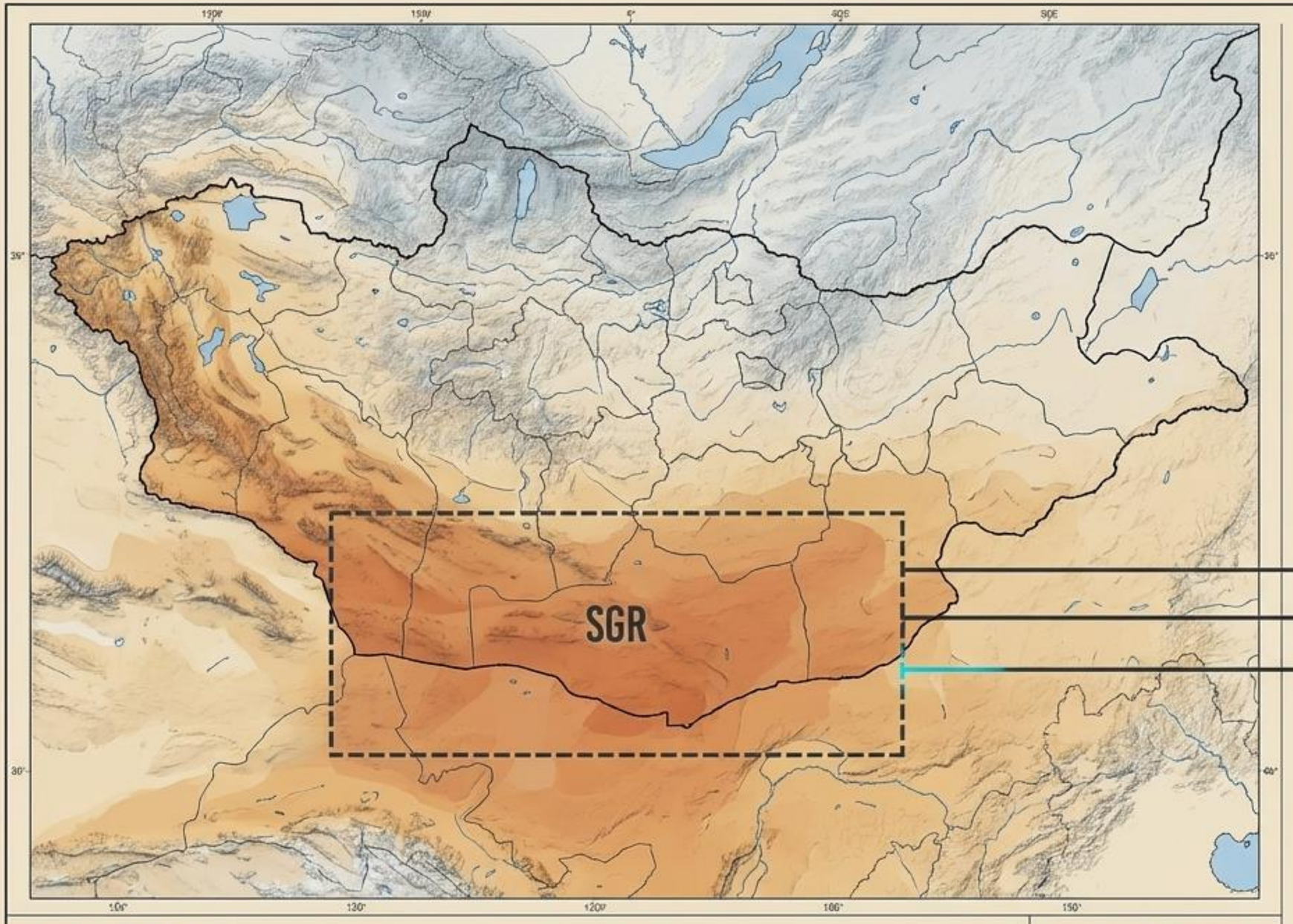
Beneath the Dust: Water, Wealth, and Friction in the South Gobi

A socio-geological analysis of resource extraction, infrastructure, and the fight for Mongolia's hidden aquifers.

Water war on Mongolia ?



EXTREME ARIDITY

50–150mm of annual rainfall characterizes the Gobi Desert zone.

EVAPORATION DOMINANCE

85-90% of rainfall occurs in short, hard summer bursts, mostly lost to immediate evaporation.

MICROSCOPIC RECHARGE

Only 1mm/year of effective water recharge actually penetrates the ground.

