Why Conservation Projects Fail in Living Coastal Systems

What Samaná Bay Reveals About Complexity, Legitimacy, and the Limits of Good Intentions

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Executive Reflection

For much of the past two decades, I have watched coastal conservation get framed as a technical challenge. Improve enforcement. Strengthen the science. Mobilise finance. Engage communities. Outcomes will follow. The global record shows, repeatedly and at scale, that this framing is incomplete. Comparative analyses of protected areas and coastal governance reforms consistently show that technical quality alone does not predict long-term success (Ostrom, 2009; Berkes et al., 2003; Ferraro & Hanauer, 2014).

Across regions where I have worked — Africa, Southeast Asia, the Caribbean — well-funded, well-designed conservation projects continue to underperform in places where biodiversity is still high, livelihoods are still ecosystem-dependent, and development pressure is still accelerating. The issue has never been a lack of effort, intelligence, or commitment. It is a structural mismatch between how these systems actually behave and how the interventions designed to improve them are conceived (Holling, 2001; Levin et al., 2013).

This paper is the opening argument in a series built around Samaná Bay, Dominican Republic. Samaná is not exceptional. It is revealing. It shows, with unusual clarity, what happens when conventional conservation logic meets a living system — a system that was already moving long before the first project arrived.

The Problem Is Structural, Not Technical

Most failed or stalled conservation initiatives do not collapse because the science was wrong, the budgets were insufficient, or the goals were unclear. Meta-analyses of conservation impacts show that many technically sound interventions deliver weak or inconsistent outcomes once implemented at scale (Ferraro & Hanauer, 2014; Pullin et al., 2013). What they share is a mismatch between the design assumptions embedded in the project and the system the project is trying to change.

Living coastal systems are already governed — formally and informally — by overlapping rules, incentives, power dynamics, histories, and expectations. Any new intervention enters an already-moving system. This is the starting observation of social-ecological systems theory, and it has been confirmed in enough field contexts to be treated as foundational (Berkes, Colding & Folke, 2003). When projects assume that introducing a new plan, committee, enforcement mechanism, or financing stream will automatically improve outcomes, they overlook that systems respond to interventions, often in ways the designer never anticipated (Holling, 2001).

Rules generate workarounds. Enforcement generates avoidance. Funding generates competition. New institutions reshape power. None of these responses is malicious. They are

adaptive — a pattern documented consistently in fisheries governance, forest management, and protected-area reform across the world (Ostrom, 1990; Cinner et al., 2012). The system is not resisting the intervention. It is responding to it. These are different problems with different solutions.

In Samaná, I have observed this dynamic operating at multiple scales simultaneously. Fishing communities adapt spatially when a zone is closed. Tourism operators adapt temporally when regulation is inconsistent. Local officials adapt politically when enforcement creates constituency risk. Each adaptation is rational. Taken together, they produce outcomes that no one intended and no one is managing.

Coastal Systems Are Complex, Not Complicated

A distinction that gets neglected in practice — though it is foundational in systems theory — is the difference between complicated and complex. A complicated system, like a jet engine or an engineering project, can be broken into constituent parts, optimised separately, and reassembled. Expertise accumulates. Errors can be traced. Solutions, once found, hold (Holling, 2001; Levin et al., 2013).

A complex system cannot be disaggregated this way. Its behaviour emerges from interaction, feedback, and adaptation rather than from linear cause-and-effect. The same intervention, applied at different times or in different relational contexts, produces different outcomes. History matters. Sequence matters. Small actions can trigger disproportionately large effects (Scheffer et al., 2009). Pressure accumulates invisibly until thresholds are crossed (Scheffer et al., 2001). And people adapt faster than rules (Ostrom, 2009).

Samaná Bay makes this distinction visible. What appears at first glance to be a marine conservation challenge — whales, tourism, fisheries — is in fact a ridge-to-reef socio-ecological system. Forests, watersheds, wetlands, mangroves, seagrass beds, nearshore reefs, fisheries, port infrastructure, tourism operators, municipal politics, national investment agendas, and international markets all interact (UNEP, 2019). A decision made about upland agriculture changes sediment load in rivers. A change in sediment load affects mangrove health. A change in mangrove health affects nursery function for fish populations. A change in fish populations affects the livelihoods of coastal communities whose cooperation any conservation programme depends on.

