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Daily Current Affairs
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1 India-Japan Deepen Strategic Ties with Focus on Key Infrastructure and Regional Cooperation

Context: In a recent high-level meeting, **Indian Foreign Secretary Vikram Misri** engaged in discussions with **senior Japanese officials** to further reinforce the **Special Strategic and Global Partnership** shared between India and Japan. Central to their talks were ongoing and future projects such as the **Mumbai-Ahmedabad Shinkansen Bullet Train**, highlighting the deepening infrastructure collaboration between the two nations.

Historical Bonds: A Legacy of Friendship

The India-Japan relationship is **rooted in centuries-old cultural and civilizational connections**. Notably, Indian monk **Bodhisena** played a historic role in **consecrating the Buddha statue at Todaiji Temple in Nara, Japan, in 752 AD**. Over the years, many prominent Indian figures have nurtured this bond:

- **Swami Vivekananda** and **Rabindranath Tagore** shared intellectual ties with Japanese thinkers.

- **Netaji Subhash Chandra Bose** and **Rash Behari Bose** found allies in Japan during India's freedom struggle.

- **Justice Radha Binod Pal** remains a revered figure in Japan for his dissenting judgment at the Tokyo War Crimes Tribunal.

- In a symbolic gesture of goodwill, **Prime Minister Jawaharlal Nehru gifted an elephant** to Tokyo's Ueno Zoo in 1949 — a gesture fondly remembered in Japan.

Defense and Security Cooperation: A Pillar of Strategic Alignment

The **India-Japan defense partnership** has gained significant momentum, driven by shared concerns over regional security, especially in the **Indo-Pacific**. Their **Joint Declaration on Security Cooperation (JDSC)**, signed in **2008**, laid the foundation for enhanced strategic alignment.

Key developments include:

- **JIMEX**: The **Japan-India Maritime Exercise**, which strengthens naval cooperation between the **Indian Navy** and **Japan Maritime Self-Defense Force (JMSDF)**.

- Regular dialogues and joint military exercises emphasizing a **free, open, and rules-based Indo-Pacific**.

Economic Synergy: Trade, Investment & Technology

India and Japan are bound by a **Comprehensive Economic Partnership Agreement (CEPA)**, operational since **August 1, 2011**. This agreement covers **trade in goods and services**, **investment**, **intellectual property rights**, and **customs procedures**.

Key trade statistics for FY 2023–24:

- **Bilateral Trade**: USD **22.85 billion**

- **Japan's Exports to India**: USD **17.69 billion**

- **India's Exports to Japan**: USD **5.15 billion**

India's top exports to Japan:

- **Organic chemicals**

- **Automobiles and vehicle parts**

- **Aluminium**
- **Marine products**

Imports from Japan include:

- **Nuclear reactors and machinery**
- **Electrical equipment**
- **Iron and steel**
- **Inorganic chemicals**

Japan is a major investor in India, particularly in **automobile**, **infrastructure**, and **smart city projects**. It is also involved in **Delhi-Mumbai Industrial Corridor (DMIC)** and **dedicated freight corridors**.

Infrastructure Collaboration: The Shinkansen Project

Japan is set to provide **two E-10 series Shinkansen trains** to India for the **Mumbai-Ahmedabad High-Speed Rail** project. Although initially expected to be completed by **2022**, the timeline has been revised, with a **new completion target of December 2029**.

This project will revolutionize travel in India by introducing **state-of-the-art high-speed rail technology**, reducing travel time between the two commercial hubs to **just around 2 hours**.

Diversifying Supply Chains: Tackling China Dependency

India and Japan, along with Australia, launched the **Supply Chain Resilience Initiative (SCRI)** in **April 2021**, aimed at countering **over-reliance on China** for **critical minerals** essential to industries such as **electric vehicles (EVs)** and **semiconductors**. The recent India-Japan talks highlighted the urgency of **securing alternative sources** for such resources.

Focus on Northeast India: Connectivity and Development

The **India-Japan Act East Forum**, established in **December 2017**, serves as a platform for collaborative development of **India's North-Eastern region**. The forum works on projects related to:

- **Connectivity infrastructure**
- **Industrial development**
- **Cultural exchanges**
- **People-to-people contacts**

Civil Nuclear Agreement: Enhancing Energy Cooperation

India and Japan signed an **Agreement on Peaceful Uses of Nuclear Energy** in **November 2016**, during Prime Minister **Narendra Modi's** visit to Japan. This enables Japan to **export nuclear technology to India**, facilitating cleaner energy development in line with India's climate goals.

