



FROM ENVIRONMENTAL MONITORING TO ENVIRONMENTAL SECURITY

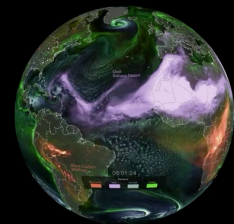
Leveraging Earth Observation for
Prevention, Enforcement and Accountability

The Institute for Environmental Security's Statutory Objective:

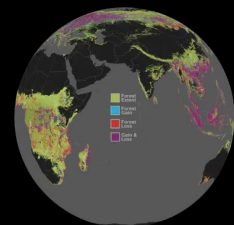
To preserve the life-support systems around the world.
To do this through an integrated program in the fields of science, law,
diplomacy, finance/economics & education.

WOUTER JUSTUS VEENING
President, Institute for Environmental Security

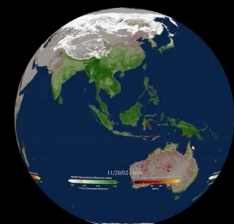
JAMIE SMITH
Communications Assistant



Aerosols By Type



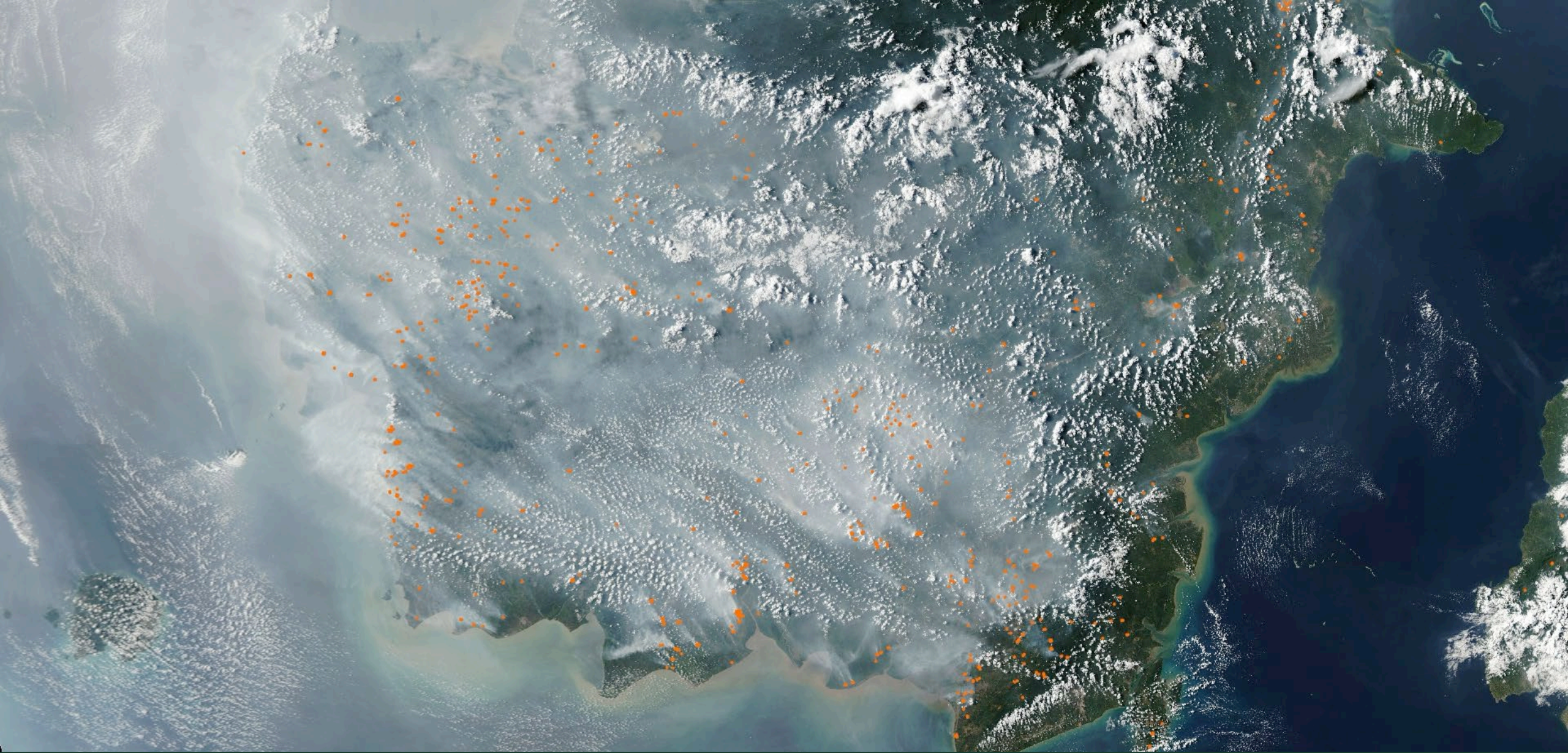
Forest Extent



Fires Modis



Forest Fires Real Time



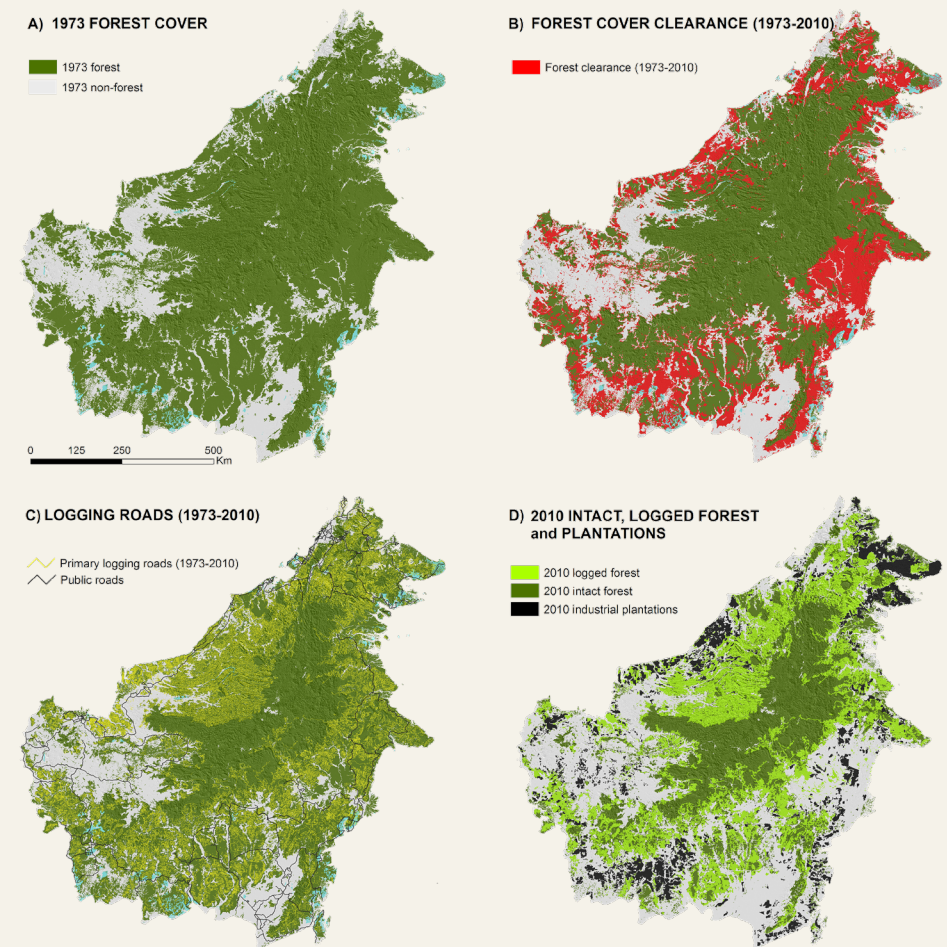
If there were an apex predator among fires, tropical peatland fires would be a top contender. They burn slowly through dried peat, often underground, producing extreme pollution and becoming very difficult to extinguish. In Indonesia, drought and El Niño conditions can turn these peatlands into major fire systems that release vast amounts of greenhouse gases and blanket large regions in hazardous smoke.

Indonesian Peatland Fires

The IES participated in various missions in Kalimantan, to propose alternative means of livelihood for the local population without resorting to setting fire to primary forest for the establishment of large scale oil palm plantations.

Part of missions to propose alternative methods of sustainable development by:

- a) — Stopping the drainage of peat forest
- b) — Mobilising local fire brigades
- c) — Providing alternative sources of income (Rattan)
- d) — Involvement in wildlife protection (Orangutan)



The forces to convert the rainforest on Kalimantan proved to be too powerful. The disastrous fires continue as we speak.

Follow the commodity, and the means used to preserve control.

\$110–281 BILLION / YEAR

Estimated global criminal proceeds generated by environmental crime.

\$2.6 TRILLION / YEAR:

Estimated value of environmentally harmful subsidies globally (2023)

- Fossil fuels
- Agriculture
- Transport
- Construction

LIQUIDITY

Can the commodity become cash quickly?