These are not side effects or externalities. They are the system. Any governance architecture that treats the marine environment in isolation from the terrestrial landscape that feeds it is not simplifying the problem — it is misunderstanding it.

This is why parallel projects — even technically competent ones — can collectively produce weak results. Each may be rational in its own logic and still misaligned in aggregate. The system experiences not a set of coordinated interventions but a set of competing signals, each with its own authority, timeline, and theory of change. The result is fragmentation, and fragmentation in a complex system is not merely inefficient. It actively undermines the coherence that resilience depends on.

Why Fragmented Success Still Produces System Failure

One of the most striking patterns I have observed in Samaná is not failure but fragmented success. Civil society organisations are strong, credible, and deeply rooted. Scientific research on whales, mangroves, and coastal ecology is substantive and growing. Communities are engaged, articulate, and historically connected to the bay's ecological rhythms. Government institutions exist and carry legal authority. Tourism generates significant revenue. International attention is genuine and growing.

The system remains fragile. Governance authority is distributed without being integrated. Knowledge is produced without being applied. Finance is arriving without institutional foundations capable of directing it. Institutions are performing their mandated functions without anyone managing the relationships between them.

This pattern mirrors what has been documented across coastal regions globally, where sector-specific success fails to translate into system-level resilience (OECD, 2016; Berkes et al., 2003; Walker & Salt, 2006). Each actor operates within their own mandate, logic, and survival constraints. Projects run alongside one another. Monitoring systems generate data that governance bodies cannot act on. Enforcement bodies apply rules that communities have had no part in designing. Finance flows toward what can be measured rather than toward what matters most.

What I have concluded from observing this pattern in Samaná and in comparable systems elsewhere is that alignment matters more than excellence. Ten technically competent projects pulling in slightly different directions do not produce one coherent system (Levin et al., 2013; Meadows, 2008). They produce a more complicated version of the fragmentation that was already there. The question is not how to improve each project individually. It is how to build the shared system logic that allows individual efforts to reinforce one another.

The Hidden Role of Legitimacy

Legitimacy is the most under-acknowledged driver of conservation outcomes and, in my experience, the most poorly designed for. Empirical studies in environmental governance are consistent on this point: compliance is driven less by fear of punishment than by perceptions of fairness, trust, and procedural justice (Tyler, 1990; Lockwood et al., 2010). Systems that generate voluntary compliance can function effectively with relatively modest enforcement capacity. Systems that rely primarily on coercion require escalating enforcement simply to maintain the same result, and they erode trust in the process.

In Samaná, what I have observed repeatedly is that governance is experienced by many actors not as an integrated system but as a series of disconnected signals. Regulations exist on paper but are applied inconsistently. Enforcement occurs in some zones and seasons but is absent from others. Permits are issued through processes that communities find opaque. Decisions about development concessions are announced without prior consultation. Each of these experiences accumulates. Trust erodes incrementally, and once it erodes past a certain threshold, compliance becomes strategic rather than normative. People follow rules when watched and when convenient. They adapt when enforcement is absent. The system begins managing appearances rather than behaviour.

The deeper problem is that legitimacy cannot be imported, declared, or funded into existence. It must be built locally, slowly, and visibly — and it must be built before governance structures harden (Ostrom, 1990; Berkes, 2009). This is foundational to co-management and polycentric governance theory. A governance platform that is established through legal decree before communities recognise its authority will spend its first years managing resistance rather than managing the bay. A financing mechanism deployed before actors trust the institution administering it will generate competition rather than cooperation.

For Samaná, this means that the sequencing question — what must happen first — is not a planning detail. It is the central design variable.

Why Human-Centred Design Is a System Methodology, Not a Consultation Exercise

Human-centred design is persistently misunderstood in conservation and natural resources management. It is framed as participation, stakeholder engagement, consultation — as a process box to tick on the way to implementation. In complex systems, this framing is not merely insufficient. It produces actively misleading project designs.

Human-centred design, applied seriously, is a methodology for understanding how people actually experience constraints, incentives, risks, and trade-offs — as distinct from how policies imagine they do (Brown, 2009). It begins with lived experience, works through the tensions and contradictions that emerge when different actors inhabit the same system from different positions, and generates design solutions that are shaped by the problem as it actually exists rather than as it was assumed to exist during project design.