Did You Know?

- **Japan was the first country to respond with aid** after the 2004 Indian Ocean tsunami.
- Tokyo and Kyoto host **some of the largest Indian communities** in East Asia.
- Japan is also one of the few G7 countries with a **dedicated India policy division** in its foreign ministry.

India and Japan continue to build a **multi-dimensional partnership** that not only serves bilateral interests but also contributes to a **more secure and prosperous Indo-Pacific**. As both nations face evolving global challenges, their **strategic cooperation**, **economic engagement**, and **cultural exchange** stand as pillars of a robust and forward-looking alliance.

2 Mass Layoffs Shake Indian IT Sector: TCS Bench Policy Sparks Debate

Context: In a significant development that's sending ripples across India's IT landscape, **Tata Consultancy Services (TCS)** has unveiled plans to lay off approximately **12,261 employees** — around **2% of its global workforce** — during **FY2026**. The move is part of a broader cost-cutting and restructuring initiative as the company adapts to evolving global and technological realities.

At the heart of the controversy lies the company's **revised Bench Policy**, which critics argue is overly rigid and lacks empathy, especially in a challenging economic environment.

What Is the Bench Policy and Why Is It Under Fire?

The **"bench"** refers to employees who are currently not assigned to active, billable projects but remain on payroll. These individuals may be:

- **Awaiting project allocation**
- **Undergoing training or reskilling**
- **Transitioning between assignments**

Historically, Indian IT firms have maintained a substantial **bench pool** to ensure flexibility in meeting dynamic client demands. However, **TCS's revised policy**, which includes a **35-day limit for unassigned employees**, is seen as **coercive and unsympathetic**.

The **Nascent Information Technology Employees Senate (NITES)** has raised formal objections, filing a complaint with the **Ministry of Labour and Employment**, calling the policy **"punitive, inhumane, and demoralizing."**

Why Are Layoffs Surging in Indian IT?

1. **Cost Pressures and Global Uncertainty:** As global **tech spending tightens**, companies are **streamlining operations** to optimize costs. Maintaining large unassigned pools is becoming **financially unsustainable**, particularly during economic slowdowns.
2. **Skill Gaps Amid Tech Transformation:** The shift toward **AI**, **cloud computing**, **cybersecurity**, and **automation** is reshaping the IT job landscape. Many **mid and senior-level employees** face challenges in transitioning to new-age roles due to outdated skill sets.
3. **AI and Automation Reducing Entry-Level Demand:** With **AI automating routine coding, testing, and support functions**, demand for **entry-level talent** is shrinking. This reduces the need for a buffer bench, pressuring firms to adopt leaner models.
4. **From Projects to Products:** IT delivery models are increasingly **product-centric and agile**, requiring **cross-functional, continuously upskilled teams** rather than large pools of idle staff. Legacy roles, such as traditional project managers, are being phased out.

Fallout: A Sector in Flux

Rising Anxiety and Workforce Disruption

The layoffs have intensified concerns about **job security**, creating a **climate of fear and uncertainty**, especially among **freshers** and **mid-career professionals**. Benched employees report a decline in **morale, mental well-being**, and **career optimism**.

Impact on Education and Upward Mobility:

The Indian IT sector has long served as a **springboard for engineering graduates**, especially from **Tier-II and Tier-III cities**. However, layoffs and stricter policies are **disrupting this traditional career pathway**, causing anxiety among job seekers and students.

Structural Challenges in the Indian Economy:

The layoffs expose a deeper issue: **India's rapid economic growth is not matched by quality employment creation**. Even as **Global Capability Centres (GCCs)** and startups grow, they are **not yet absorbing talent at the scale of traditional IT giants**.

Global Dependencies and Visa Vulnerabilities:

Export-oriented Indian IT firms are deeply exposed to **economic cycles in the U.S. and Europe**. Any **budget cuts, recessionary signals, or inflation** in those markets have a direct impact on hiring and project flows in India. For **H-1B visa holders**, layoffs can mean **legal jeopardy**, limited fallback options, and **forced repatriation**.

The Road Ahead: Reforms and Resilience:

Reimagining Bench Policy with Flexibility and Empathy

Rather than enforcing a **blanket 35-day rule**, companies could introduce **tiered bench durations**, tailored to employee experience and skill relevance. A more **humane approach** would improve morale and engagement.