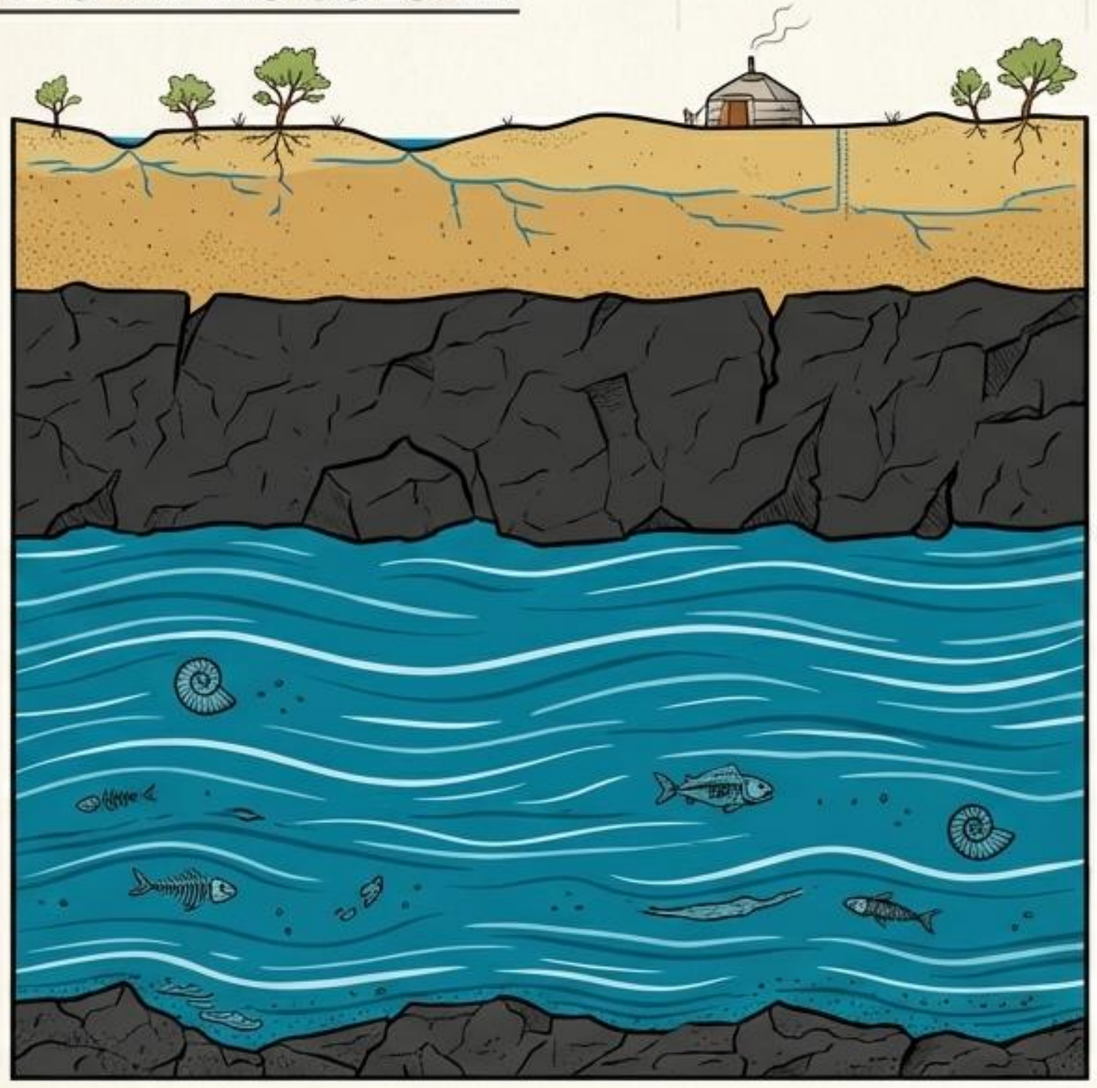
MONGOLIA

CLIMATE GRADIENTS & WATER SCARCITY BLUEPRINT

THE PHYSICAL REALITY

Surface water in the SGR is nearly non-existent. There are no permanent rivers—only ephemeral streams (zadgai). All life and industry are 100% reliant on what lies hidden underground.

STRATIGRAPHIC COLUMN



LAYER 1: SURFACE & EPHEMERAL RIVERS (0-20m)

Recharged by rare rainfall. Supports shallow herder wells, wildlife, and Hailaas (Siberian elm) trees. **Highly vulnerable to drought.**

LAYER 2: AQUICLUDE / BEDROCK

The physical rock barrier historically assumed to isolate deep ancient water from surface ecology.

LAYER 3: DEEP FOSSIL AQUIFERS (50-200m+)

THE HIDDEN SEA: Contains non-renewable "fossil water" carbon-dated to 35,000–42,000 years old. Ancient, trapped water with zero modern recharge.

