three-Wheelers:**
 - Standard e-rickshaws: 25,000 in Year 1, 12,500 in Year 2.
 - **L5 Category Cargo E-Three-Wheelers:** 50,000 in Year 1, 25,000 in Year 2.

Smart e-Voucher System for Hassle-Free Subsidies:

To ensure transparency and ease in claiming subsidies, the Ministry of Heavy Industries is introducing an innovative e-voucher system:

- **One vehicle per Aadhaar** card will be eligible.
- Upon purchase, an e-voucher will be auto-generated and signed.



- This e-voucher is essential for OEMs (Original Equipment Manufacturers) to claim reimbursement.

Charging Infrastructure Expansion to Tackle Range Anxiety:

Understanding the importance of charging availability, the scheme will **prioritize the development of Electric Vehicle Public Charging Stations (EVPCS)**:

- **Select cities** with high EV adoption will see rapid installation of chargers.
- **Highways** with heavy freight traffic will also be equipped to support electric truck journeys.

Additional Insights: India's Push Towards a Greener Transport Sector

- India's **road freight sector contributes nearly 40% of vehicular emissions**, despite trucks making up less than 5% of total vehicles.
- Transitioning even **10% of the truck fleet to electric** could save over **3 billion litres of diesel annually**.
- India aims to **electrify 30% of its vehicle fleet by 2030** under its **National Electric Mobility Mission Plan**.

Conclusion:

With the **first-ever focused incentive scheme for electric trucks**, India is sending a strong signal towards achieving **net-zero emissions** in the transport sector. The **PM E-DRIVE initiative** not only accelerates the shift towards clean mobility but also supports **Make in India, job creation, and a greener economy**.

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Singapore in Focus: A Strategic Maritime Hub and India's Trusted Partner

Context: India's External Affairs Minister recently held discussions with his **Singaporean counterpart**, aiming to deepen **bilateral cooperation** across trade, defence, digital connectivity, and strategic affairs. This engagement reinforces the growing importance of **Singapore** as a key partner for India in the **Indo-Pacific region**.

Singapore: A City-State of Global Significance

- **Capital:** *Singapore*
- **Location:** A sovereign city-state situated at the **southern tip of the Malay Peninsula**, Singapore consists of **one main island** and around **60 smaller islets**.
- It lies approximately **137 km north of the Equator**, granting it a **tropical equatorial climate** with **high humidity**, **year-round rainfall**, and **uniformly warm temperatures**.



Maritime Boundaries and Strategic Positioning:

- **North:** Bordered by **Malaysia**, separated by the **Johor Strait**.
- **South:** Close to **Indonesia**, across the **Singapore Strait**.
- Strategically located near the **Strait of Malacca**, one of the **world's busiest shipping lanes**, connecting the **Indian Ocean** with the **South China Sea**.

Geographical and Economic Significance:

- Singapore is **Southeast Asia's largest port** and consistently ranks among the **top global ports by cargo tonnage**.
- It has leveraged its **geographical advantage** to emerge as a **major hub for global finance, logistics, and maritime trade**.
- Its **Port of Singapore** serves over **600 ports in 120 countries**, underscoring its critical role in **global commerce**.

India-Singapore Relations: A Growing Partnership

- Singapore is one of the **largest foreign investors in India**, with strong ties in **infrastructure, fintech, startups, and skill development**.
- The two nations engage in **joint military exercises**, cyber cooperation, and are part of **key regional forums** like the **ASEAN, East Asia Summit, and Indian Ocean Rim Association (IORA)**.
- Singapore also hosts a large and vibrant **Indian diaspora**, enhancing **people-to-people ties**.

Extra Insight:



- Singapore was once part of **British Malaya**, gaining independence in **1965** after a brief merger with Malaysia.
- Despite its small size, Singapore ranks **high on global indices** of education, innovation, and ease of doing business.
- The country follows a **parliamentary republic model**, with a **unicameral legislature** and is known for **efficient governance and low corruption**.

Conclusion:

Singapore's **strategic maritime location**, **economic prowess**, and **robust governance** make it a crucial player in **regional geopolitics**. For India, deepening ties with this island nation is not just beneficial—it's **essential for a secure, connected, and prosperous Indo-Pacific**.