Accelerating Scalable Upskilling:

A robust investment in **GenAI, cybersecurity, full-stack development**, and **cloud technologies** is critical. Collaboration between **IT firms, edtech platforms, and government bodies** can create subsidized skilling programs and **reskilling pathways**.

- **Performance-linked incentives** for tech certification completion
- **In-house digital academies** for hands-on learning
- **Public-private partnerships** for tech training in underserved regions

Ensuring Labor Protections and Fair Practices:

Industry bodies like **NITES** and **FITE** are pushing for **regulatory coverage** under the **Industrial Disputes Act**. Proposed reforms include:

- **Mandatory notice periods and severance pay**
- **Internal grievance redressal mechanisms**
- **Transparent and consultative termination policies**

Fostering a Human-Centric Tech Transition:

Companies must balance automation with compassion:

- **Mental health counseling** and **career coaching** for benched employees
- **Ethical AI adoption** that minimizes disproportionate displacement

- **Inclusive hiring policies** focusing on **Tier-II and Tier-III cities** for decentralization of IT jobs

Did You Know?

- India's IT industry employs **over 5 million people**, with TCS alone accounting for **over 600,000 employees** globally.

- As of 2025, **over 50% of TCS's workforce** is expected to undergo **AI-based role redefinition**.

- According to NASSCOM, nearly **60% of current IT roles** will require **some level of GenAI proficiency** by 2027.

The Indian IT sector is at a **pivotal moment of transformation**. While the pressures of global slowdown and technological change are real, the way forward lies in **responsible innovation**, **inclusive skilling**, and **empathetic workforce management**. The need of the hour is not just cost efficiency — but also **equity, transparency, and long-term resilience**.

3   Pralay Missile: India's Cutting-Edge Tactical Weapon

Context: India's defence capabilities received a major boost as the **Defence Research & Development Organisation (DRDO)** recently conducted **two back-to-back successful test flights** of the **Pralay missile**. The tests were carried out from **Dr. APJ Abdul Kalam Island**, situated off the **Odisha coast**, demonstrating the missile's operational effectiveness and technological superiority.

What is the Pralay Missile?

The **Pralay missile** is a **next-generation, indigenously developed, quasi-ballistic missile** designed to strike deep into enemy territory with unmatched speed and precision. It is a key component of India's evolving **conventional deterrence strategy** and fills a critical gap between long-range strategic weapons and short-range battlefield systems.

Key Features and Capabilities:

- **Propulsion**: Uses a **solid propellant rocket motor**, enabling high speed and rapid deployment.

- **Range**: Capable of striking targets between **150 to 500 kilometers**, making it ideal for tactical missions across short to medium range.

- **Payload Capacity**: Can carry **warheads weighing between 500 to 1,000 kg**, optimized for **conventional explosives**.

- **Warhead Flexibility**: Compatible with **various types of warheads**, enhancing its adaptability for different mission profiles.

- **Guidance System**: Features **advanced inertial navigation** and **state-of-the-art control systems**, achieving a **Circular Error Probable (CEP)** of **less than 10 meters**, ensuring **pinpoint accuracy**.

- **Terminal Velocity**: Achieves speeds up to **Mach 6.1** during its terminal phase, making it extremely difficult to intercept.

- **Maneuverability**: Uniquely designed to **alter its trajectory mid-flight**, allowing it to evade enemy defence systems.

- **Launch Flexibility**: Can be deployed from **road-mobile launch platforms**, offering strategic mobility and surprise.

Strategic Importance:

The Pralay missile is tailored for precision strikes against critical battlefield infrastructure such as:

- **Enemy radar systems**

- **Airstrips and logistics hubs**

- **Command and control centers**

Its deployment provides the Indian Armed Forces with a potent tool for **preemptive and retaliatory tactical missions**, particularly in **contested border areas**.

Development and Industry Collaboration:

- **Developed by**: **Research Centre Imarat (RCI)**, in association with multiple **DRDO laboratories**.

- **Industry Partners**: Collaboratively produced with support from **Bharat Dynamics Limited (BDL)**, **Bharat Electronics Limited (BEL)**, and several **MSMEs and private defence firms** across India.

Did You Know?

- The Pralay missile draws technological inspiration from India's **Prithvi Defence Vehicle (PDV)** program and shares components with the **Dhanush** and **Prahaar** missile systems.

- It is considered a **counterforce missile**, specifically intended for use in **high-intensity conflict zones** along the Line of Actual Control (LAC) or Line of Control (LoC).

