

# The Achilles' Heel of Hydrological Commons Governance: Lessons from Mariana on Institutional Capture and Power Asymmetries

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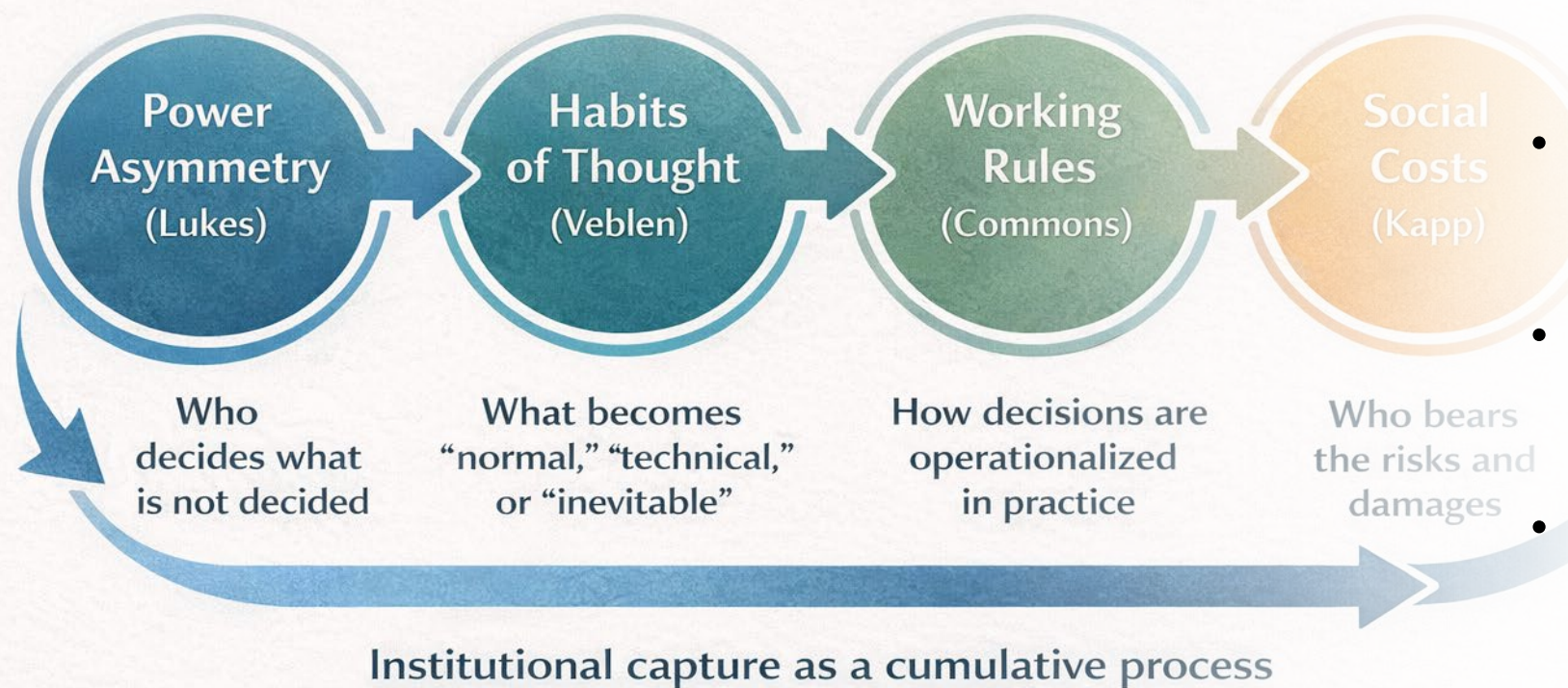
**AMERICAN  
ECONOMIC  
ASSOCIATION**





- **Context:** The 2015 Fundão Dam collapse with 43 million m<sup>3</sup> tailings (Mariana, Brazil).
- **The Puzzle:** The region had "state-of-the-art" participatory water governance (River Basin Committees). Why did it fail?
- **Central Argument:** Regulatory oversight became **Ceremonial** (ritualistic validation) rather than **Instrumental** (problem-solving) due to economic power asymmetries.

