

SAIMUN 2026

## United Nations Environment Programme

### STUDY GUIDE

*Agenda Item: Mitigating the Environmental Damage Caused by the Extraction and Processing of Rare Earth and Critical Minerals*

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#### **1. Introduction**

This study guide has been prepared for delegates of the United Nations Environment Programme (UNEP) committee at SAIMUN 2026. It is intended to serve as a comprehensive reference document for research, preparation of position papers, and deliberation on the floor. Delegates are expected to engage seriously with the material presented here while conducting independent research to supplement their preparation.

The topic before this committee — the environmental damage caused by the extraction and processing of rare earth and critical minerals — sits at the intersection of climate policy, economic development, human rights, and ecological governance. As the global transition away from fossil fuels accelerates, the extractive industries underpinning that transition have come under increasing scrutiny. This committee is tasked with developing a framework that reconciles escalating demand for critical minerals with the imperative to protect ecosystems, communities, and long-term planetary health.

Delegates are reminded that UNEP resolutions are non-binding instruments. The strength of any resolution passed in this committee lies in its political legitimacy, the coalitions it builds, and the degree to which it reflects the genuine will of the international community. Ambitious but operationally sound language will be rewarded.

#### **2. Committee Overview: The United Nations Environment Programme**

##### ***2.1 Origin and Institutional Status***

The United Nations Environment Programme was established in 1972 through UNGA Resolution 2997, following the Stockholm Conference on the Human Environment. Headquartered in Nairobi, Kenya, it is the only major UN body based in the Global South —

a deliberate decision with ongoing political significance for how environmental issues affecting developing nations are governed.

UNEP is a programme, not a specialized agency. The distinction matters: bodies such as the World Health Organization or the International Monetary Fund have independent constitutions and mandatory assessed contributions from member states. UNEP, by contrast, operates on voluntary contributions to the Environment Fund, giving it significant convening authority but comparatively limited financial resources. This structural feature shapes the kinds of interventions UNEP can realistically pursue and explains why the committee tends to focus on standard-setting, monitoring, and knowledge-generation rather than enforcement.

## ***2.2 What UNEP Can Do***

Within the scope of its mandate, UNEP is empowered to undertake the following:

- Commission and publish authoritative scientific assessments — including the Global Environment Outlook and International Resource Panel reports — which provide the evidentiary basis for international negotiations.
- Draft and advocate for multilateral environmental agreements. Landmark instruments including the Minamata Convention on Mercury and the Basel Convention on Hazardous Waste were developed under UNEP's umbrella.
- Design technology-transfer frameworks and capacity-building programmes tailored to the needs of developing nations.
- Coordinate global monitoring systems, including the Global Environment Monitoring System (GEMS).
- Facilitate negotiations toward new international environmental standards and voluntary codes of conduct.

## ***2.3 What UNEP Cannot Do***

Delegates must be clear-eyed about the limits of this committee's authority:

- UNEP resolutions are not legally binding on member states.
- UNEP cannot levy trade sanctions (a WTO prerogative), regulate commodity markets (IMF/World Bank domain), mandate military action (Security Council authority), or directly fine corporations operating across borders.

- Any resolution produced in this committee is a framework instrument; its force comes from whether states choose to implement it and whether international pressure makes non-compliance politically and reputationally costly.

Understanding these limitations is not defeatist — it is the starting point for crafting resolutions that are credible, implementable, and capable of genuinely influencing state and corporate behaviour.

### **3. Background to the Agenda**

#### ***3.1 The Energy Transition and the Demand Surge***

The global shift away from fossil fuel dependency — mandated by the Paris Agreement and underpinned by national net-zero pledges across much of the world — is fundamentally a materials challenge. Wind turbines require neodymium and dysprosium. Electric vehicle batteries depend on lithium, cobalt, nickel, and manganese. Solar panels use silicon, tellurium, and indium. Grid-scale storage and power electronics rely on graphite, vanadium, and gallium.

The International Energy Agency projects that to achieve net-zero emissions by 2050, the demand for critical energy transition minerals could increase sixfold relative to current levels, with lithium demand alone expected to grow fortyfold. This is not a marginal shift — it represents a structural transformation of global commodity markets that will unfold over the next three decades and will require the opening of hundreds of new mining operations across every inhabited continent. These materials are broadly categorised as Rare Earth Elements (REEs) — the 17 metallic elements of the lanthanide series plus scandium and yttrium — and critical minerals, a broader classification including lithium, cobalt, nickel, and graphite identified by governments as essential to both economic security and the energy transition.