- **Pralay** will eventually be deployed alongside **BrahMos**, giving India a powerful dual-pronged tactical strike capability.

Conclusion:

The **Pralay missile** is more than just a tactical weapon; it is a **symbol of India's indigenous defence innovation** and a **crucial addition to its conventional military arsenal**. With its precision, speed, and versatility, Pralay enhances India's **operational readiness** and ensures that the country remains prepared to respond effectively to emerging security challenges.

4 Kaziranga's First Grassland Bird Census: A New Chapter in Avian Conservation

Context: In a significant moment for India's conservation journey, **Prime Minister Narendra Modi** recently lauded the **first-ever grassland bird census** conducted in **Kaziranga National Park**, Assam. This pioneering effort marks a crucial step toward understanding and protecting some of India's **most threatened avian species** that inhabit the region's rich grassland ecosystems.

Why Grassland Birds Matter:

Grassland birds are a specialized group of species uniquely adapted to open, grassy landscapes. They are not only vital for **maintaining ecological balance** but also serve as **bio-indicators**, reflecting the health and stability of their habitats.

Notable species include:

* **Bengal Florican**
* **Finn's Weaver**
* **Swamp Francolin**
* **Jerdon's Babbler**
* **Indian Courser**
* **Great Indian Bustard**

Many of these birds are **globally threatened** due to **rapid habitat degradation**, **agricultural encroachment**, and **climate change**—a concern made even more critical as some are **endemic to India**, meaning their loss would lead to **global extinction**.

Kaziranga's Groundbreaking Bird Census: A Conservation Milestone

This historic census in **Kaziranga**, which contains over **70% grassland**, was led by a coalition of **forest officials**, **scientists**, and **conservation groups**. It was inspired by the research of **Chiranjib Bora**, a doctoral scholar studying the **endangered Black-breasted Parrotbill**, with support from the **INSPIRE fellowship** under the **Department of Science and Technology (DST)**.

The objective was to document and monitor **elusive, camouflaged, and rapidly declining bird species** that typically evade visual detection. The survey placed special focus on **10 priority species**, including:

* **Bengal Florican (Critically Endangered)**
* **Finn's Weaver (Endangered)**
* **Swamp Francolin**
* **Black-breasted Parrotbill**
* **Jerdon's Babbler**

In total, the team recorded **43 bird species**, of which:

* **1 was Critically Endangered**
* **2 were Endangered**
* **6 were listed as Vulnerable** (according to the **IUCN Red List**)

Revolutionizing Bird Monitoring Through Acoustics:

Unlike conventional surveys that rely on sight, this study adopted a **cutting-edge technique called passive acoustic monitoring**. Given that many grassland birds are shy, small, and well-camouflaged, **audio surveillance** proved far more effective.

- **Six recorders** were strategically placed across **29 grassland locations** during the **March–May breeding season**, when bird vocal activity peaks.
- Recordings lasted for **three consecutive days** and were later analyzed using **spectrograms** and **BirdNET**, a **machine learning tool** capable of identifying bird species by their calls.

This method enabled scientists to **detect hidden or nocturnal species** that might otherwise be missed, providing a **more accurate and comprehensive bird inventory**.

Finn's Weaver: A Rare Find That Sparks Hope

One of the most **exciting discoveries** was the identification of a **breeding colony of Finn's Weaver**, a bird **endemic to the Brahmaputra floodplains** and considered **Endangered**. Researchers found **over 85 active nests**, marking a **rare nesting record** and offering valuable insight into the species' behavior, nesting preferences, and survival needs.

This finding could reshape future **conservation strategies** for grassland birds not just in Kaziranga but across Northeast India.

A Fragile Ecosystem Under Siege:

Despite these promising results, the census also shed light on the **growing threats** facing Kaziranga's grassland birds:

- Assam has lost nearly **70% of its grasslands** over the past four decades.
- **Habitat loss** is primarily driven by:
  - **Overgrazing**
  - **Conversion to agriculture**
  - **Natural succession** turning grasslands into woodlands
- **Climate change** has exacerbated population declines, especially for species like the **Bengal Florican**, which now teeters on the brink.

For species that are **regionally endemic**, such as the **Black-breasted Parrotbill**, extinction here would mean their **complete disappearance from the planet**.

A Call to Action: Saving India's Grassland Birds:

India's grasslands are often **undervalued in conservation policies**, overshadowed by forests and wetlands. Yet, they are **critical habitats** supporting **rare and threatened wildlife**.

