

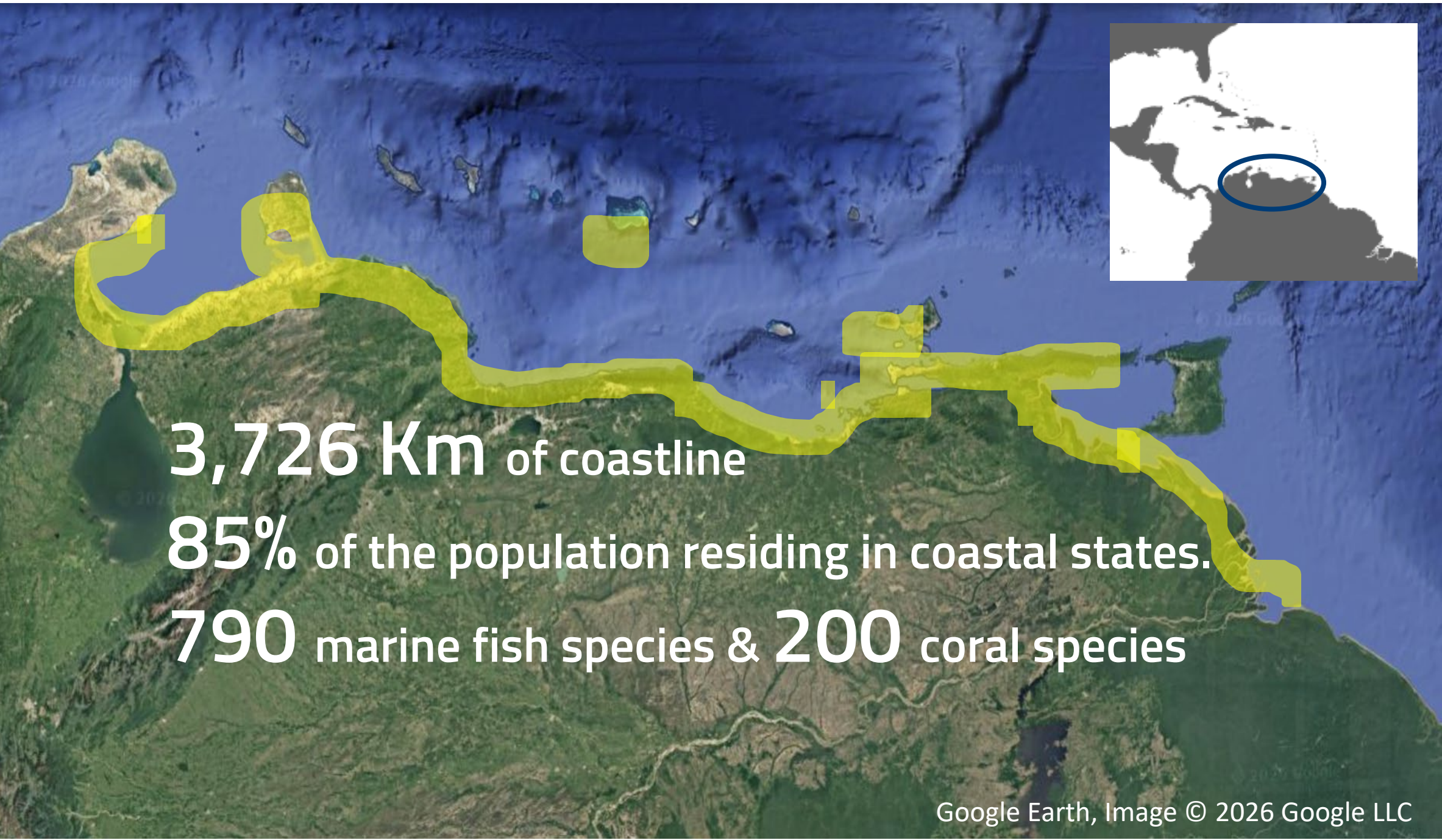
Socio-Ecological Vulnerability in Venezuelan Coasts

Integrating Ecological Data and Social Perceptions (2010 - 2025)

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Convergence of crises in Southern Caribbean Coastal Systems

Venezuela’s coastal socio-ecological systems (SES) are currently facing widespread instability due to converging chronic stressors. This degradation impacts all marine ecoregions, where social adaptive capacity has been critically compromised as a consequence of ongoing institutional and economic crises.



70% GDP decline & 90% food insecurity,
driving reactive, high-risk survival strategies that widen the chasm between institutional governance and local reality.