CONTROL

Who controls land, permits, labour, routes or markets?

COERCION

How is that control preserved? Often, the threat of (ultimate) violence.

“Plata o plomo: Silver or lead?”

From Earth Observation to Evidence

Satellite observations can reveal environmental change from space; local communities and environmental defenders provide the “eyes and ears on the ground” needed to verify and document what is happening, using handheld devices (see to the right)

An important organisation in this field: Global Witness works with local partners to gather, cross-check and document evidence from land and environmental defenders worldwide.

- 2,375 defenders have been killed or disappeared since 2012
- Colombia and Brazil accounted for 52% of all killings documented in 2025
- Across Asia, defenders face increasing criminalisation, intimidation and repression.
- Land disputes were linked to more than half of all killings documented in 2025.

- Evidence gathered and verified by NGOs, local communities and environmental defenders
- Evidence shared with authorities and relevant mechanisms, including UN anti-corruption frameworks
- If a crime matches one of the 20 offences listed in the EU Environmental Crime Directive (2024/1203), national authorities may investigate and prosecute under Member State law.
- Within the Rome Statute, the ICC may act where national authorities are unable to investigate & prosecute
- Cases proceed to prosecution and judicial determination



GNSS field data collector

ICC The Court Of Last Resort

The ICC acts where national authorities are unwilling or unable genuinely to investigate or prosecute.

Environmental damage under the Rome Statute

Explicitly covered as a war crime under Article 8(2)(b)(iv); the ICC Prosecutor's 2025 policy also explains how other Rome Statute crimes may involve or result in environmental damage.

IES example: Kakhovka Dam destruction, 2023

IES previously used the dam's destruction as a case study of environmental harm during armed conflict.

‘Excessive in relation to the concrete and direct overall military advantage anticipated.’

The Rome Statute of the International Criminal Court contains one provision that explicitly protects the natural environment namely during armed conflict: Article 8(2)(b)(iv):

“(iv) Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated;”

**Russian military hierarchy
of its highest level**
Chain of Command



Colonel General Makarevich Oleg Leontievich. Source: dzen.ru

Forest disturbance takes different forms

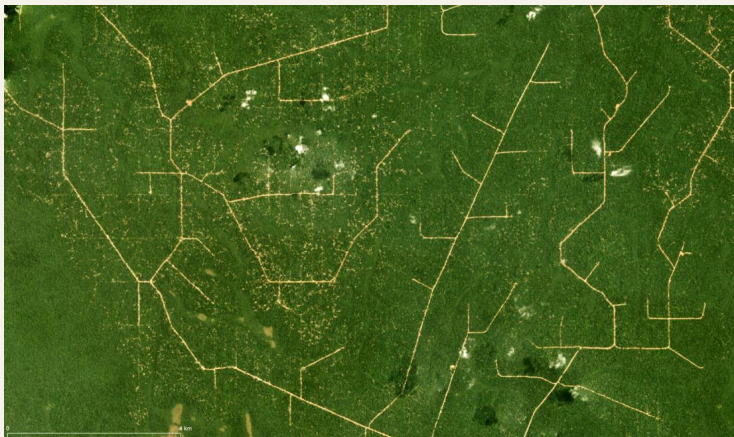
In its work to protect forest ecosystems around the world, The IES has a longterm working relationship with remote sensing company GAF, from Munich, Germany.



Logging Clear Cut



Mining (alluvial)



Selective Logging



Mining (artisanal)

GAFAG

an e-GEOS (ASI / Telespazio) Company

Mining disturbance visible from imagery

Earth Observation locates the site. Field sampling establishes mercury.

The euphemism ‘artisanal’ mining is one of the most threatening practices to life support systems around the world. Especially the use of mercury used to separate the gold from the ore, while highly effective as such, it is at the same time one of the worst threats to the health of the environment and the planet due to its toxicity and the fact that mercury persists in the environment.

Earth Observation cannot see mercury directly. Instead, satellite imaging (Reflectance Spectroscopy) and machine learning are used to reveal subtle changes in how contaminated soils reflect light. When those patterns are compared with real soil samples, researchers can estimate where mercury contamination is likely to be highest.

GAF (upon request) can monitor deforestation associated with gold mining using satellite imagery. Complementary reflectance-based techniques can help assess soil contamination.