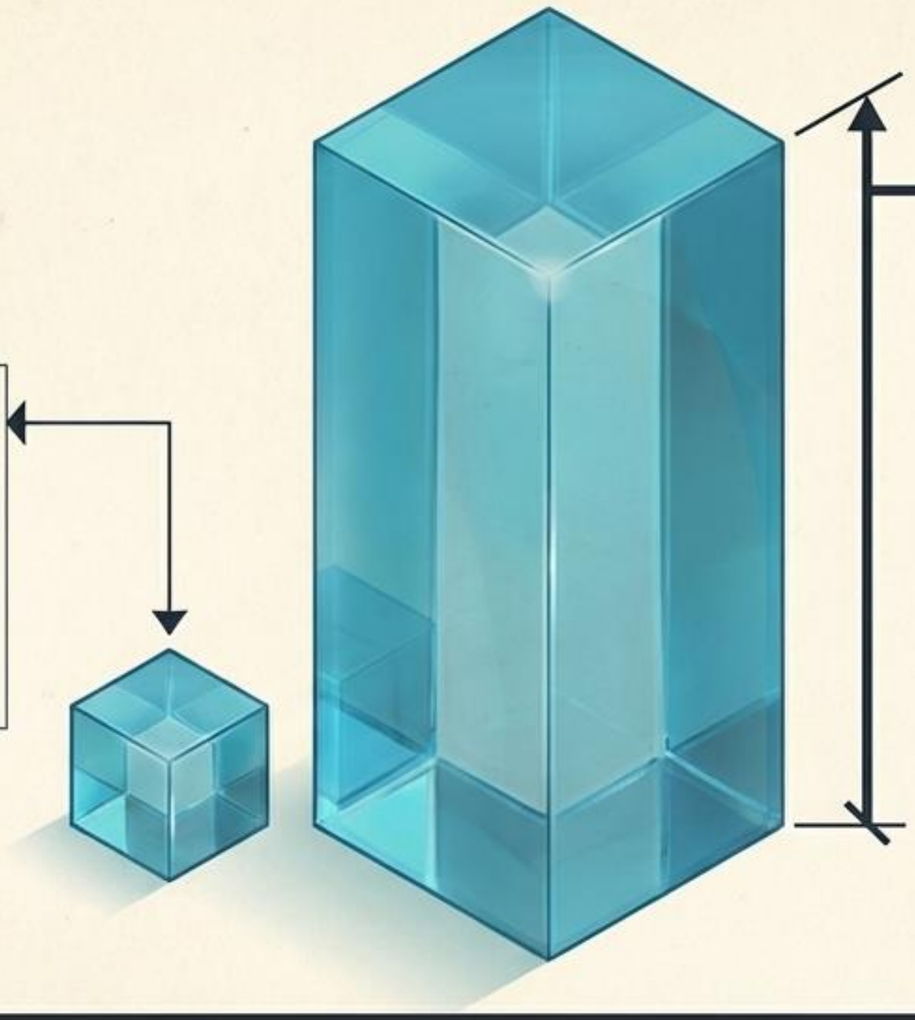
TAKEAWAY: To pump from the deep aquifer is not to harvest a renewable resource; it is to mine a finite mineral.

HISTORICAL BASELINE

Total SGR Rural & Livestock Demand

Volume: ~32,000 m³/day

Context: Sustains 90,000 rural residents and millions of livestock.



THE NEW THIRST

Projected 2020 Mining & Energy Demand

Volume: ~300,000 m³/day

Callout Breakdown:

- Oyu Tolgoi: 60k
- Tavan Tolgoi: 76k
- Shivee-Ovoo: 50k
- Tsagaan Suvraga: 32k

Industrial demand represents an unprecedented ten-fold increase in water extraction, drawing almost exclusively from non-renewable fossil aquifers.

Diagnostic Matrix: Two Ontologies of Water

CULTURALLY EMBEDDED WATER
(The Herder Perspective)

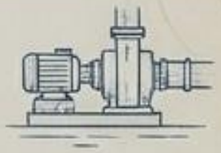
NATURE:
Multi-use, cyclical, and shared resource.

MEANING:
Deep spiritual and historical value. (e.g., The Undain River is revered for saving Chinggis Khan's soldiers; historically honored with silver yembuu bullion).

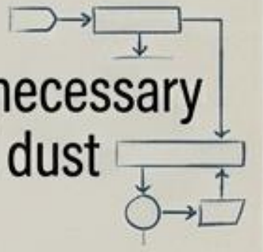
OBSERVATION:
Monitored through daily, localized interaction with shallow wells and pasture health.

MODERN / CORPORATE WATER
(The Mining Perspective)

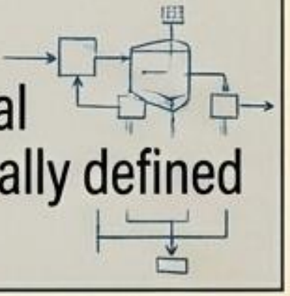
NATURE:
Single-use, abstracted, and linear flow.



MEANING:
A quantifiable economic input strictly necessary for processing copper/gold slurry and dust dust suppression.



OBSERVATION:
Monitored via generalized hydrological models, pump rates, and mathematically defined "cones of depression".



THE SHIFTING STATE: WATER: WATER AS POLITICAL INFRASTRUCTURE

TRACK 1: THE STATE & PUBLIC SECTOR

SOCIALIST ERA: EXPANDING PASTURE
State-funded hydrology created 40,000 shallow and deep wells nationwide. Infrastructure modernized the Gobi, integrated nomads into collectives (negdel), and manifested State power and care.

1960s — 1980s — 1990s — 2000s — PRESENT

TRACK 2: THE CORPORATE & PRIVATE SECTOR

1990s — 2000s — PRESENT

1990s: PRIVATIZATION COLLAPSE
Collapse of state well maintenance; 40% of rural wells abandoned.