# Theoretical Framework (The OIE Lens)



- **Veblen & Bush:** Instrumental (solving problems) vs. Ceremonial (validating status/hierarchy).
- **John R. Commons:** Working Rules (de facto) vs. Formal Laws (de jure).
- **K.W. Kapp:** Social Costs (Systematic cost-shifting to the public).
- **Lukes/Foucault:** Epistemic Power (Control over technical knowledge determines policy).

Source: Author's elaboration.



# Methodology: Institutional Process-Tracing

**Method:** Theory-Testing Process Tracing.

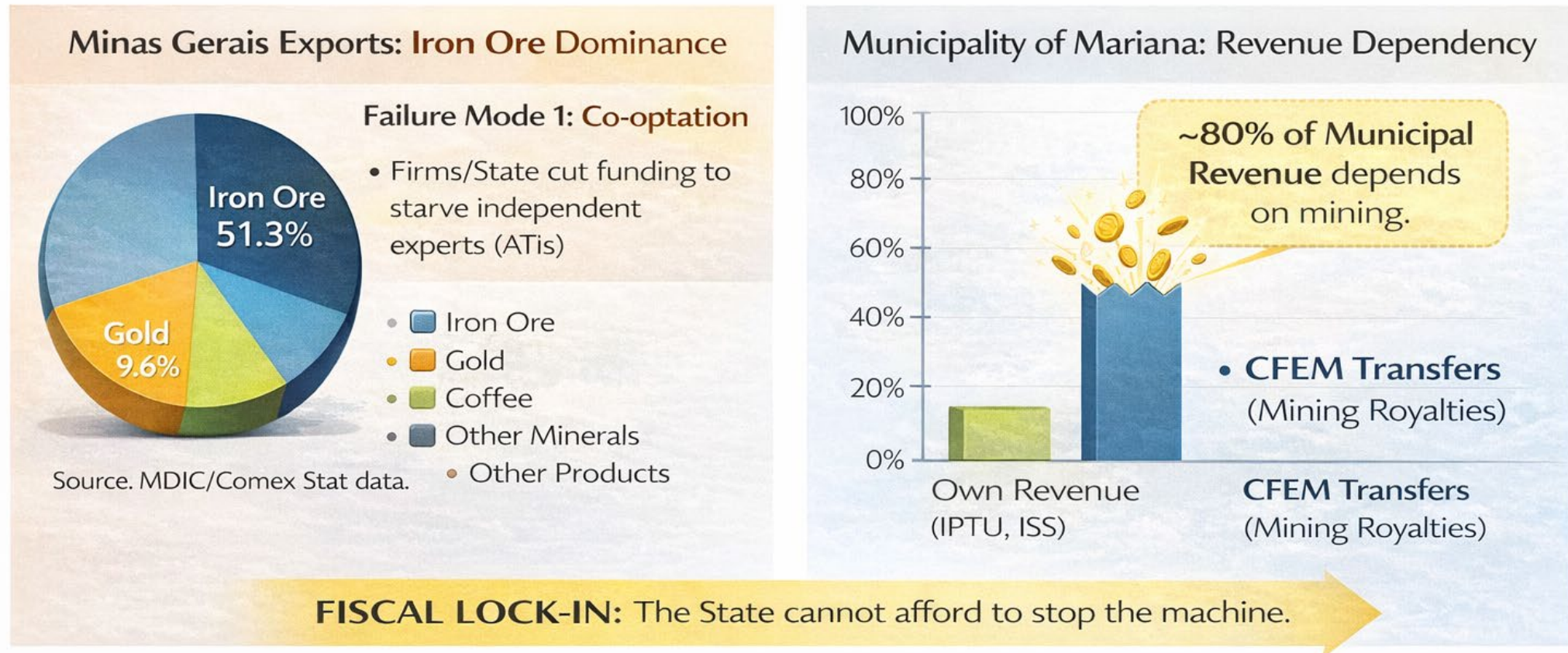
## **Data Sources:**

- Legislative Inquiry Reports (CPI).
- Licensing Records (SEMAD 2007-2015).
- Basin Committee Minutes (CBH-Doce).