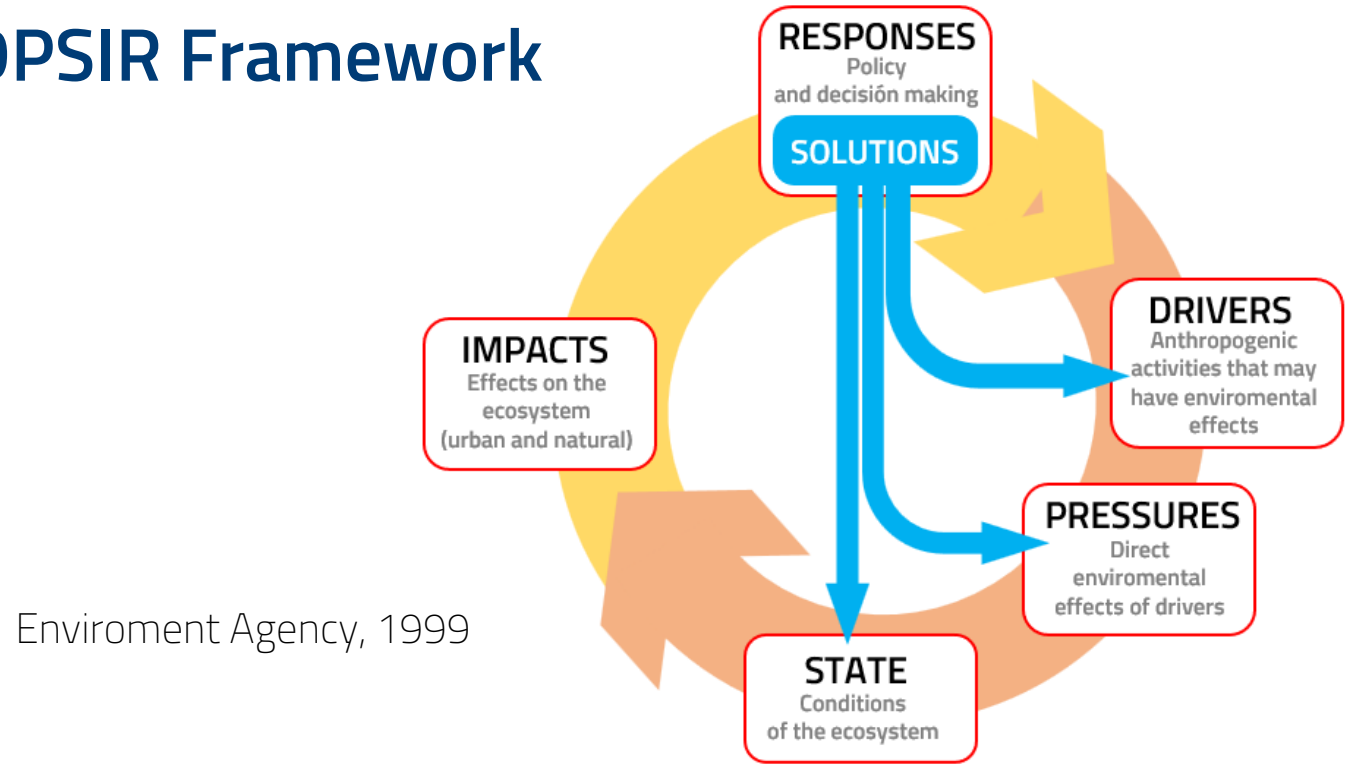
3 invasive species,
undermining reef structural integrity and disrupting ecological succession.

~10 million people in a “biological blind spot”,
concentrated across 3 major cities, this **Urban-marine disconnection** fracturing the biocultural bonds essential for effective ecosystem stewardship.