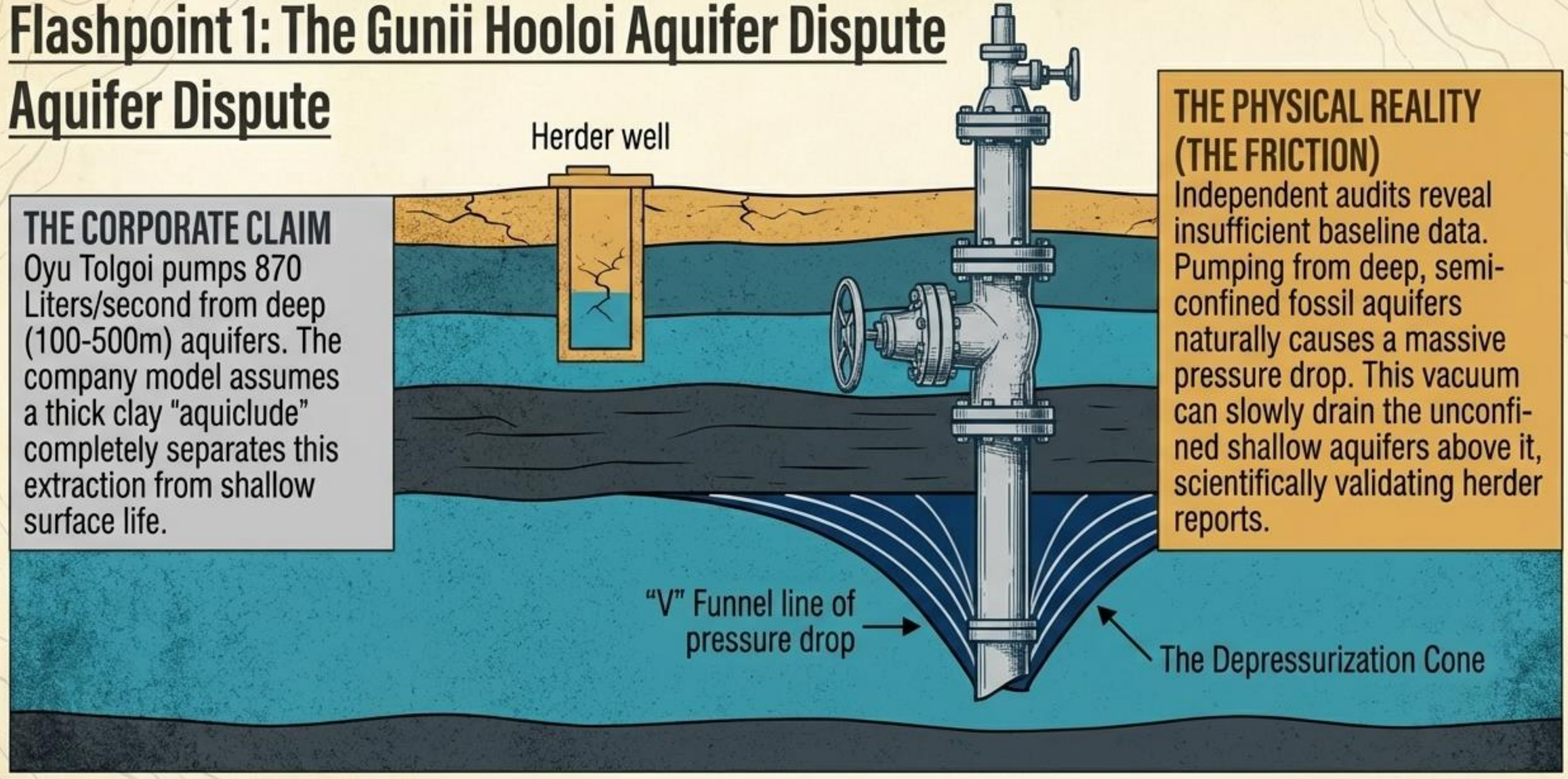
NEOLIBERAL ERA: EXPANDING CAPITAL
Rise of "Self-Discovered" water. Foreign corporations fund deep aquifer exploration. Infrastructure shifts to massive, private, single-use industrial pipelines.

Flashpoint 1: The Gunii Hooloi Aquifer Dispute

Aquifer Dispute

THE CORPORATE CLAIM

Oyu Tolgoi pumps 870 Liters/second from deep (100-500m) aquifers. The company model assumes a thick clay "aquiclude" completely separates this extraction from shallow surface life.