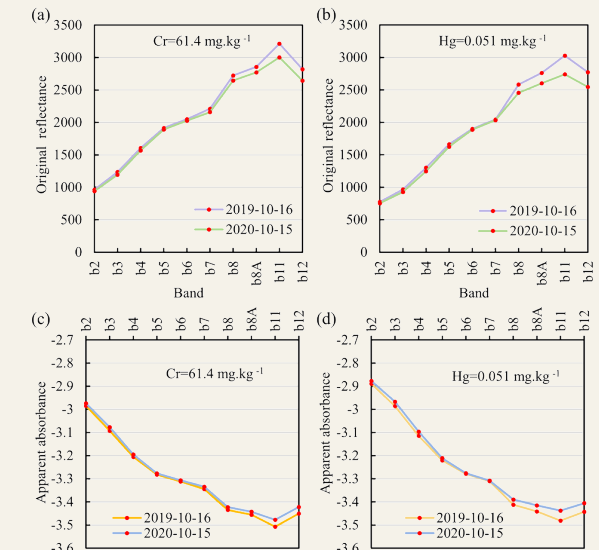


Fig. 3. Spectral reflectance features of Cr and Hg measured on different dates at the same sampling point (a and b: original spectral reflectance; c and d: apparent absorbance).



The Malaysian Biomass Case

Malaysian biomass treated as sustainable on the basis of certification, but origin claims need stronger geospatial verification.

Compliance is only as defensible as the evidence behind it.

RWE, Rheinisch-Westfälisches Elektrizitätswerk, Based in Essen, Germany Operating in 20 countries, says its biomass is certified and sustainable, but there are questions over whether a paper-based certification system is enough to verify what is actually happening at origin.

This case shows why geolocation, traceability and precise Earth Observation matter: if origin claims cannot be independently checked, due diligence stays largely on paper.

The Malaysian biomass case raises the practical question. Are the supporting documents verified with satellite data?



EUDR & ECD

Regulation (EU) 2023/1115 · Directive (EU) 2024/1203

The European instrument for regulating the commodities that enter the European market.

Checking a forest is not enough. The evidence must connect that forest to the product entering Europe.

The EU Deforestation Regulation requires covered products to be legally produced and deforestation-free. The Environmental Crime Directive connects specified breaches of these requirements to criminal liability.

For imported Malaysian biomass, EU compliance concerns the company placing the product on the European market. That company must substantiate the product's origin and compliance, rather than simply rely on a supplier's assurances.

Earth Observation can and is used to help test the forest history behind those claims. Authorities must then establish the breach and who is legally responsible.

Main EUDR obligations for large and medium operators apply from 30 December 2026

Non-compliance can lead to more than a fine:

- Products and revenues: confiscation and restrictions on market access.
- Companies: substantial financial penalties where liability is established.
- Individuals: criminal prosecution and imprisonment where the applicable offence is proven.

Police are now investigating possible abuses and criminal offences in RWE's Malaysian biomass imports, while environmental-crime investigators say there are "strong indications" the company's administration is not in order.



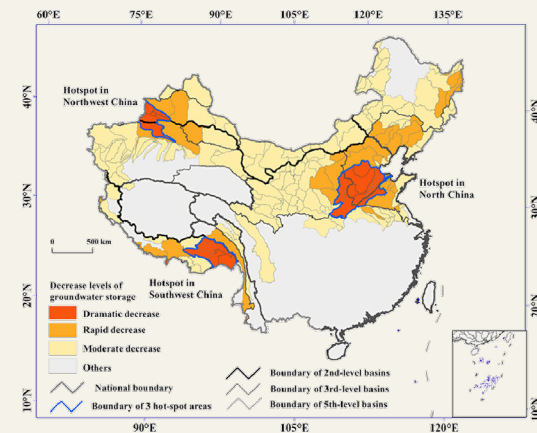
China: Resources, Rivers and Responsibility

China has about 17% of the world's population but only 6% of its freshwater resources, making water scarcity a major strategic constraint. China can be named a “Thirsty Dragon”.

This helps explain the importance of importing water-intensive goods, such as soybeans from water-rich Brazil. In 2024, Brazil supplied 71% of China's soybean imports.

It also highlights the strategic importance of the Tibetan Plateau, the “Water Tower of Asia,” under Chinese control since the early 1950s and feeding many of Asia's major rivers.

A rigorous Earth Observation-based analysis of China's ecological fundamentals could help illuminate how water and resource security interact with its economic and foreign policies.