#### ***3.2 The Foundational Paradox***

The core policy tension before this committee can be stated plainly: the technologies required to protect the Earth's atmosphere are dependent on an extractive industry that systematically destroys local ecosystems, contaminates freshwater supplies, displaces indigenous communities, and generates toxic and radioactive waste. Meeting global climate goals without confronting this paradox is not possible. The UN Sustainable Development Goals capture both sides of the tension — SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) drive demand for critical minerals, while SDG 15 (Life on Land) and SDG 6 (Clean Water and Sanitation) articulate the values placed at risk by extraction. No existing international

mechanism satisfactorily resolves this contradiction. This committee is tasked with developing one.

#### **4. Environmental Crisis Zones**

The mining and chemical processing required to produce critical minerals — particularly in low-regulation zones where most deposits are concentrated — generates a cluster of distinct but interrelated environmental harms. Three specific failure modes define the crisis:

##### ***4.1 Toxic Waste and Tailings Management***

Processing rare earth elements requires highly corrosive chemical baths — typically involving ammonium sulphate, hydrochloric acid, or sodium hydroxide — to separate target minerals from surrounding rock. This leaves behind tailings: slurry waste mixtures containing radioactive thorium and uranium, heavy metals including arsenic and lead, and residual toxic chemicals, typically stored in large impoundments retained by earthen or engineered dams that must remain structurally sound in perpetuity.

The history of tailings dam failure is a catalogue of disaster. The Mariana catastrophe in Brazil (2015) released 60 million cubic metres of iron ore tailings into the Rio Doce river system, killing aquatic life across 600 kilometres of waterway. The Mount Polley failure in British Columbia (2014) discharged 24 million cubic metres of tailings into a salmon-bearing lake. The Brumadinho collapse in Brazil (2019) killed 270 people when a dam failed without warning. Globally, more than 1,743 active tailings storage facilities currently exist, and no international body mandates real-time monitoring of their structural integrity.

##### ***4.2 Water Depletion and Acid Mine Drainage***

Lithium extraction from brine aquifers in South America's Lithium Triangle consumes enormous volumes of water drawn from underground reservoirs formed over geological timescales. In Chile's Atacama Desert, lithium operations consume approximately two million litres of water per tonne of lithium carbonate produced in one of the driest ecosystems on Earth. Communities dependent on these aquifers for drinking water and subsistence agriculture have documented significant water table declines attributable to mining operations. Separately, when rock containing iron sulphide minerals is exposed to air and water, oxidation reactions produce sulphuric acid — a process known as acid mine drainage. Acidic runoff leaches heavy metals including cadmium, zinc, and mercury into surrounding waterways, creating conditions

lethal to aquatic life and rendering water unsuitable for human consumption for centuries after mine closure.

### ***4.3 Biodiversity Loss and Deforestation***

Research published in *Nature* found that over half of global critical mineral projects overlap with ecologically sensitive areas, Key Biodiversity Areas, protected zones, and indigenous territories. The opening of access roads into previously undisturbed terrain typically precedes broader deforestation as logging, agricultural encroachment, and informal settlement follow mining infrastructure. The fragmentation of continuous habitat — even where forest cover is not entirely cleared — independently drives biodiversity decline by disrupting gene flow between wildlife populations and reducing ecosystem resilience.

## **5. Case Studies in Mineral Extraction Harm**

### ***5.1 Baotou, Inner Mongolia, China***

Baotou hosts the world's largest rare earth processing complex and sits at the centre of a supply chain that provides approximately 60 per cent of global REE output. Decades of processing have produced a toxic tailings lake covering approximately eleven square kilometres, containing radioactive thorium and cerium. Leakage into surrounding groundwater has been linked to elevated rates of osteoporosis, lung disease, and skin conditions in nearby communities, and local villages have been repeatedly evacuated. The Baotou case illustrates the systemic costs of state-directed industrial expansion that sacrifices environmental oversight for production volume and the multigenerational legacy borne by communities located near processing facilities.

### ***5.2 The Lithium Triangle — Chile, Argentina, and Bolivia***

The Lithium Triangle holds an estimated 58 per cent of the world's known lithium reserves. Production in the Atacama saltflat ecosystem has become a focal point of tension between indigenous Atacameño communities — who hold ancestral water rights under Chilean and international law — and lithium producers supplying global electric vehicle manufacturers. Environmental assessments commissioned by mining companies have repeatedly been challenged by indigenous groups as inadequate or conducted without genuine free, prior, and informed consent (FPIC) as required under ILO Convention 169. This case illustrates the gap between formal procedural compliance and substantive environmental and community protection.

