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Thirsty Mines: Water Risk and the Critical-Minerals Supply Chain

 **DOWN TO EARTH**

24 July 2026

ENVIRONMENT**GS3**

CURATED & WRITTEN BY

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GS3

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THE LIFT LINE

“The clean-energy transition runs on lithium, cobalt and copper, but pulling them from the earth demands water, and much of that earth is running dry. The minerals of the future have a thirst problem.”

A new assessment finds that roughly **two-thirds of the world's mining and metals facilities** face significant physical water risk. This editorial argues that water stress is now a material threat to the **critical-minerals supply chain** that underpins batteries, renewables and electronics, and that mining must be sited and managed with water security at its centre rather than treated as an afterthought.

WHY THIS EDITORIAL MATTERS FOR YOUR EXAM

This theme fuses two of the most examined GS3 areas, the energy transition and water stress, into a single supply-chain argument. It rewards candidates who can see that **decarbonisation** is not friction-free, that the shift away from fossil fuels creates its own resource dependencies.

It also lets you localise a global finding: India's own critical-minerals push must reckon with the water intensity of mining and processing.

GS Paper 3: Conservation, environmental pollution and degradation, infrastructure and energy, and the economics of mineral and resource security.

GS Paper 1: Distribution of key natural resources and the geography of water stress.

For **Prelims**, hold the specifics: the report is by the **International Council on Mining and Metals (ICMM)**; it finds about **65.7 per cent**, nearly two-thirds, of global mining and metals facilities exposed to at least one major physical **water hazard**, meaning drought, flood or baseline **water stress**; **critical minerals** include **lithium, cobalt, copper and rare earths**; **water stress** is measured by tools such as the **WRI Aqueduct**; and India runs the **National Critical Mineral Mission** and **KABIL** for overseas mineral assets.

For **Mains**, frame the **paradox**: the transition to clean energy intensifies demand for water-thirsty mining in often water-scarce regions, so **water stewardship** is not a side issue but a supply-chain risk.

BACKGROUND AND CONTEXT

The world is racing to electrify. Batteries, solar panels, wind turbines and grids all depend on **critical minerals**, and demand for lithium, cobalt, copper and rare earths is projected to surge as economies decarbonise. This has made mineral security a strategic priority for every major economy, India included.

But mining and, especially, **mineral processing** are water-intensive. Ore must be crushed, washed, separated and refined, and many of the richest deposits lie in arid or drought-prone regions, from the lithium salt flats of the Andes to copper belts in water-scarce zones. The clean-energy story therefore collides with a water story.

The **International Council on Mining and Metals (ICMM)** report quantifies this collision. It finds that about **65.7 per cent** of global mining and metals facilities are exposed to at least one major physical **water hazard**, drought, flood or chronic **water stress**. Two-thirds of the infrastructure that must feed the energy transition sits in the path of a water problem.

THE CORE ARGUMENT / ISSUE

The central claim is that water risk is not an operational nuisance but a strategic **vulnerability** of the entire critical-minerals supply chain, and that ignoring it puts the energy transition itself at risk.

Water as a Supply-Chain Risk

If nearly two-thirds of mining facilities face drought, flood or water stress, then the flow of minerals into batteries and renewables is exposed to water disruption. A drought can halt processing; a flood can shut a mine; chronic **water stress** can pit a mining operation against local communities and farms for a shrinking resource. Water risk translates directly into supply risk, price **volatility** and social conflict.

The Scale of Exposure

DIMENSION	FINDING	IMPLICATION
Facilities at risk	About 65.7 per cent exposed	Two-thirds of supply infrastructure vulnerable
Hazard types	Drought, flood, baseline water stress	Both scarcity and excess threaten operations
Key minerals	Lithium, cobalt, copper, rare earths	The transition's core inputs
Water intensity	High in extraction and processing	Processing, not just mining, drives demand
Measurement	Tools like the WRI Aqueduct	Water stress can be mapped and sited around

The Water-Community Conflict

The honest complication is social, not only technical. Where a mine competes with farmers and towns for water, the resource conflict can stall projects, trigger protests and impose a real human cost. **Water stewardship**, using less, recycling more, and siting operations where water can be shared sustainably, is therefore both an environmental and a social licence-to-operate issue. For India's **National Critical Mineral Mission**, this means the domestic push cannot ignore where water is available.

HOW TO THINK ABOUT THIS (ANALYTICAL FRAME)

A clean-energy device is only as sustainable as its supply chain. The analytical move is to look behind the low-carbon output to the resource-intensive inputs, the water, land and energy embedded in mining and processing. A solar future built on water-stressed mines is not unambiguously green. Ask, for any transition technology, what it consumes upstream and where that consumption falls. Sustainability is a property of the whole chain, not just the final product.

THE DIAGRAM IN WORDS

Energy transition needs lithium/cobalt/copper/rare earths -> mining and processing are water-intensive -> many deposits sit in arid or drought-prone regions -> ICMM finds ~65.7% of facilities face water hazard (drought/flood/stress) -> water risk becomes supply risk + community conflict -> adopt water stewardship, recycling, water-aware siting -> secure minerals without exhausting water -> transition stays genuinely sustainable

WAY FORWARD

- ① **Make water risk central to siting.** Use tools like the WRI Aqueduct to map water stress and locate or approve mining and processing where water can be shared sustainably, not where it is already scarce.
- ② **Invest in water stewardship.** Mandate recycling, closed-loop water use and reduced freshwater withdrawal in mining and processing, cutting the water footprint of each tonne of mineral.
- ③ **Protect community water rights.** Ensure mining does not deprive farms and towns of water, embedding local consent and equitable sharing into the social licence to operate.
- ④ **Build water-aware mineral security.** For India's National Critical Mineral Mission and KABIL, factor water risk into both domestic mining and overseas asset choices, treating water as a strategic input.

PYQ LINKAGE AND PRACTICE

- **UPSC GS3 (2020):** “What are the salient features of “inclusive growth”? Has India been experiencing such a growth process?” (resource-community equity framing)
- **UPSC GS1 (2021):** On the distribution of key natural resources across the world.
- **UPSC GS3 (2016):** On water resources and the challenges of water management.

Practice question (250 words, 15 marks): “The energy transition depends on critical minerals, but nearly two-thirds of the world’s mining facilities face significant water risk. Examine how water stress threatens the critical-minerals supply chain and suggest measures for water-secure mineral development.”

Sources: Down To Earth, International Council on Mining and Metals

Source: Thirsty Mines: Water Risk and the Critical-Minerals Supply Chain — Ujjyari.com | Free UPSC & State PCS Editorial Analysis

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