## **Inferential Strategy:**

- Distinguishing *Incompetence* (Random errors) vs. *Capture* (Systematic bias).
- **Identification of "Smoking Gun" Evidence:** High-probative internal documents proving prior risk awareness (not mere negligence).

# The Structural Trap: Economic Dependence & Lock-in



Source: Author's elaboration.

## Technical Warning



**ESTADO DE MINAS GERAIS**  
SECRETARIA DE ESTADO DE MÉIO AMBIENTE  
E DESENVOLVIMENTO SUSTENTÁVEL

Document: Parecer Único n.º 047/2013  
Date: October 2013  
(2 years before collapse)

### Technical Finding:

... identify saturation in the left abutment  
(saturação na ombreira esquerda) ...  
... defects in the internal drainage system  
(falhas na drenagem interna) ...

**Risk Level: Severe**

Source: MDIC/Comex Stat data.

## Administrative Decision

### OFFICIAL DECISION

Operating License (LO) N.º 234/2013

Status: **GRANTED**

Condition 15:

\*The company must present a  
stability analysis of the dam...  
[deadline: future].

The "Smoking Gun": Evidence of  
Prior Risk Awareness

Risk Externalized

Official Decision :

Operating License (LO) N.º 234/2013

Status: **GRANTED**

- The company must present a stability analysis of the dam... [deadline: future].

# Mechanism 1 - Ideological Convergence (Ex-Ante)

- **The Mechanism:** State planning documents (MME 2011)
- frame regulation as a "Competitiveness Bottleneck."
- **The Evidence:** 2013 Operating License granted
- despite technical failures.
- **The Working Rule:** "Operate now, mitigate later."
- **Result:** Precautionary Principle displaced
- by "Conditionalities."

*"Environmental licensing [...] represents a bottleneck to competitiveness (gargalo para a competitividade)."*

(Source: National Mining Plan 2030, MME, 2011, p. 23)

**Precautionary Principle** Ideological Convergence → **"Pay-as-you-go" Logic**  
(Safety conditional on future profit)

**SEMAD Process nº 0047/1999** (2013 Operating License):

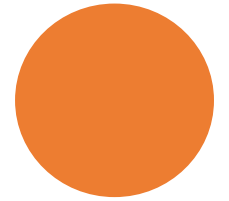
**Issue:** Drainage failures & left abutment saturation identified.

**Decision:** License Granted subject to **Condition 16**

→ (Stability studies deferred to future).

## Mechanism 2 - Agenda Exclusion (The Committee)

- **Arena:** CBH-Doce (River Basin Committee).
- **Concept:** "Non-decision making" (Bachrach & Baratz).
- **Evidence:** Between 2013-2015, dam safety was systematically treated as "**out of scope.**"
- **Epistemic Monopoly:** Laypeople could not challenge "voluminous technical dossiers" provided by miners.