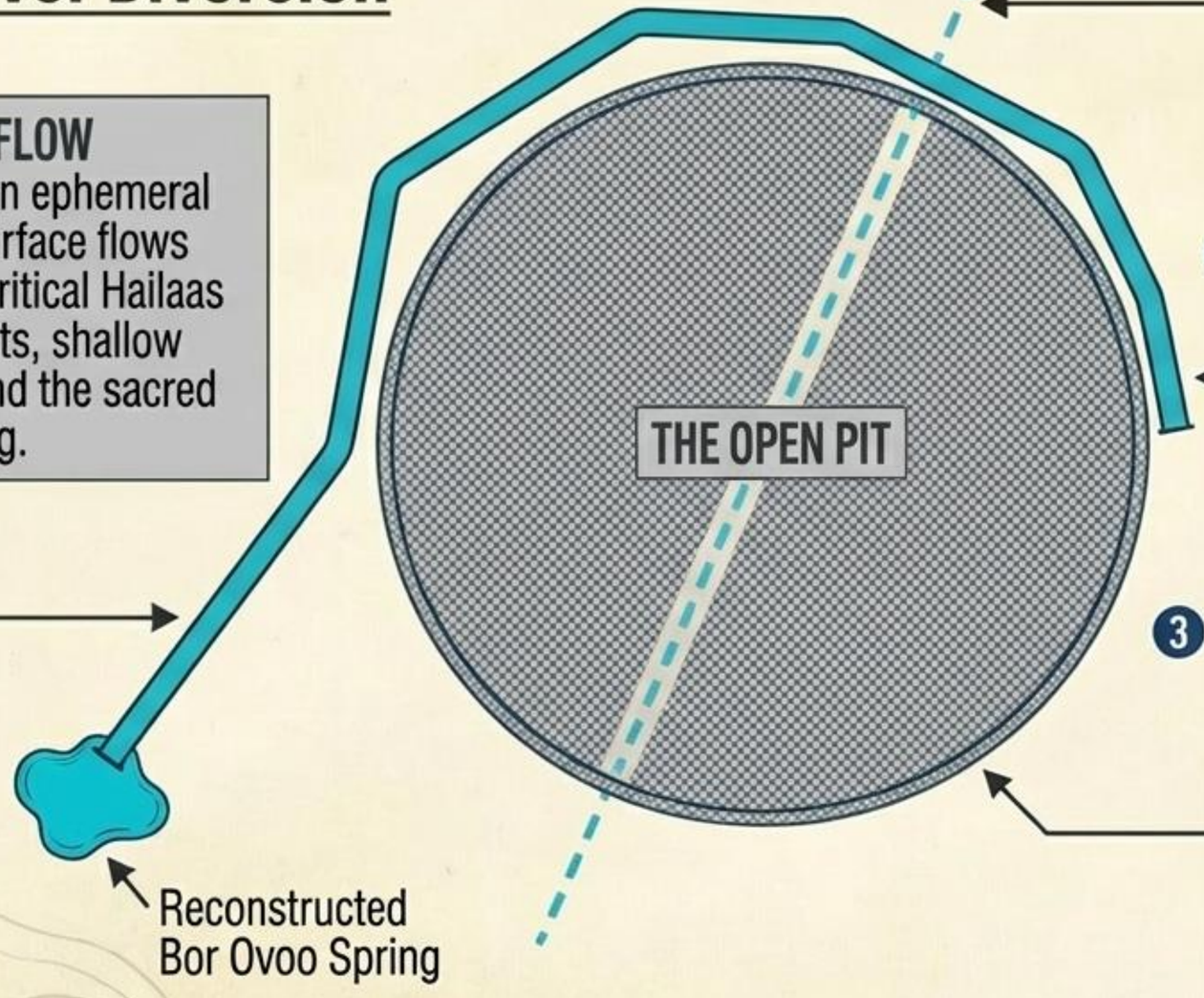


THE PHYSICAL REALITY (THE FRICTION)

Independent audits reveal insufficient baseline data. Pumping from deep, semi-confined fossil aquifers naturally causes a massive pressure drop. This vacuum can slowly drain the unconfined shallow aquifers above it, scientifically validating herder reports.

THE DISCONNECT: Corporations dismiss local knowledge as 'poor well maintenance,' invalidating centuries of nomadic hydrological expertise.

Flashpoint 2: Anatomy of the Undain River Diversion



THE NATURAL FLOW
The Undain is an ephemeral river. Its sub-surface flows naturally feed critical Hailaas (elm) tree forests, shallow herder wells, and the sacred Bor Ovoo Spring.

1 **THE NATURAL FLOW**
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2 **THE ENGINEERING INTERVENTION**
To access the ore, the river was severed. Sub-surface flows were diverted into an engineered pipe and the sacred spring was artificially reconstructed 500 meters south.

3 **THE RESULT**
Engineering models claim "no net loss of reliability." However, downstream herders report drying wells—demonstrating the fatal flaw in treating a complex, culturally embedded ecosystem as a simple plumbing equation.

The Governance Gap: Rescaling Local Water to National Asset

THE LEGAL BASELINE

The "Long-Named Law"

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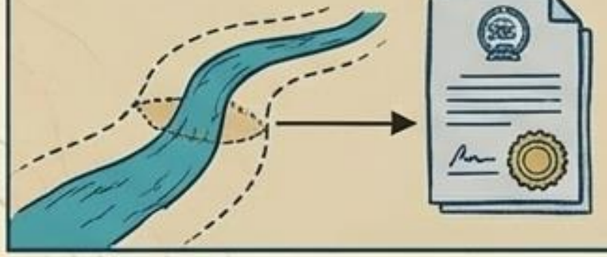
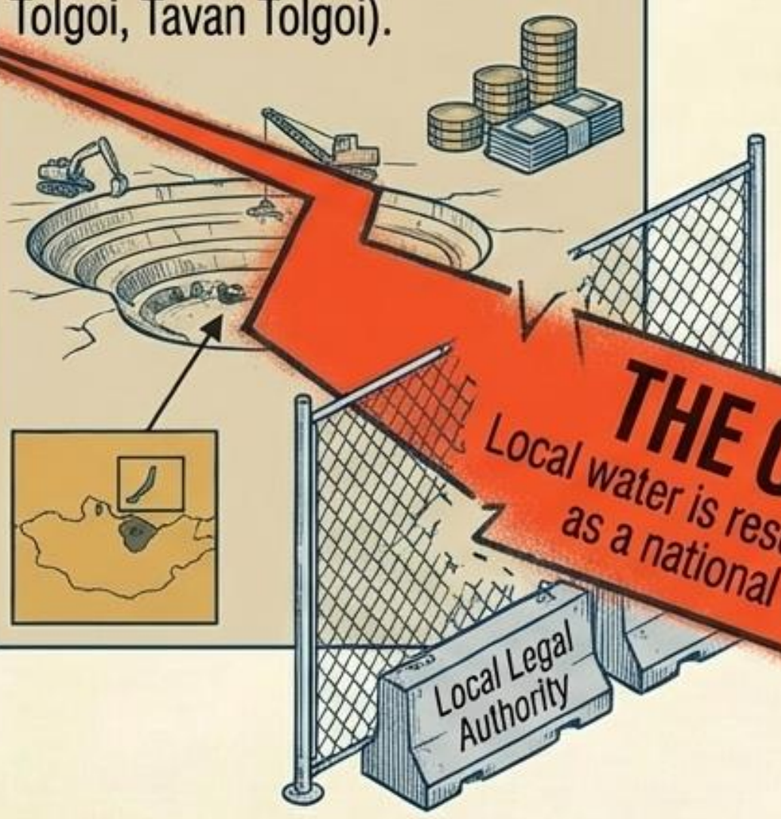
The "Long-Named Law" explicitly protects water resources, mandating 200m protective zones around rivers where mining is banned. Local soum governors hold legal authority to terminate industrial water utilization.