### ***5.3 Cobalt Extraction in the Democratic Republic of Congo***

The Democratic Republic of Congo supplies approximately 70 per cent of global cobalt, a metal essential to lithium-ion battery cathodes. Artisanal and small-scale mining operations, which employ an estimated 40,000 workers including children, operate largely outside formal regulatory frameworks. Mining near the Copperbelt region has contaminated soil and water with cobalt, lead, and uranium, and elevated urinary cobalt levels documented in communities near mining operations have been associated with thyroid disorders and cardiac complications. Despite due diligence requirements under the OECD Guidance and the EU Battery Regulation, supply chain opacity remains a significant obstacle to accountability.

## **6. Existing Governance Architecture and Its Limitations**

Several international instruments touch on aspects of critical mineral extraction and processing. None provides comprehensive, binding governance. Delegates should understand both what each instrument does and where it fails.

### ***6.1 UN Guiding Principles on Business and Human Rights (2011)***

The Ruggie Principles established a global standard for corporate human rights responsibility built on three pillars: the state duty to protect, the corporate responsibility to respect, and the need for remedy. In the context of mining, they require companies to conduct human rights due diligence and avoid contributing to adverse impacts. However, the principles are entirely voluntary and lack enforcement mechanisms. Companies routinely self-certify compliance without independent verification, and legal consequences for non-compliance remain limited and inconsistent.

### ***6.2 Global Industry Standard on Tailings Management (GISTM, 2020)***

Developed following the Brumadinho disaster by the International Council on Mining and Metals (ICMM), GISTM created the first global safety standard for tailings facilities, including requirements for independent reviews and the designation of a responsible engineer for each facility. The standard represents meaningful technical progress but is voluntary and applies only to ICMM member companies, explicitly excluding most state-owned enterprises from major producer nations. There is no public registry of tailings facilities, no mandatory reporting, and no satellite monitoring requirement.

### ***6.3 Minamata Convention on Mercury (2013)***

The Minamata Convention is the most relevant direct precedent for UNEP-anchored binding governance in the extractive sector. Developed under UNEP's facilitation, it entered into force in 2017 and has been ratified by 147 parties. It limits mercury use in artisanal and small-scale gold mining through national action plans and technology transfer. Delegates should study this model carefully: it demonstrates that UNEP can anchor a binding instrument, while also showing that implementation in artisanal contexts has been uneven and enforcement capacity in lower-income states remains limited.

### ***6.4 Basel Convention on Hazardous Waste (1989)***

The Basel Convention restricts transboundary movement of hazardous waste and imposes notification and consent requirements on such transfers. In principle it applies to toxic mining waste, but the classification of "mining waste" as hazardous is legally contested: many tailings contain radioactive materials and heavy metals at concentrations that arguably meet the hazardous threshold, yet producers routinely contest this characterisation to avoid compliance obligations. The definitional gap is one of the most tractable governance failures this committee might address through precise new language.

### ***6.5 Systemic Gaps in the Existing Architecture***

Across all existing instruments, four systemic failures persist. First, no mechanism tracks the cumulative environmental damage embedded in a mineral's supply chain across multiple national jurisdictions. Second, no binding transboundary liability framework exists for tailings dam failures, meaning downstream states affected by upstream failures have no established legal remedy. Third, no internationally mandated satellite monitoring system watches the structural integrity of active tailings facilities. Fourth, technology transfer and capacity-building mechanisms remain underfunded relative to the scale of the challenge, leaving lower-income producer states without the technical means to implement higher standards even when political will exists.

## **7. The Geopolitical Landscape**

### ***7.1 China's Dominance in REE Processing***

China currently controls approximately 60 per cent of global rare earth mining and over 85 per cent of rare earth processing capacity. This dominance is the result of deliberate state industrial

policy sustained over several decades, combined with a willingness to absorb environmental costs that Western regulatory frameworks would prohibit. China has demonstrated its willingness to use rare earth supply as a geopolitical instrument — export restrictions imposed during the 2010 Sino-Japanese territorial dispute caused significant price volatility in global REE markets. The environmental governance debate cannot be separated from this context: higher global environmental standards raise production costs and could constrain the competitive advantage currently held by low-regulation producers.

## ***7.2 Critical Mineral Nationalism***

In response to supply chain vulnerability exposed by the COVID-19 pandemic and the Russia-Ukraine conflict, major consuming states have moved to designate critical minerals as strategic assets. The United States Inflation Reduction Act (2022), the European Union Critical Raw Materials Act (2024), and equivalent instruments in Japan, South Korea, Australia, and Canada have established domestic processing targets, subsidies for domestic extraction, and supply chain diversification requirements. This wave of critical mineral nationalism creates both an opportunity and a risk for environmental governance: states seeking to diversify supply chains away from dominant producers have incentives to support higher environmental standards in alternative producer nations, but domestic political pressure to accelerate production may simultaneously encourage regulatory shortcuts.