Preserving these landscapes requires:

- **Long-term habitat protection**
- **Regular scientific surveys** using modern tools like **acoustic monitoring**
- **Community involvement** and **local awareness**
- **Inclusion of grasslands in national conservation policies**

Final Thought: The **Kaziranga Grassland Bird Census** is more than just a research initiative—it is a **turning point** in how India understands and conserves its **grassland biodiversity**. By combining **traditional ecological knowledge** with **advanced technology**, India is setting a new precedent in the fight to **protect endangered species** and **preserve fragile ecosystems**.

GS Paper 2 – Governance, Constitution, Polity, Social Justice

5 India Reconsiders China Blockade to Supercharge Tech Manufacturing

Context: Nearly five years after adopting a **restrictive investment regime** targeting Chinese entities post the **2020 Galwan Valley clashes**, India is now signaling a **carefully measured recalibration** of its policy. The goal? To **accelerate domestic electronics manufacturing**, attract **critical foreign investment**, and **deepen integration into global supply chains**.

This evolving stance comes as India aspires to become a **global tech manufacturing powerhouse**, while recognizing a **strategic dependence** on Chinese upstream components critical for **smartphones, wearables, and AI-powered electronics**.

The Origins of India's Investment Blockade:

In **April 2020**, India issued **Press Note 3**, which mandated **government approval for all Foreign Direct Investment (FDI)** from countries sharing a **land border** with India—effectively targeting **Chinese firms**.

This policy was aimed at:

- **Preventing opportunistic takeovers** of Indian companies during COVID-19

- Serving as a geopolitical response to **border tensions with China**

- Curtailing Chinese influence in **telecom, electronic hardware, and infrastructure sectors**

Despite this, India's **electronics assembly ecosystem** grew rapidly under initiatives like the **Production Linked Incentive (PLI) schemes**, though with continued **reliance on Chinese imports** for critical parts.

Early Signs of Policy Recalibration:

As India's tech manufacturing ambitions expand, it has begun to **soften its rigid stance**—but only selectively. The government appears to be moving from a **security-first approach** to a **pragmatic balancing act**, driven by ground realities.

Key Developments Include:

- **Dixon Technologies**, a leading Indian contract manufacturer, received government approval to form a **joint venture with China-based Longcheer** to produce **smartphones, smartwatches, and AI-integrated electronics**.

- **NITI Aayog** has recommended **relaxing FDI norms** for Chinese firms in select segments to **enhance domestic capabilities** and **spur exports**.

- The **Economic Survey 2023–24** acknowledged the need to revisit blanket restrictions, noting China's **indispensable role** in the **electronics supply chain**.

India's Structural Dependence on Chinese Inputs:

Despite banning Chinese tech brands from dominating the Indian consumer market, **raw material and component-level imports** from China remain massive.

- In **FY2023–24**, India imported over **$12 billion in electronic parts** from **mainland China** and another **$6 billion from Hong Kong**.

- Combined, these sources account for **more than 50%** of all electronic component imports—far surpassing South Korea, Taiwan, or Japan.

This reveals a critical tension: **India's assembly growth is powered by Chinese inputs**, even as policy tries to curb Chinese presence.

What's Driving India's Rethink?

1. Manufacturing Push: India's ambition to emerge as a **global electronics manufacturing hub** hinges on its ability to build capacity in **semiconductors, PCB design, display units, and high-end components**—areas where **Chinese expertise dominates**. The government's ₹**23,000 crore incentive scheme** for components relies heavily on **foreign technology partnerships**.

2. Global Supply Chain Realignment: With **China+1 strategies** gaining traction amid **U.S.-China trade frictions**, India sees an opening to position itself as a **reliable alternative** in electronics manufacturing. But participating in these diversified supply chains requires **collaboration with existing Chinese players**, many of whom hold **monopoly control** over upstream elements.

3. Diplomatic and Geopolitical Nuance: While tensions persist, diplomatic engagement has resumed:

- **Tourist visas** for Chinese nationals are being reissued.
- **High-level visits**, such as External Affairs Minister **S. Jaishankar's** trip to Beijing, indicate India's willingness to balance **competition with cooperation**.

Challenges: Navigating the Tightrope

Even as India opens selected gates, significant roadblocks remain:

- **China has retaliated** by withdrawing skilled workers and **delaying export approvals** for **rare earth metals and specialized electronics-grade materials**.
- Indian firms continue to face **import hurdles** for capital goods due to procedural red tape and supply bottlenecks.
- Chinese investors and manufacturers face **bureaucratic delays**, scrutiny over **data and security**, and an uncertain regulatory environment.