0 500 100m

THE LOOPHOLE

Classification as "Strategic Deposits" (mines generating >5% of national GDP, e.g., Oyu Tolgoi, Tavan Tolgoi).



THE OUTCOME

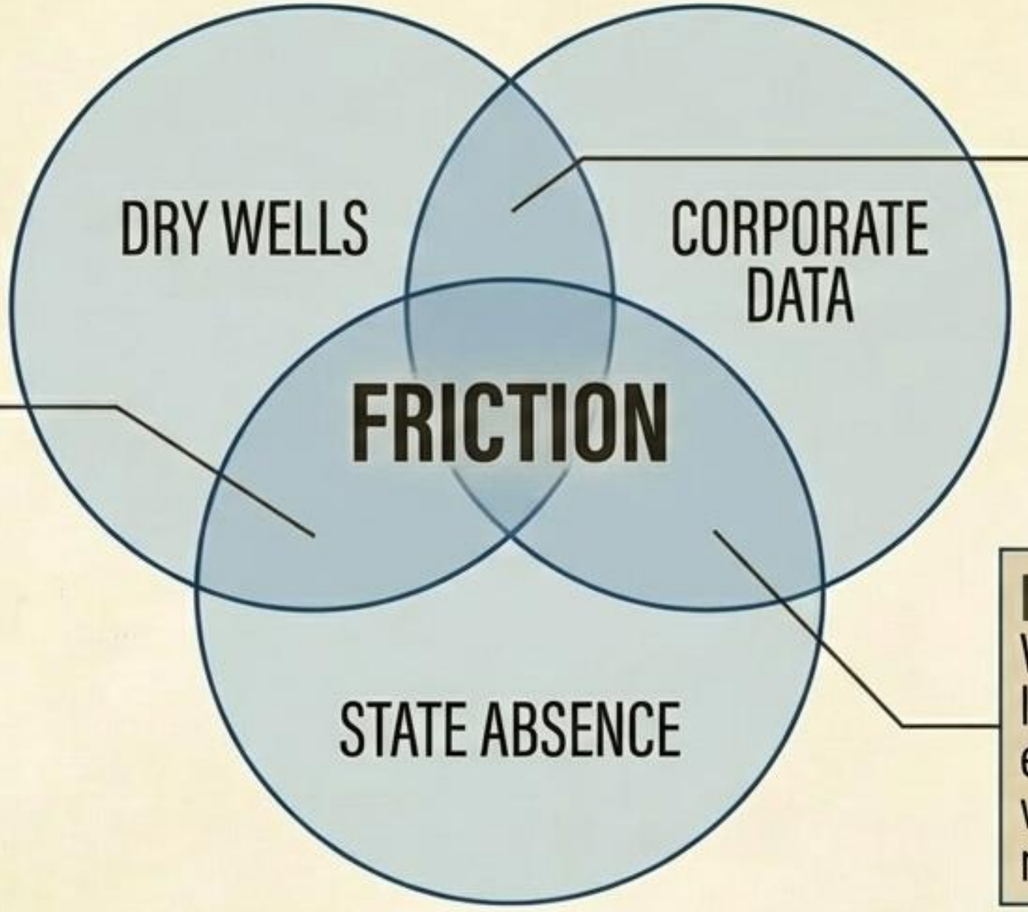
Water rights for volumes >100m³/day bypass local councils entirely. Central ministries grant access directly, leaving herders with zero legal recourse.

THE OVERRIDE

Local water is rescaled and commodified as a national economic asset.

N W E S

The Climax of the Crisis



THE LOSS OF TRUST
When mega-mines provide data showing "no impact," local NGOs and herders reject it outright due to a complete lack of independent verification.

THE GOVERNANCE VOID
The State has functionally offloaded water monitoring duties to the corporations themselves.