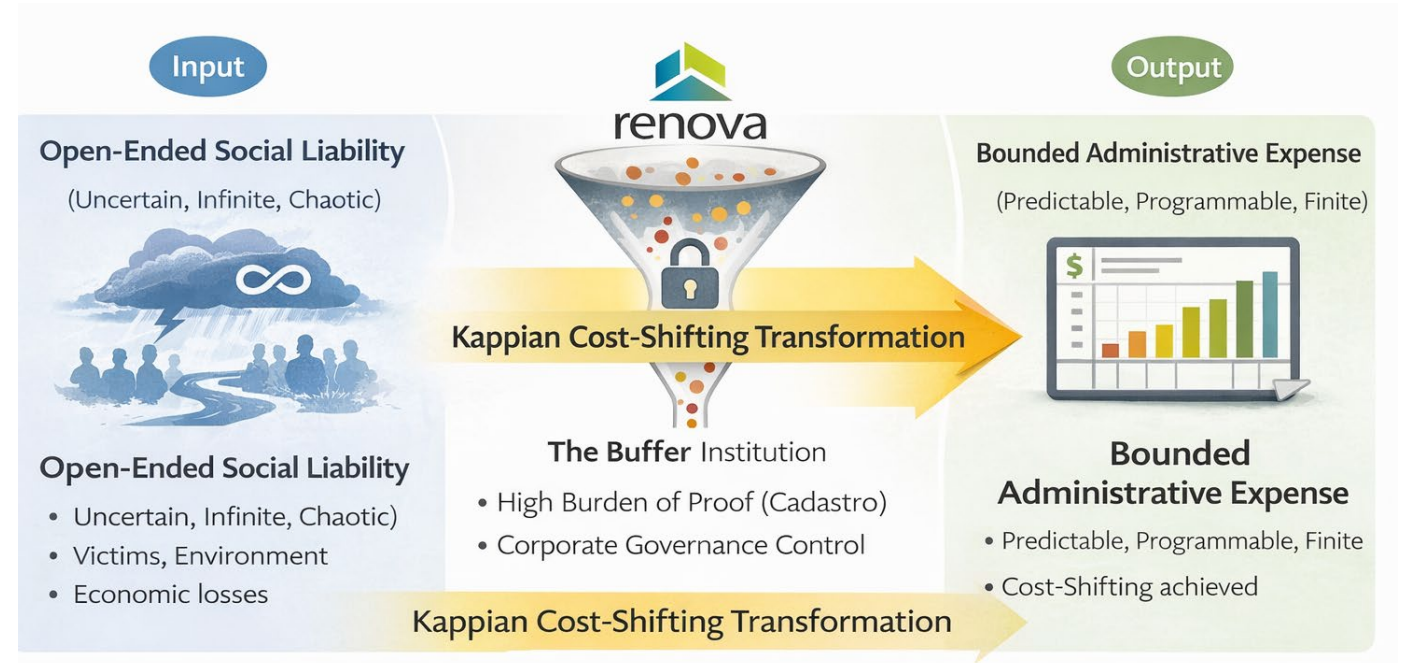


**The "Non-Decision" (Bachrach & Baratz)**  
Risk was actively kept off the table.

**Epistemic Monopoly:**  
"Voluminous technical dossiers" paralyzed laypeople, enf

# Mechanism 3 - Buffer Institutions (Ex-Post)

- **The Renova Foundation:** A private entity created to manage public reparation.
- **Function:** Institutionalized Cost-Shifting (Kapp).
- **Mechanism:** Converted open-ended liability into bounded, programmable budget items.
- **Result:** The Foundation acts as a "Buffer," shielding Vale/BHP from the victims.



Source: Author's elaboration.



# The Diagnostic Summary

Power Mechanism	Manifestation in Mariana	Institutional Consequence
Ideological Convergence	Regulation viewed as a “bottleneck”	State Complicity
Agenda Exclusion	Safety kept off Committee agendas	Ceremonial Oversight
Cost-Shifting	Renova Foundation	Privatization of Remedy

Source: Author's elaboration.

# The Gap

- Participation alone is insufficient.
- Without structural power, committees drift into ceremonialism.

## Current State:

Asymmetry creates a “veto” on safety.

Current State: Asymmetry

Requires Structural Counter-Power

# Institutional Scaffolding

- Not a universal blueprint, but **Design Heuristics**.
- **Specific mechanisms** to disrupt the causal chain of capture.