## ***7.3 Implications for the Committee***

The geopolitical context means delegates from major processing nations — particularly those in the Sovereignty Bloc — will resist governance frameworks perceived as constraining their industrial capacity or as instruments of economic competition dressed in environmental language. Delegates from consuming nations in the Transparency Bloc hold both genuine environmental concerns and strategic interests in raising competitors' production costs. Swing states in the developing world are simultaneously major producers with sovereignty concerns and communities bearing the greatest ecological costs of extraction. Navigating these overlapping interests is the central diplomatic challenge in this committee.

## **8. Country Bloc Positions**

### ***8.1 Transparency Bloc — Germany, France, United Kingdom, United States, Japan***

States in the Transparency Bloc are predominantly major consumers of critical minerals rather than major producers, and carry comparatively limited domestic extraction footprints. They are

broadly supportive of stronger international environmental standards, mandatory supply chain due diligence, binding tailings management requirements, and independent monitoring mechanisms. Their credibility is constrained by the fact that their own historical industrialisation involved substantial environmental externalities, and they continue to benefit from supply chains that externalise ecological costs to the Global South. Delegates from these nations must demonstrate genuine financial and technical commitment — not merely advocate for governance mechanisms they can more easily comply with than others.

### ***8.2 Sovereignty Bloc — China, Russia, Iran***

The Sovereignty Bloc encompasses states that combine major extractive or processing capacity with strong institutional preferences for non-interference in domestic resource governance. China's rare earth dominance, Russia's significant reserves of nickel, cobalt, and platinum group metals, and Iran's position as a resource-rich state under international sanctions all shape their shared resistance to binding international oversight. Expected positions include opposition to mandatory disclosure, rejection of transboundary liability mechanisms as interference in domestic affairs, and emphasis on the sovereign right of states to manage their natural resources. Delegates representing these nations should develop coherent alternative frameworks that acknowledge environmental concerns without accepting external oversight mechanisms.

### ***8.3 Swing States — India, UAE, Saudi Arabia, Turkey, Egypt***

The Swing States occupy diverse positions. India is simultaneously a significant consumer, an emerging producer with REE deposits in Andhra Pradesh and Rajasthan, and a state with a strong tradition of asserting developing-country solidarity in multilateral forums. The UAE and Saudi Arabia, as major hydrocarbon economies under transition pressure, have strategic interests in the critical minerals underpinning renewable energy infrastructure. Turkey holds significant deposits of boron and rare earth elements, while Egypt is positioned as a regional transit and processing hub. This bloc will likely be the decisive terrain of negotiation; its members have the leverage to shift outcomes and their positions are not ideologically fixed. Delegates should enter the conference prepared to offer and extract concrete concessions.

### ***8.4 Ecologically Vulnerable States — Djibouti, Somalia***

Djibouti and Somalia represent a constituency of states whose primary concern is as downstream victims of environmental harm rather than upstream producers. Both are highly

exposed to water insecurity, ecosystem degradation, and the consequences of inadequate transboundary waste management. Their moral authority as ecological stakeholders is significant — historically, vulnerable state blocs have played decisive roles in shaping the ambition of multilateral environmental instruments, as coastal and island states did in pushing for more aggressive climate language in successive COP agreements. Delegates should consider how to build coalitions with other ecologically exposed nations and how to translate genuine vulnerability into effective diplomatic leverage.

## **9. Potential Areas for Committee Action**

The following thematic areas represent realistic domains in which this committee can develop meaningful operative language. Delegates should approach each as a site of genuine negotiation rather than a template to be filled:

### ***9.1 Mandatory Environmental Impact Assessment Standards***

A UNEP-anchored binding standard for environmental impact assessments (EIAs) prior to critical mineral extraction — incorporating cumulative impact assessment, independent third-party verification, and mandatory FPIC processes for affected indigenous communities — could close one of the most fundamental governance gaps. The committee should consider what institutional body would administer such a standard and what technical assistance would be made available to lower-income states to meet its requirements.

### ***9.2 Tailings Facility Registry and Satellite Monitoring***

An internationally mandated public registry of all active tailings storage facilities, combined with a UNEP-coordinated satellite monitoring programme, would represent a significant step beyond current voluntary industry self-reporting. This proposal will likely face opposition from the Sovereignty Bloc on data-sovereignty grounds; delegates should anticipate counter-proposals favouring national registries with voluntary data-sharing arrangements as a compromise position.