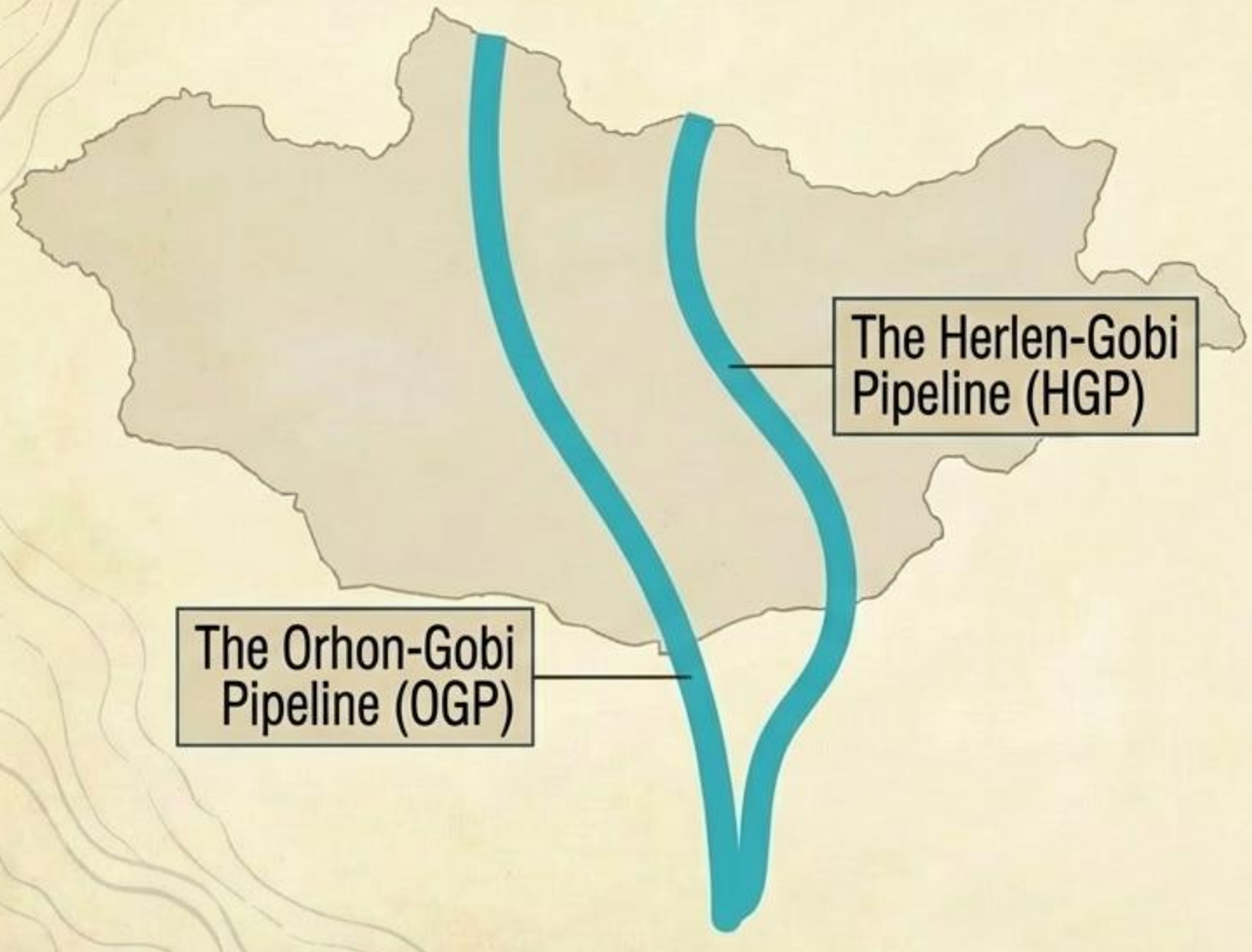
INTERNATIONAL ESCALATION
With the domestic state absent, locals bypass the government entirely, filing grievances directly with the World Bank's CAO to mediate disputes.

Takeaway: The South Gobi Region does not just have a water scarcity crisis; it has a profound trust and governance crisis.

The 2020 Infrastructure Crossroads

REGIONAL GROUNDWATER DEVELOPMENT Decentralized deep well fields	LONG-DISTANCE SURFACE CONVEYANCE Herlen/Orhon-Gobi Pipelines
CAPITAL EXPENDITURE Lower upfront cost (~50% cheaper).	**CAPITAL EXPENDITURE** Massive upfront investment (Estimated >$400M+).
OPERATIONAL COMPLEXITY Higher localized complexity (requires managing dozens of decentralized, scattered pump stations).	**OPERATIONAL COMPLEXITY** Centralized, but highly vulnerable to single-point mechanical failure across hundreds of kilometers.
ENVIRONMENTAL RISK High risk of irreversibly depleting 35,000-year-old fossil aquifers; localized depressurization.	**ENVIRONMENTAL RISK** Shifts the ecological burden to northern river basins; highly vulnerable to climate change altering river flows.
SOCIAL IMPACT Direct friction with local nomadic herders over overlapping local water domains.	**SOCIAL IMPACT** Introduces massive, complex transboundary water geopolitics (rivers flowing to Russia/China).