**Epistemic** (Knowledge)



**Political** (Veto)

Source: Author's elaboration.

# The Proposal - Institutional Scaffolding

- **The Premise:** Participation alone cannot reverse ceremonial drift.
- **The Solution: Institutional Scaffolding.**
- **Definition:** Design heuristics to disrupt key links in the capture sequence.
- **Goal:** To move from *Naïve Participation* to a *Counter-Power Architecture*.

# The Proposal - Institutional Scaffolding


**Epistemic Independence**



**Counter-Expertise**  
(ATIs)

- Independent funding (Escrow) + Technical autonomy

**Target:** Epistemic Epistemic Monopoly



**Disrupts Epistemic Monopoly**


**Binding Deliberative Parity**



**Veto Points**

- **Suspensive veto** on high-risk projects

**Target:** Disrupts Political Asymmetry



**Disrupts Political Asymmetry**

**Democratically Auditable Enforcement**



**Public Good Data**

- Open-source triggers + Real-time telemetry

**Target:** Disrupts Ceremonial Monitoring



**Disrupts Ceremonial Monitoring**

Source: Author's elaboration.



# Scaffolding Pillar 1 - Epistemic Independence



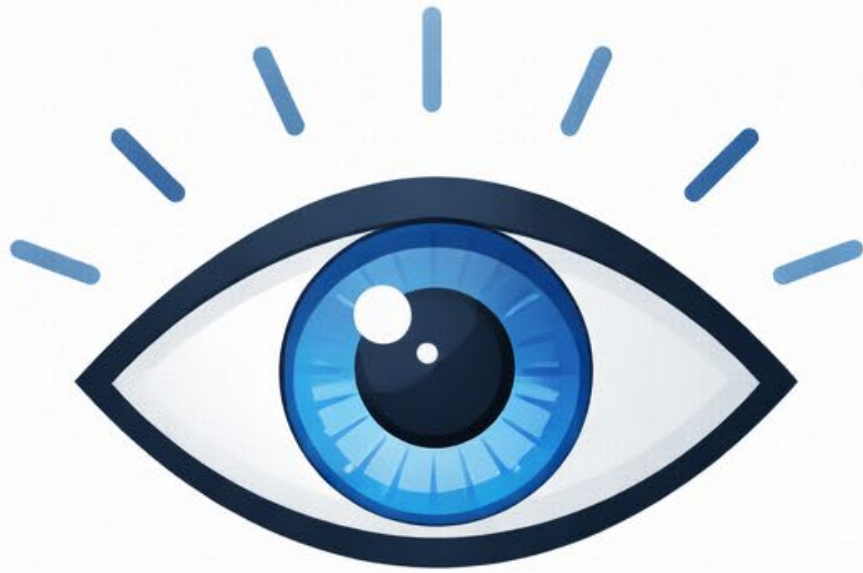
Source: Author's elaboration.



# Scaffolding Pillar 2 - Binding Deliberative Parity

- **Target:** Reconfigures Veto Points.
- **Mechanism: Binding Powers for Committees.**
  - Shift from "Consultative Ritual" to "Structured Bargaining."
  - **Suspensive Veto Power** over high-impact projects.
- **Logic:** If the community bears the risk, they must have the power to stop the accumulation process.





# Scaffolding Pillar 3 - Democratic Auditable Enforcement

- **Target:** Makes Monitoring Non-Ceremonial.
- **Mechanism: Real-time Public Telemetry.**
  - Open-source trigger logic (algorithm).
  - Independent custody of monitoring infrastructure (sensors).
- **Function:** Prevents the manipulation or hiding of safety data.

# The Paradox of Reform (Failure Modes)

## Failure Mode 1: Co-optation



### Failure Mode 1: Co-optation

- Firms/State cut funding to starve independent experts (ATIs)



### Escrow Funding

Logic: Resources held in trust, independent of political/corporate budget cycles.