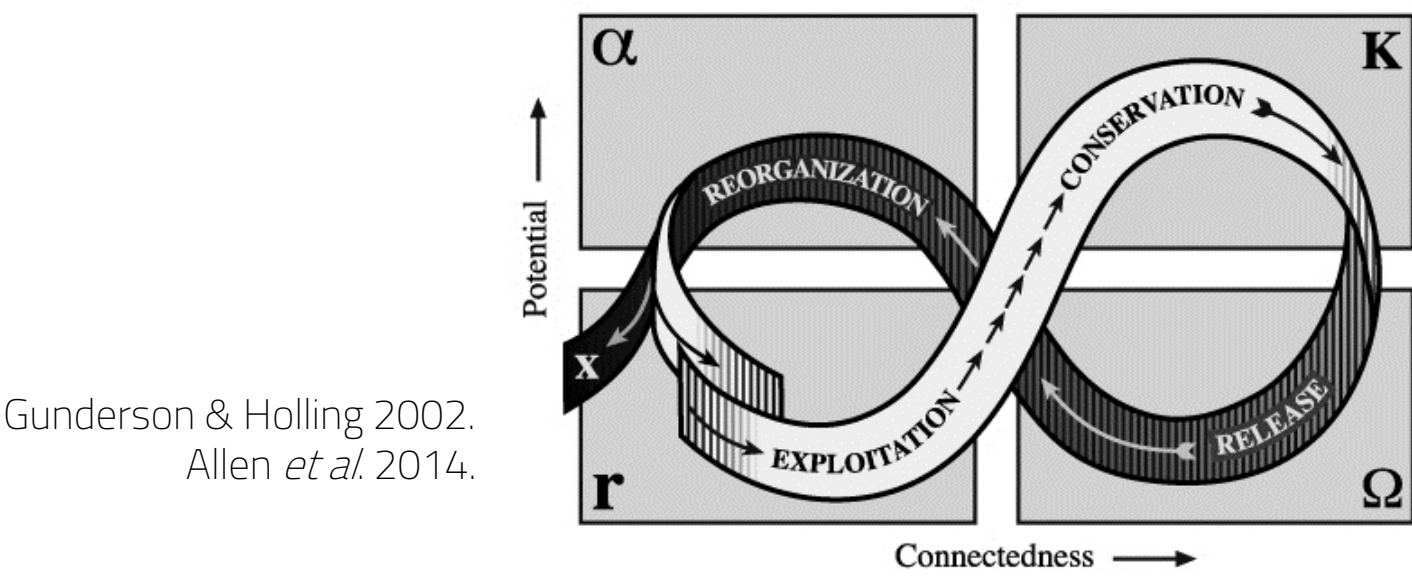
Dual earthquake 7.1 & 7.5 Mw;
24th June 2026 shattered physical infrastructure and paralyzed social agency. Drawing on evidence from research and fieldwork led by the Human Ecology Laboratory, this study identifies recurring patterns of vulnerability and key resilience factors to propose concrete, actionable strategies for systemic recovery

Methods: Integrated analytical frameworks applied to data from seven case studies*

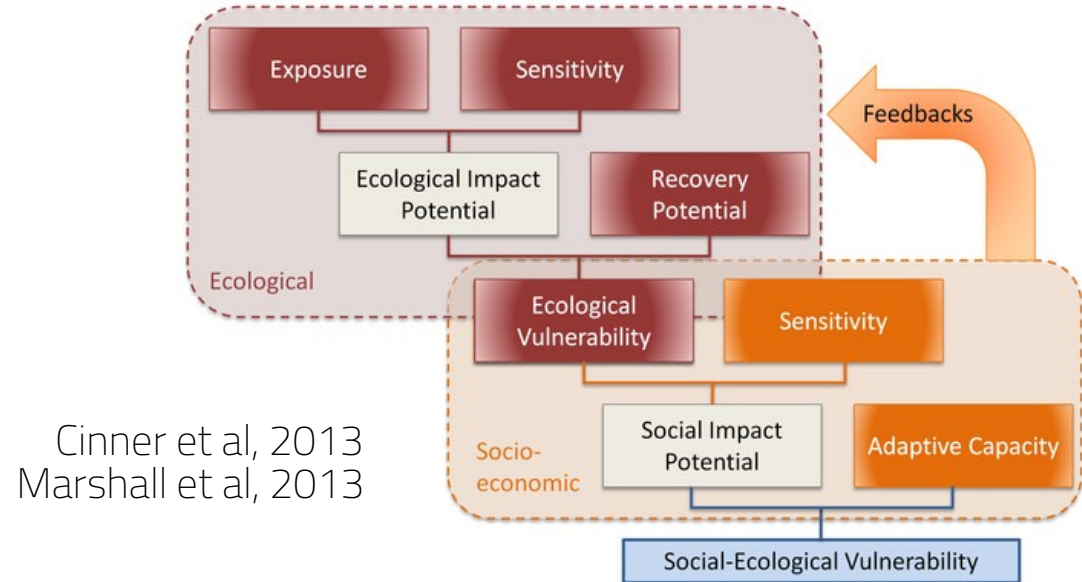
DPSIR Framework



Panarchy (Adaptive Cycle)



Socioecological Vulnerability



Metacommunities and metaecosystems
Leibold & Chase, 2018

Basic Sustainability Units (UBS)
Leibold & Chase, 2018

*All case studies were conducted by the Human Ecology Laboratory (IZET-UCV). They were focusing on socio-ecological vulnerability in coastal communities, invasive species dynamics, Caribbean benthic regime shifts, reef-urban basin monitoring, and recent post-seismic assessments.

