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#167: How the Hemisphere was written — Second Thread of a Hidden Weave

Dams and the Disassembled Year: Vapor, Heat, and the Collapse of Seasonal Time — A journey into the feedback loops the models forgot.

ALI BIN SHAHID

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> **“Nearly all the rivers in the Northern Hemisphere are now mechanically controlled.”**
>
> — Cliff Krolick from NECAPA, in conversation

That sentence was the pivot.

When Cliff first reached out, I didn’t realize what I was being invited into. We were discussing land memory, tree rings, and the architecture of atmospheric feedback. Dams felt like a side concern. Important, yes—but not central. Everyone’s worried about something.

Then he shared his group’s datasets. I glanced. Nodded. Moved on.

It wasn’t until the second call—with Alpha Lo and Rob Lewis in the mix—that something started shifting. Rob spoke of forest-driven weather. Alpha pointed toward model biases and misattributed forcings in climate simulations.

But it was Cliff’s casual mention of **“mechanically controlled rivers”** that stopped me. Suddenly, this wasn’t about reservoirs anymore.

It was about rewiring the North.

How Did We Get Here?

Let's begin with scope.

The **Global Dam Watch (GDW v1.0)** database consolidates the world's known barriers and reservoirs, *Lehner et al. (2024)*. It now contains:

- **41,145 barrier locations**
- **35,295 mapped reservoirs (**associated reservoir polygons)
- A cumulative surface area of **302,450 km²**
- And a combined storage of **7,405 km³** of water

These reservoirs now **artificially inflate the Earth's inland water area by 11%**, and **storage by ~4%**, effectively rewriting the planet's hydrological fingerprint *Lehner et al. (2024)*.

> *"An 11% increase in global lake area—without a single new lake born of nature."*

But this is just the visible tip.

When statistical models are applied to account for small and unmapped structures, we arrive at a staggering estimate:

> **Over 16.7 million reservoirs** storing **8,069 km³** across **507,102 km²** globally. *Lehner et al. (2011)*.

Zoom into **North America and Eurasia**, and a pattern emerges:

More than **70% of total global storage capacity** lies in just three northern countries: **Canada, Russia, and the United States**.

Arctic Drainage Map + Yukon River Ice Break Flooding : This image sets the stage: a planetary view of Arctic drainage basins from Canada, Russia, and parts of Alaska —

the three hydro-hegemons of the sub-Arctic hemisphere. Below it, a haunting image from the Yukon River captures the tangible consequence: floods, ice jams, thermal imbalance — not from rainfall, but from the artificial pulse of programmed release.
This triad not only dominates water retention—but overlays precisely atop the **Arctic vapor corridor**: a feedback-sensitive belt that governs:

- Polar jet stream alignment
- Snowpack thermal insulation
- Greenland melt rates
- Estuarine bloom timing

This is no accident of geography. It is an engineered reconfiguration of heat pathways.

This isn't just about electricity. It's about thermal choreography.

And yet—this entire choreography is being modeled with fractured, incomplete datasets.

Until very recently, we lacked even a unified map of the world's dams. **For decades, global understanding remained scattered across dozens of siloed databases**, each with its own criteria, omissions, and focus areas.

Only in 2024 did the Global Dam Watch (GDW v1.0) consolidate these into a cohesive planetary view.

Figure X: Major global dam and reservoir databases — their scope, gaps, and attribute types **Lehner, B., et al. (2024).** *Global Dam Watch v1.0 — A global inventory of mapped dams and reservoirs.* **Global Dam Watch / McGill University.**
The table shows clearly:

- Some datasets prioritize **structural geometry**, others only **power capacity**.
- Many **ignore small and unregistered reservoirs** entirely.
- Virtually none capture **seasonal evaporative loss, heat fluxes, or climatic feedbacks.**

In short, **we knew where the concrete was—but not how it shifted the clouds**.

Now, with GDW (2024), we finally have a scaffold to see the system whole.
But we're still only beginning to ask the right questions.

Degree of Regulation: The Quiet Metric

Dams are often mapped spatially — plotted as dots on a landscape. But once we **stack temporal layers** — memory, seasonality, delay — a **different picture emerges**. One that measures not just **presence**, but **influence**.