## Failure Mode 2: Lawfare



### Failure Mode 2: Lawfare

- Firms judicialize the process to induce “institutional fatigue” and delay binding decisions



### Safeguard

#### Precautionary Suspension

“If you sue, operations stop.”  
Aligns economic incentives with speed.

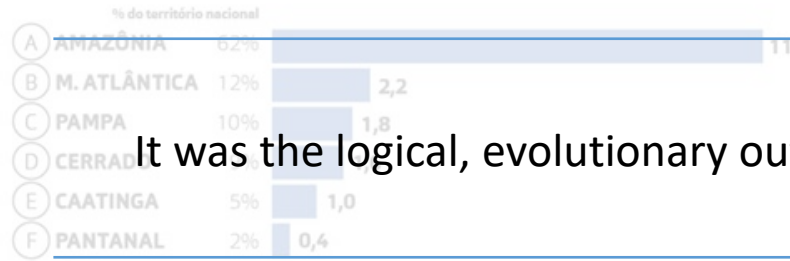
# Superfície de água no Brasil 1985-2023

## Conclusion

 **18,3 Mha**  
SUPERFÍCIE DE ÁGUA TOTAL NO BRASIL  
Em 2023

 **-1,5%**  
ABAIXO DA MÉDIA HISTÓRICA NO BRASIL  
Em 2023

Superfície de água nos **biomas** em 2023 Mha



Mariana was not an accident.

It was the logical, evolutionary outcome of a governance system designed for **Ceremonial Performance**, not safety.

These lessons apply to **any extractive commons** characterized by high economic power asymmetry and institutional dependence.

Superfície de água nos **municípios** ha

Perdas em relação à média histórica

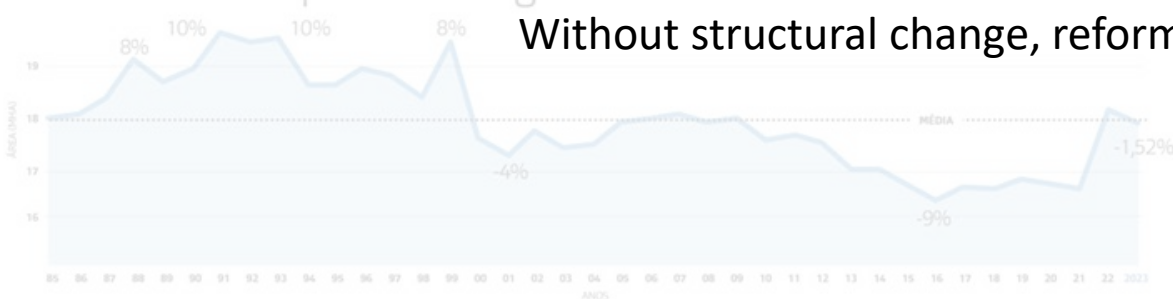


Ganhos em relação à média histórica



True sustainability demands **Institutional Scaffolding**: democratization of *knowledge production* and *auditable enforcement*.

Histórico de superfície de água no **Brasil** Mha



Without structural change, reforms remain ceremonial rituals of regret.

Classificação dos corpos hídricos

 **0,3%**  
AQUI-CULTURA  
50.771 ha

 **0,3%**

 **16,8%**  
HIDRELÉTRICAS  
3.070.916 ha

 **5,3%**  
RESERVATÓRIOS  
969.397 ha

 **77,3%**  
SUPERFÍCIE NATURAL

 **-2 Mha**  
SUPERFÍCIE DE ÁGUA INFERIOR A MÉDIA  
Em relação a média dos 10 anos anteriores

**23%** SUPERFÍCIE DE ÁGUA ANTRÓPICA (COM INTERVENÇÃO HUMANA)

 **53%**  
DAS SUB-BACIAS HIDROGRÁFICAS

Apresentaram redução na superfície de água em 2023



Thank you. I welcome  
your comments.