Patterns of vulnerability convergence

Pre-earthquake SES vulnerability index ranged from 0.5 to 0.8, driven by high ecological sensitivity and low social adaptive capacity.

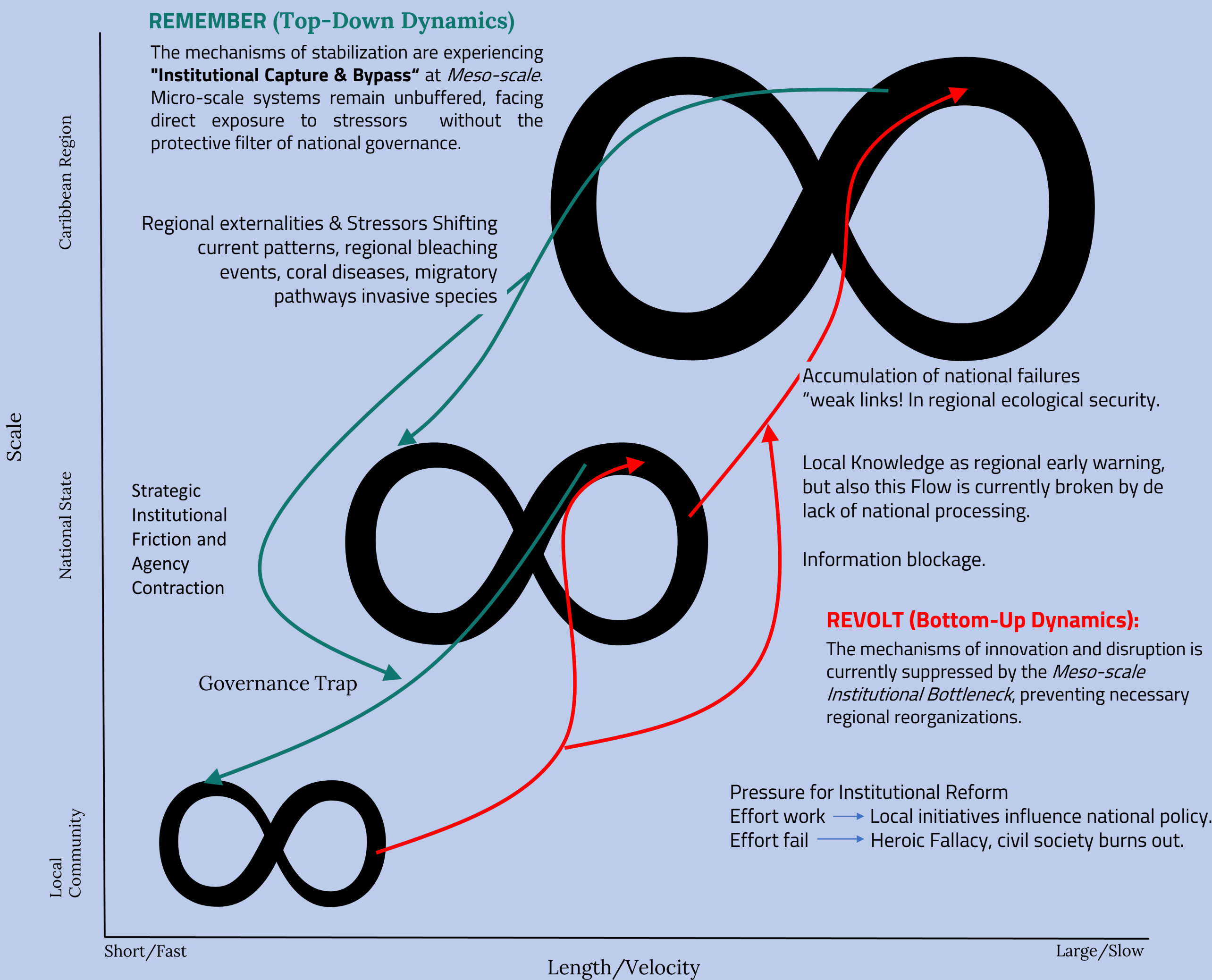
Local survival strategies (overfishing, mangrove deforestation) bypass regional management. Aggregated “eco-suicide” behaviors accelerate trophic collapse and regime shifts.

Scale decoupling. National governance shows traction only in managed fisheries. Higher-magnitude processes (e.g., benthic shifts) exceed local governance capacity, rendering isolated interventions ineffective.