The Indian government must **weigh the costs of dependency** against the **strategic benefits of economic self-reliance**.

What Lies Ahead: A Balanced Approach?

India is clearly charting a **third path**—neither fully embracing nor fully excluding Chinese participation. The shift is **sector-specific and selective**, focused on:

- Encouraging **component-level joint ventures**
- Ensuring **technology transfer**
- Avoiding **overexposure to foreign control** in critical infrastructure

In the long run, India hopes to **build indigenous capabilities** while still tapping into **global (and yes, Chinese) expertise**, until domestic alternatives become viable.

Conclusion: Strategic Autonomy Through Smart Integration

India's evolving electronics policy reflects a **mature balancing act** between **strategic sovereignty and economic necessity**. While the **China blockade** was rooted in geopolitical urgency, the emerging approach appears to be **pragmatic and industry-focused**.

6 **Global Hotspots of Zoonotic Disease: New Study Maps Emerging Threat Zones**

Context: A groundbreaking international study has identified **global hotspots for zoonotic diseases**—those that jump from animals to humans—excluding **COVID-19**. This is the **first comprehensive global analysis** of **priority zoonoses** listed by the **World Health Organization (WHO)**, such as **Ebola**, **Nipah**, and **Crimean-Congo hemorrhagic fever**.

What Are Zoonotic Diseases?

Zoonotic diseases, or **zoonoses**, are caused by pathogens—**viruses, bacteria, fungi, or parasites**—that can **transmit between animals and humans**. These diseases are often difficult to predict and can lead to **devastating outbreaks**, especially in areas with **weak health infrastructure** and **intense human-animal interactions**.

Key Findings from the Study:

- **9.3% of the world's land area** is classified as at **high (6.3%) or very high (3%) risk** for zoonotic outbreaks.

- **Latin America and Oceania** are the **most vulnerable regions**, with **18.6%** of their territory at elevated risk.

- **Asia** (6.9%) and **Africa** (5.2%) also exhibit significant risk zones, primarily in biodiversity-rich, densely populated areas.

- About **3% of the global population** lives in **very high or high-risk zones**, while nearly **20%** resides in **medium-risk regions**.

These hotspots coincide with **tropical ecosystems**, regions experiencing **land-use disruption**, and **rapid urban expansion**—areas often under-resourced in health surveillance.

What's Driving the Risk?

1. Climate-Related Factors:

- Warmer temperatures and **increased rainfall** can boost pathogen survival and **host-vector dynamics**, raising spillover potential.

- **Water scarcity** leads to **animal congregation around limited resources**, increasing **human-animal interaction** and **transmission risk**.

2. Land Use and Environmental Change:

- High **livestock density** near human settlements acts as a bridge for pathogen transfer between species.

- **Deforestation, agricultural expansion, and urban encroachment** bring people closer to wildlife, escalating the threat of emerging zoonoses.

3. Population and Urban Pressure:

- **Unplanned urban growth**, especially in low-income regions, combines **high human density** with **poor sanitation** and **limited healthcare**, creating conditions ripe for outbreaks.

- Of all factors, **population density** was identified as the **strongest single driver** of zoonotic risk.

What Needs to Be Done?

The study urges **immediate action** to reduce the risk of future pandemics by adopting a **One Health approach**, integrating human, animal, and environmental health.

Key Recommendations:

- **Promote sustainable land-use planning** and protect remaining natural ecosystems.

- Implement **climate adaptation strategies** to mitigate warming-related disease risks.

- Strengthen **public health systems** with a focus on **zoonosis surveillance**, early detection, and rapid response.

- Encourage **inter-sectoral collaboration** across health, agriculture, environment, and climate sectors.

- Leverage **machine learning and data modeling** to forecast outbreaks and prioritize vulnerable regions for intervention.

Extra Insight: Lessons from the COVID-19 Era

Although **COVID-19** was excluded from this analysis, it served as a stark reminder of how **quickly a zoonotic virus can disrupt the global economy and health systems**. **Three out of every four emerging infectious diseases** in humans today are **zoonotic in origin**, making these findings not just timely—but vital for **global health security**.

Final Thought:

As the world continues to grapple with **climate change**, **urbanization**, and **biodiversity loss**, the risk of zoonotic spillovers will only grow. Mapping these threats is the first step—but **preparedness, prevention, and planetary cooperation** are the keys to averting the next pandemic.