PACNET

MINERALS THAT ARE CRITICAL: US-INDIA COOPERATION IN A FRAGILE SUPPLY CHAIN

BY TYLER LISSY

Tyler Lissy (Tylerlissy17@gmail.com) is a Motwani-Jadeja US-India Fellow at the Pacific Forum, researching India's defense modernization and US-India strategic cooperation. A Dickinson College graduate and incoming graduate candidate at the University of Maine, he has worked with the US Army War College, Diamond6 Leadership, and US Congressman Ryan Mackenzie's office.

The global race for critical minerals is not just about economic value but national security. US-India collaboration on critical minerals represents a pivotal but underleveraged axis in broader defense and technological cooperation. As supply chains become weaponized, aligning their efforts in extraction, processing, and innovation will shape the Indo-Pacific's strategic landscape.

India's push toward defense indigenization is an integral piece of its broader self-reliance strategy, centered around the realization of strategic autonomy. As defense production becomes increasingly reliant on rare earth elements (REE), India is adapting to situate itself as a long-term beneficiary of evolving industrial and resource policies. Yet strategic autonomy does not mean isolation; recent engagement in the Quadrilateral Security Dialogue ("Quad") and BRICS forums show that India continues to leverage multilateral cooperation for advancing its goals. Meanwhile, the current US administration has recognized the geopolitical importance of critical minerals, launching deals and frameworks designed to improve supply chain resilience. This convergence presents a timely opportunity for invigorated US-India collaboration on critical minerals that spans resource development, processing infrastructure, co-investment, and innovation in critical mineral technologies.

Critical minerals, essential for everything from EVs to missile systems, are now central to defense and economic strategy. The Quad (Australia, India, Japan, and the US) has aimed to counter China's dominance in refining and processing, but President Trump's return brings a shift toward bilateral, deal-driven approaches that could undermine collective efforts. For India, expanding its domestic capabilities and investing abroad, this is both a challenge and an opportunity to shape a more resilient and strategic supply chain alongside trusted partners.

Critical minerals are essential to advanced defense technologies, enabling the performance of key military platforms. Rare earths like neodymium and terbium power precision-guided munitions, sensors, and electric motors, while gallium semiconductors enhance radar and electronic warfare. Titanium and rhenium support stealth aircraft and high-temperature jet engines, and beryllium and tantalum are critical for secure satellite communications. Lithium, cobalt, and REEs drive drone systems, while hafnium and tungsten support naval stealth, hypersonics, and directed energy weapons. These materials underpin military advantages, making supply chain security a top defense priority. For the US, rare earths, gallium, and titanium are most critical due to their role in stealth aircraft, advanced radars, and precision weaponry, while for India, lithium, rare earths, and titanium are key to advancing drone capabilities, indigenous missiles, and fighter jet production.

Looking at the IEA's Global Critical Minerals Outlook 2025, China's dominance over global critical mineral supply chains, controlling over 60% of rare earth mining and over 85% of refining capacity, posing a significant strategic risk to both the US and India. This concentration enables Beijing to impose export restrictions, manipulate prices, and exploit labor-intensive artisanal mining, often with poor environmental and human rights standards, particularly in Africa. In response, the US and India increasingly

recognize this shared vulnerability. India joined the US-led Mineral Security Partnership (MSP) to improve transparency and secure resilient global supply chains, while the Quad's 2025 critical minerals initiative aims to coordinate mapping, processing, and trade standards among allies, helping to diversify sources and reduce dependency on Chinese processing dominance.

As part of this effort, India is now intensifying its sustainable capacity across the critical minerals value chain, hoping to match immense mineral deposits with enhanced application.

Incorporated under the National Critical Mineral Mission, The Geological Survey of India will lead 1,200 exploration projects through 2030, targeting key minerals like lithium, cobalt, and rare earths. The mission enables central government control over 24 critical minerals under the Mines and Minerals Development and Regulation (MMDR) Act, promotes private sector participation through fast-track approvals, and supports recycling, processing parks, and strategic stockpiles. Internationally, India is acquiring assets in Argentina and Australia via Khanij Bidesh India Ltd (KABIL), while India Limited (IREL) expands domestic refining.

The June 2025 Critical Mineral Processing Seminar spotlighted numerous challenges facing India's critical minerals ecosystem, including limited commercial scalability of mineral processing technologies, fragmented recycling regulations, and dependence on outdated or foreign (especially Chinese) technology. India's rare earth reserves are mainly low-grade and hard to process, while battery and nickel value chains suffer from high energy intensity and weak refining infrastructure. Lack of risk capital, and insufficient lifecycle assessments further hinder investor confidence. The seminar emphasized the need for phased refining capacity, expanded regulatory coverage, capital mobilization, and public-private partnerships to build a self-reliant mineral economy.

Positively speaking, recent Indian news on critical minerals includes the Mines and Minerals (Development and Regulation) Amendment Bill, which is expected to operationalize the National Critical Mineral Mission, enabling overseas mineral acquisition and the use of National Mineral Exploration Trust funds for exploration abroad. The government is also accelerating environmental clearances and incentivizing state-level reforms under the Special Assistance to States for Capital Investment. Notably, India's Northeast, now recognized as rich in critical minerals like lithium, rare earths, and vanadium, is being strategically integrated into national supply chains through infrastructure upgrades, auction-ready mineral blocks, and connectivity projects aligned with the Act East Policy. Together, these steps position India to enhance mineral self-reliance, ensure cleaner energy transitions, and emerge as a key global player in secure, resilient supply chains.

The US can play a significant role in overcoming India's challenges by supporting technology transfer and joint ventures in mineral refining and recycling. For example, US firms such as MP Materials and Energy Fuels specialize in environmentally sound rare earth separation and can help India build scalable, less hazardous refining systems. In particular, MP Materials has spearheaded public-private collaboration in the US, earning a multi-billion dollar investment from the DoD. Building off last October's US-India MOU on expanding critical mineral supply chains, technical collaboration, such as co-developing battery recycling standards or co-financing lithium ventures in Australia or Africa, can significantly accelerate India's strategic autonomy.

While other perspectives have noted that multilateral collaboration through the Quad pact can address the uneven nature of countries' skills in the world of critical minerals, viewing critical minerals collaboration bilaterally allow for deeper strategic alignment, faster implementation, and clearer accountability. Context is also key when considering the unique relationship between India and its multilateral memberships, where India's parallel engagement with BRICS and the Quad reflects its pursuit of multipolarity. Critical minerals as a tool of "strategic non-alignment" can allow India to deepen cooperation with the US while maintaining space for autonomous global engagement.

The path to meaningful progress may lie in deepening bilateral cooperation between the US and India. In the

face of rising supply chain vulnerabilities and China's overwhelming dominance in processing, a focused US-India partnership, spanning co-investment and joint refining ventures, can deliver more resilient outcomes. Establishing a joint critical minerals task force to identify key materials for co-development, as well as a pilot refining project in India with US technical support and investment, could help build processing capacity outside of China. The task force could begin by selecting 2–3 priority minerals for co-development and establishing a facility in a resource-rich state like Odisha, supported by US financing through the International Development Finance Corporation (DFC). By combining India's growing ambition and resource base with US technological and financial support, the two nations can move beyond symbolic cooperation to shape a secure critical minerals ecosystem at the heart of the Indo-Pacific.

PacNet commentaries and responses represent the views of the respective authors. Alternative viewpoints are always welcomed and encouraged.