Hydrologists use a lesser-known index called **Degree of Regulation (DOR)**. It measures how much flow can be controlled upstream — in percent of a river's natural average discharge.

And the numbers are quietly extreme.

According to the **GRanD v1.3** dataset:

- Nearly **80% of large rivers** in **Canada and northern U.S.** are under high regulation (DOR > 100%)
- In **very large rivers** (>10,000 m^3/s), nearly **45%** are affected globally
- In **medium and large rivers** (100–10,000 m^3/s), that number rises to **over 60% in North America**. (Lehner et al., 2011)

Global river CSI scores showing 48.2% of reaches already impaired by human structures. Red reaches indicate CSI < 65%, the most severe loss of natural connectivity. Source Link
DOF (degree of fragmentation) and DOR (degree of regulation) account for over **92%** of all dominant pressure indicators for river reaches with CSI < 95%. These two forces alone reconfigure global flow patterns. Source link
Just **37%** of the world's very long rivers (>1,000 km) remain free-flowing across their entire length. North America, Eurasia, and India show the highest disruption, often aligned with high DOR zones. Source Link

This doesn't just alter flow. It rewrites the memory embedded in water:

- Spring surges are now timed releases.
- Summer lows become baseflows from gated storage.
- Winter ice forms downstream of warm plumes.
- The seasonal signal is no longer natural. It is **encoded** — by valves, turbines, and contractual demand curves.

Canada: A Case Study in Mechanical Weather

Let's take **Canada**, the so-called poster child of "clean" hydropower.

With **1,157 large dams** and **some of the largest artificial reservoirs** on Earth, Canada has turned its northern rivers into programmable thermal reservoirs

Distribution of dams (black dots) and reservoirs (blue polygons) across Canada. The high density along northern drainage basins underscores Canada's transformation of boreal hydrology — not just for energy, but for seasonal vapor modulation.
This image establishes the sheer spread and geographic alignment of control — a corridor of valves overlaid across the sub-Arctic hemisphere.

> "From the Yukon to the Labrador Sea, it is not a hydrological cycle. It's a hydraulic script."
> *One river can show the arc of the whole story — and its cost. Eastmain is that river.*

Act I: The River Alive

"Eastmain River before diversion — a boreal artery flowing with seasonal pulse."
Conglomerate Gorge on the lower Eastmain River just before its diversion about 1979. The Cree portage was along the right shore.

Act II: The Rewriting of Geography

Diversion map — Eastmain's waters rerouted north into the La Grande system to maximize electricity output.

Act III: Death by Design

What remains — the emptied channel of Eastmain after redirection. A river reduced to memory. Conglomerate after the diversion. *[Source]*

and another view …

Then and now — Eastmain's seasonal floodplain turned static. The vitality of flow replaced by exposed sediment and evaporative silence

Now let's look closer:

- The **Caniapiscau** reservoir alone spans **1,650 square miles**
- The **Churchill Falls system** floods an area larger than many European countries
- **La Grande**, **Robert-Bourassa**, and **Eastmain-1** are not just hydroplants — they are seasonal heat engines.

Interior of a hydroplant turbine vault (La Grande/Robert-Bourassa)

This conveys the engineered precision — power stations built into bedrock, cycling megawatts into climate loops.

Aerial view of one of Canada's mega-reservoirs (likely Eastmain or Robert-Bourassa)

The reservoir as a climatic mirror — massive water bodies warming under a low-sun winter sky.

Figure: **Canada's Natural Streamflow — Monthly Discharge by Watershed - Government of Canada.** (1985). *Canada Streamflow (Hydrological Regions and Monthly Discharge Patterns)*. National Atlas of Canada, 5th Edition. [Used with permission under educational fair use.]

Each curve shows the **river's seasonal rhythm**: spring floods, summer peaks, winter lows. But these are natural baselines — prior to regulation.

Where dams now govern flow, this pulse is replaced by programmed discharge.

Where rivers once remembered the snow, they now obey the switch.