### ***9.3 Transboundary Liability Framework***

A framework establishing clear liability and remediation obligations for transboundary environmental harm from tailings dam failures — modelled on the UN Watercourses Convention — would address one of the most serious structural gaps in existing governance.

The allocation of legal and financial burden between home-state regulators and extracting corporations will be a central point of contention in drafting such language.

#### ***9.4 Technology Transfer and Capacity Building***

Any governance framework that imposes higher environmental standards without commensurate financial and technical support will be perceived as a tool of economic competition by developing-country producers. This committee should consider recommending the establishment of a dedicated critical minerals environmental technology fund — potentially anchored in the Green Climate Fund or a purpose-built financial mechanism — providing concessional financing for environmental remediation and technology transfer in producer nations.

#### ***9.5 Extended Producer Responsibility and Circular Economy***

Placing legal and financial responsibility for end-of-life mineral recovery on manufacturers — particularly of electric vehicle batteries and electronic goods — creates market incentives for closed-loop supply chains, reduces the total volume of primary extraction required, and could generate revenue streams for environmental remediation in producer communities. The EU Battery Regulation (2023) provides a working model; the committee might consider recommending its core principles as a template for a global instrument.

### **10. Questions a Resolution Must Address**

Delegates should orient their draft resolutions toward answering the following questions:

- What monitoring or reporting obligations, if any, should be imposed on extracting states and corporations, and which body administers compliance?
- How should financial responsibility for environmental remediation be distributed between producing states, processing corporations, and consuming-state importers who benefit from supply chains that externalise ecological costs?
- What role, if any, should be given to indigenous communities and civil society in governance structures created by this resolution?
- How can the resolution avoid creating regulatory frameworks that favour states with existing technical capacity at the expense of developing-country producers?
- What is the enforcement or accountability mechanism, and how does it avoid triggering sovereignty-based refusals from major producing nations?

- How does the resolution promote closed-loop mineral economies and recycling as a complement to primary extraction, and what investment is required to make recycling economically competitive at scale?

## **11. Recommended Further Reading**

The following resources are essential preparation for delegates. Those from the IEA, UNEP, and OECD are considered priority reading, as they provide the authoritative empirical and institutional context that will be referenced throughout debate.

### **UNEP — Critical Energy Transition Minerals:**

<https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals>

### **IEA — Critical Minerals Topic Hub:**

<https://www.iea.org/topics/critical-minerals>

### **IEA — Global Critical Minerals Outlook 2024 (Full Report):**

<https://www.iea.org/reports/global-critical-minerals-outlook-2024>

### **OECD — Due Diligence Guidance for Responsible Mineral Supply Chains:**

<https://www.oecd.org/en/topics/responsible-mineral-supply-chains.html>

### **Minamata Convention on Mercury — Overview and Text:**

<https://minamataconvention.org/en/about>

### **UN DESA Policy Brief No. 171 — Leveraging Critical Energy Transition Minerals (2025):**

<https://desapublications.un.org/policy-briefs/un-desa-policy-brief-no-171>

### **UNEP GEAS — Rare Earths and the Green Economy (2011):**

<https://www.unep.org/resources/report/green-economy-vulnerable-rare-earth-minerals-shortages>

### **Global Industry Standard on Tailings Management (GISTM, 2020):**

<https://globaltailingsreview.org/global-industry-standard/>

### **Basel Convention on Hazardous Waste — Overview:**

<https://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx>

**EU Critical Raw Materials Act (2024) — European Commission:**

[https://single-market-economy.ec.europa.eu/sectors/raw-materials/critical-raw-materials-act\\_en](https://single-market-economy.ec.europa.eu/sectors/raw-materials/critical-raw-materials-act_en)

**World Bank — Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition (2020):**

<https://www.worldbank.org/en/topic/extractiveindustries/publication/minerals-for-climate-action>

**Amnesty International — Time to Recharge: Corporate Action and Inaction to Tackle Abuses in the Cobalt Supply Chain (2017):**

<https://www.amnesty.org/en/documents/afr62/7395/2017/en/>

**Responsible Minerals Initiative — Conflict Minerals and Supply Chain Tools:**

<https://www.responsibleminerals.org/>

**Columbia Center on Sustainable Investment — Mining and the Energy Transition:**

<https://ccsi.columbia.edu/work/projects/mining-energy-transition>

**Business and Human Rights Resource Centre — Mining and Minerals:**

<https://www.business-humanrights.org/en/big-issues/natural-resources/mining/>

**UN Environment Assembly — Resolutions on Mining and Sustainable Development:**

<https://www.unep.org/environmentassembly/>