Variations of groundwater storage in China: 2003 –2020
Analysis based on GRACE data

Resource Pressures

Large population, limited water and cultivable land

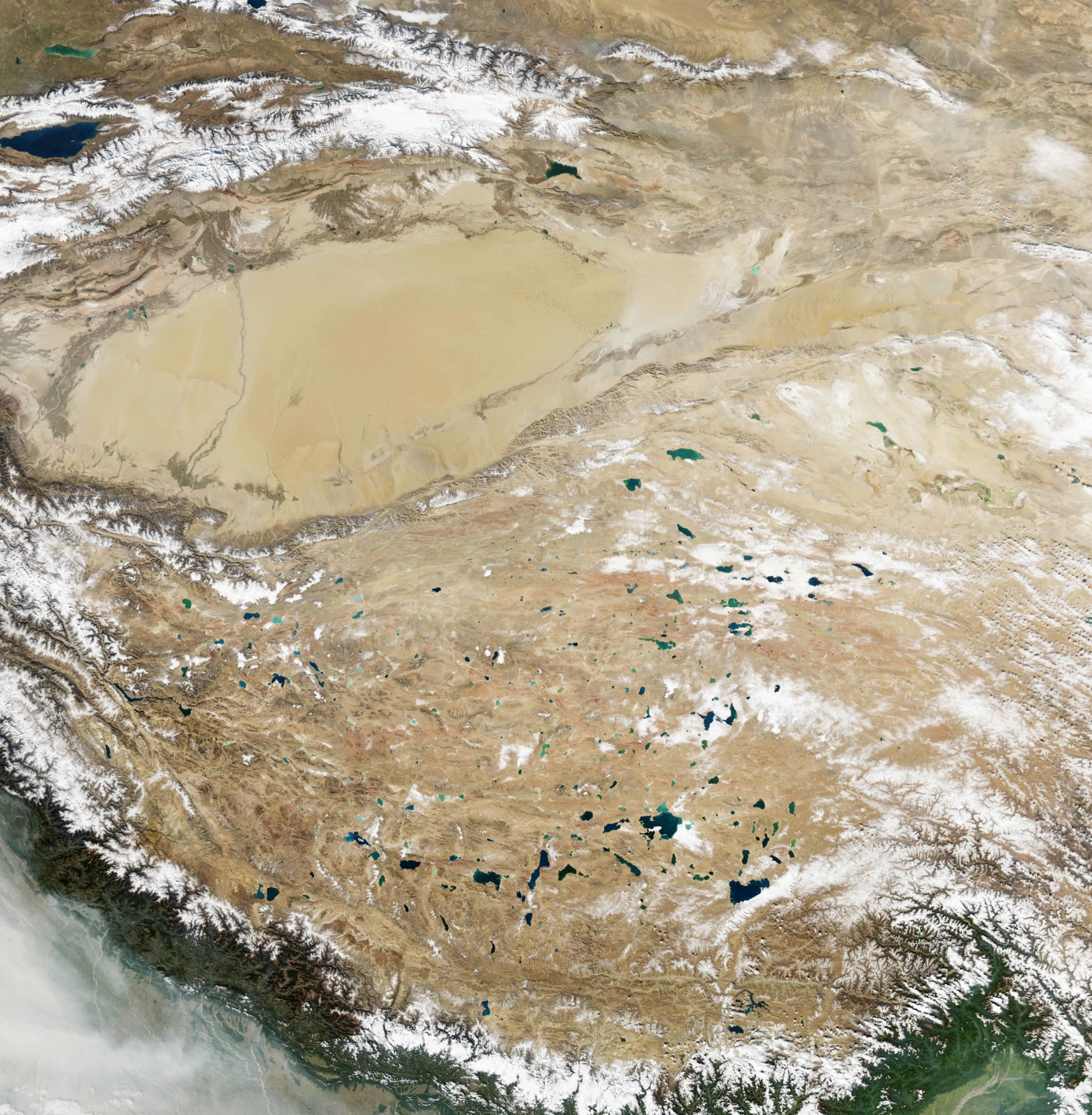
Strategic Minerals

rare-earth extraction complements dependence on agricultural resources

Shared headwaters

Tibetan Plateau connects China's environmental management to rivers and communities.





The Tibetan Plateau: Water Tower Of Asia

China is building the largest hydroelectric dam in the world, known as the Medog Dam, (The Yarlung Zangbo hydropower project) on the Tibetan Plateau.

NASA Goddard Space Flight Center / Scientific Visualization Studio, via International Campaign for Tibet, "Tibet's importance as earth's third pole raised at COP15" (2009)

The Economist, "China approves the world's most expensive infrastructure project", 2 January 2025

Evidence to Action



Earth Observation becomes environmental security when observation is connected to evidence, responsibility and action

Preserve the life-support systems around the world, through science, law, diplomacy, finance/economics & education.

THANK YOU