Now compare this:

In **winter**, when **natural evaporation would cease**, these dams:

- **Release warm water** into sub-zero air
- **Inject vapor** into an atmosphere with minimal CCNs (cloud condensation nuclei)
- And create persistent **fog belts** visible from satellite, but invisible to traditional emissions inventories

[Insert Figure Placeholder: Canadian DOMEs and fog signatures]

This makes Canada's vapor systems — these **DOMEs** (Domes of Moisture Emissions) — uniquely potent. They emit:

- **Short-cycle phase-shifted energy** (vapor)
- **Long-cycle emissions** (from drowned biomass and sediment fermentation)
- And do so across landscapes primed for amplification: snowfields, inversion basins, and jetstream corridors

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Regulation with Vapor, Not Just Valves

Here's the deeper implication:
Vapor behaves differently than carbon.

Carbon accumulates.
Vapor activates.

When vapor condenses — often hundreds or thousands of kilometers downwind — it releases **latent heat**, alters **vertical atmospheric stability**, and triggers or suppresses storms depending on cloud seeding availability.

And this means:

- A dam in Quebec may alter storm tracks over Greenland
- A warm plume in Saskatchewan might modulate lapse rates over Hudson Bay

- Fog corridors in Siberia may originate from hydroelectric pulses hundreds of kilometers upstream

Steam Fog over the Great Lakes (NASA, Jan 2014) - When cold Arctic air moves over warmer waters, steam fog rises. While this image captures a natural occurrence, similar fog trails emerge from dam-release plumes — but remain largely undocumented by emissions inventories.

These fog corridors — persistent, patterned, and seasonally engineered — are no accident.

They trace the unseen routes of vapor shaped by dams — warm water released into cold air, cycling through the atmosphere like clockwork.

When this vapor condenses — often hundreds or even thousands of kilometers downwind — it releases latent heat, shifts vertical stability, and either triggers or suppresses storms, depending on cloud seeding potential.

And the patterns persist.

Because the infrastructure runs on rhythm — not rainfall.
Season after season, synced to energy demand, snowmelt, and grid dispatch.
What results is more than environmental impact.
It's thermodynamic feedback.

More Than a Water Story

But this wasn't always invisible.

In one of our earliest calls, **Cliff Krolick** mentioned a name I hadn't encountered before: **Hans J.A. Neu**, a Canadian oceanographer who, as early as the 1960s, warned Hydro-Québec that regulating Arctic rivers like the Manicouagan would do more than alter local ecosystems.

Neu recognized that reversing seasonal flows could disrupt more than rivers and bays. It could interfere with the rhythm between freshwater and saltwater, destabilize estuarine mixing, and potentially influence the global thermohaline circulation — a key component of the planet's climate balance.

After presenting his findings, Neu's consulting contract was discontinued. He was reportedly placed under a **gag order**, and the technical documentation quietly disappeared from circulation. But the core insights remained — carried forward decades later by **Stephen Kasprzak**, who used satellite-era data to revisit and expand Neu's observations.

Kasprzak's work showed that these altered rivers — **La Grande**, **Churchill**, **Vilyuy** — weren't just shifting water. They were:

- Modulating the timing and location of atmospheric heat release
- Disrupting jet stream behavior
- Severing the seasonal nutrient pulse that once fed estuaries each spring

Cliff summarized it clearly:
"They're watering the ocean in winter — when marine life is dormant — and starving it in spring, when it needs to bloom."

That reframing was pivotal.

Because this isn't just about water or vapor.
It's about **sequence** — the choreography of seasonal events, and what happens when that rhythm is interrupted.

DOMEs — **Domes of Moisture Emissions** — are not merely physical outputs.
They're **temporal agents**. They insert new signals into a climate system that was never designed to receive them.

What Comes Next

This was just the surface layer — the broad contours and foundational reframe.

In **Part 3**, we turn eastward.

To **Russia**.

Where the manipulation wasn't incidental, but intentional.
Where the goals were climatic — to warm the Arctic, melt ports, make tundra arable.

We'll examine:

- The Vilyuy and Yenisei vapor loops
- The fog corridors of Krasnoyarsk
- The Soviet-era climate doctrines behind "hydrological engineering"
- And the warming of the Kara Sea — the fastest-heating marine basin on Earth

Because Canada may have laid the blueprint.
But Russia turned it into an operating system.

Citations and References

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