The Surface Water Mega-Projects



HERLEN-GOBI PIPELINE

- Length: 540 km
- Volume: Moving 1,500 Liters/second
- Destinations: Shivee Ovoo, Sainshand, Tsagaan Suvraga

ORHON-GOBI PIPELINE

- Length: 740 km
- Volume: Pumping 2,500 Liters/second
- Destinations: Tavan Tolgoi, Oyu Tolgoi

THE REALITY CHECK

Surface water is not a total replacement; it is an enabler for unprecedented industrial expansion. It creates a conjunctive use scenario where remote communities and industrial backup systems will still rely heavily on local SGR groundwater.

The Structural Solution: Bridging the Governance Gap

SGR-GMIC

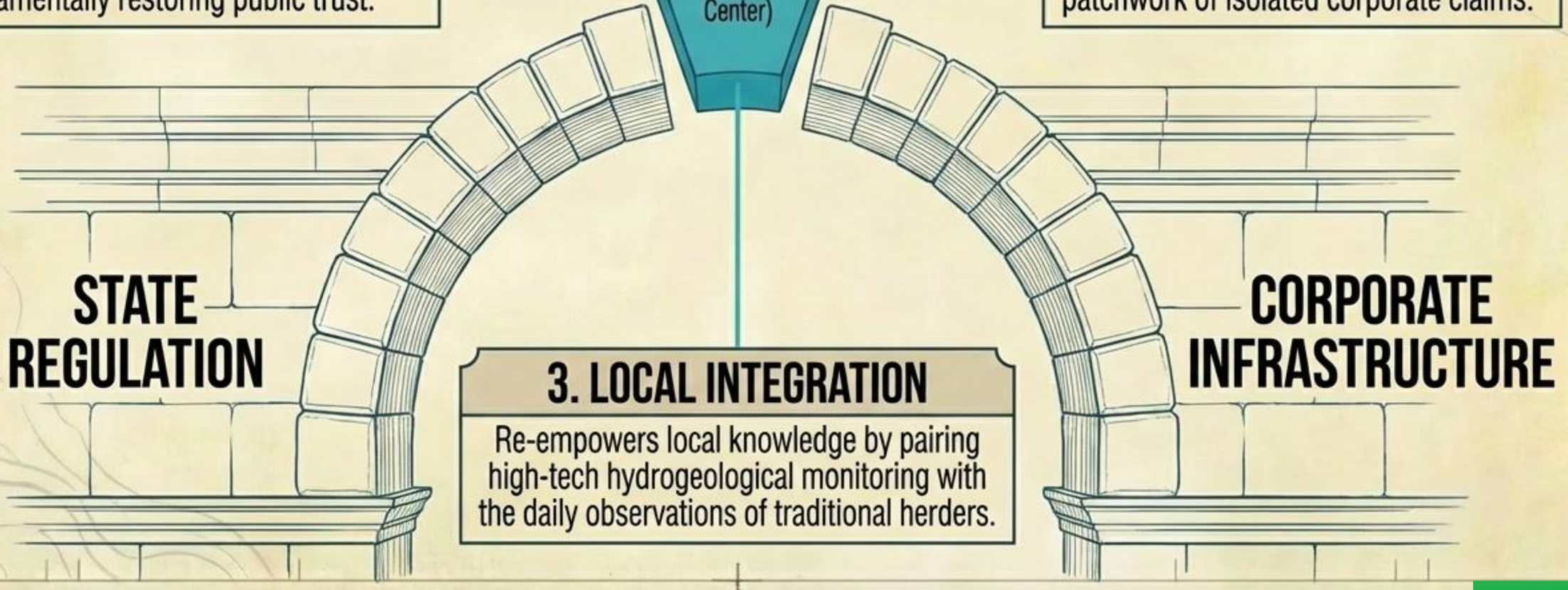
(Southern Gobi Region Groundwater Management & Information Center)

1. INDEPENDENT ARBITER

Operates under the Water Authority to impartially verify corporate data, monitor aquifer health, and mediate disputes, fundamentally restoring public trust.

2. HOLISTIC MANAGEMENT

Consolidates fragmented data. Treats SGR groundwater as a single, connected regional resource rather than a patchwork of isolated corporate claims.



STATE REGULATION

CORPORATE INFRASTRUCTURE

3. LOCAL INTEGRATION

Re-empowers local knowledge by pairing high-tech hydrogeological monitoring with the daily observations of traditional herders.

The Master Blueprint

1. GEOLOGY IS DESTINY

You cannot build infinite economic growth on top of 35,000-year-old finite fossil water without hitting profound ecological limits.

2. ENGINEERING IS NOT ENOUGH

A 740km pipeline or a diverted river only solves a plumbing problem; it does not solve the deep social friction caused by abstracting culturally sacred resources.

3. TRUE INFRASTRUCTURE IS GOVERNANCE

Technical solutions will fail unless paired with transparent, independent basin-level governance (SGR-GMIC) that respects traditional ontologies alongside modern economic demands.

FINAL INSIGHT: To survive the 21st century, Mongolia's master blueprint must engineer trust just as rigorously as it engineers pipelines.

VERSATILITY OF APPLICATION

HYDROCARBONS

Oil

Gas

Condensed

PRECIOUS METALS AND BASES

Gold

Copper

Lithium

Nickel

STRATEGIC

Uranium

Diamonds

Coal

WATER RESOURCES

Drinking Water

Underground

Geothermal

The technology eliminates false positives by identifying the specific type of mineral.

Customized version

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