Biological Blindness. A “radar of social indifference” towards non-commercial invasive species (seagrass or octocoral species) perpetuates irreversible degradation until ecosystem benefices collapse.

The Lionfish invasive species paradox: conventional market-based management fails. Sustained economic incentives require deliberate institutional design, contrasting with failed subsidy-based approaches.

Proposed Hierarchical Adaptive Model for Venezuelan Coasts



Venezuela local community core:

Resilience in this SES is multiplicative, defined as:

$$R_{SSE} = A \times I \times \Psi$$

A = Agency: finance, resources & human capital.
I = Institutional Framework: governance, rules & continuity.
Ψ = Psychosocial filter: identity, bio-affinity & care reciprocity.
Actually:

- Migratory and other collective griefs.
- Solastalgia: Adaptive paralysis due to the loss of home.
- Eco-suicide: survival strategies when agency is lost.

We interpret the current efforts of Venezuelan civil society as a *Social-Ecological Metacommunity Source – Sink dynamic*: less affected urban “Sources” centers divert resources to coastal “Sinks” communities.

The problem is this buffer has reached an **operational asymptote**. The model currently relies on **resource extraction** (charity/volunteerism) rather than **network reconfiguration**

We observe a critical threshold:

$$A \rightarrow 0 ; I \rightarrow 0 ; \Psi \rightarrow 0$$

This co-occurrence creates a state of systemic nullification where resilience collapses, locks the system in a **Poverty and Inertia Traps**.

Proposal: El Mar en la Ciudad / The Ocean in the City Program

The initiative focuses on activating connective identity, co-designing solutions, and fostering horizontal value transfer.

PILLARS

The program operates through:

Cultural Stewardship:
fostering community ownership of the landscape
community ownership of the landscape.

Urban-Coastal Metabolism:
Managing the resource Flow between city and sea.

Open Basin Governance:
Management of watersheds.

SCALABILITY AND SOCIAL COHESION

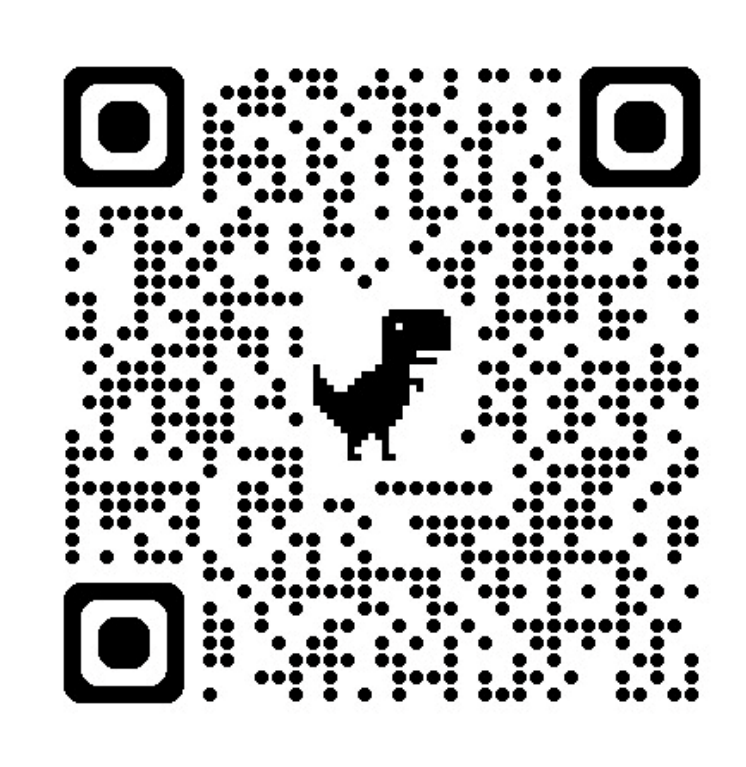
Replicable in any city by linking the program to its specific watershed. Social cohesion through:

Scientific Rigor & Socio-ecological Management
Strategic Urban Planning
Gastronomy & Conscious Consumption
Psychosocial Health
(griefs and community identity)

We enhance a network of Basic Sustainability Units (BSUs) through an Urban Basin System (UBS) protocol.

It is a management tool specifically designed to operate under conditions of high institutional friction, defined at Blue City standard, scalable to any economic sector, to reverse systemic nullification and foster a regenerative network

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technical resources, and collaboration opportunities.



Knowledge coalition, to eradicate environmental blindness and build identity capacity near or close the sea