Research across environmental governance and institutional reform confirms that systems designed without this understanding systematically generate resistance, avoidance, or symbolic compliance (Reed, 2008; Kenter et al., 2016). The rules look coherent. The logic is sound. Enforcement is technically possible. And actors find ways around the rules that enforcement cannot practically address, because the rules were designed for a system the designers were imagining rather than the one they were trying to govern.

In Samaná, the diversity of lived experience within a single bay system is striking. An upland farmer managing a small plot on the watershed edge inhabits a fundamentally different reality from a whale-watching operator managing a boat on the bay. A municipal official in Las Terrenas navigating political pressures inhabits a different reality from an enforcement officer making daily decisions about whether and how to apply regulations that are inconsistently backed. A community fisher whose family has worked the bay for three generations inhabits a different reality from an international conservation scientist producing peer-reviewed research on the same ecosystem. Each of these realities is legitimate. Each shapes behaviour. Governance designed without engaging all of them will produce rules that work for some actors and fail for others — and in a complex system, partial failure propagates.

Human-centred design does not slow progress. It identifies and resolves problems during the design phase that would otherwise emerge during implementation, at far greater cost and difficulty (Andrews, Pritchett & Woolcock, 2017). In complex systems, this is not a luxury. It is the difference between governance that functions and governance that performs.

The Sequencing Trap: Right Actions at the Wrong Time

The failure mode I encounter most frequently in conservation practice is not designing the wrong thing. It is designing the right thing at the wrong time. Sequencing is treated as a logistical question — what should happen after what? In complex adaptive systems, it is a causal variable. Sequence determines what a system is capable of absorbing, and systems that are asked to absorb change they are not ready for respond through resistance, capture, or collapse rather than through the intended transformation.

The evidence from institutional reform and conservation finance is consistent on this point. Governance reforms introduced before the trust and relational foundations exist to make them legitimate harden opposition rather than enabling cooperation (Andrews et al., 2017). Financing mechanisms introduced before governance credibility is established concentrate benefits among actors with existing access rather than distributing them according to stewardship contribution (Ferraro & Hanauer, 2014). International designations pursued before institutions are demonstrably functional become symbolic rather than transformative. In each case, the intervention is not wrong in principle. It is wrong in time.

Samaná sits at a critical moment in this regard. Pressure is accelerating. Development trajectories around Puerto Duarte and the Samaná Bayport are forming rapidly. Ecological thresholds in the bay have not yet been crossed — but the window for preventive governance is narrowing with each month that passes. Port infrastructure nearing completion is creating path dependencies: once economic momentum accumulates around a high-volume, high-throughput model, the political and institutional cost of redirecting it rises sharply (Arthur, 1989).

The sequencing logic that I have found most useful in thinking about Samaná is this: governance permission must precede governance architecture. Governance architecture must precede conservation finance. Conservation finance must precede international designation. Each of these transitions requires demonstrable function at the preceding stage before the next can be introduced without risk of distorting what came before. Skipping stages does not accelerate outcomes. It shifts the failure to a later, more expensive, and less recoverable point in the trajectory.

What Samaná Reveals

The most important insight from extended work in Samaná Bay is this: the bay does not suffer from a deficit of concern, commitment, or capability. What it lacks is a shared space where legitimacy, authority, knowledge, and economic power can be brought into alignment without triggering the defensive responses that fragmented governance produces.

Civil society organisations in Samaná are among the strongest I have encountered in the Caribbean. Ecological knowledge of the bay is substantive. Institutional authority exists across relevant agencies. Community attachment to the bay's ecological and cultural identity runs deep. Economic interest in conservation is growing, driven by the clear connection between ecosystem health and tourism value. These are the raw materials of a functional stewardship system. They have not yet been organised into one.

This is a systemic condition, widely observed in complex coastal systems globally (UNEP, 2019; OECD, 2016; Folke, 2006). The gap between existing capacity and functioning governance is not

filled by adding more projects, more monitoring, or more enforcement. It is filled by creating the coordination architecture — the shared institutional platform — that allows existing efforts to reinforce one another rather than running in parallel. That architecture must be built with the people who will use it, on terms they recognise as legitimate, at a pace that governance readiness can absorb.

What the Samaná Bay experience reveals about complex coastal systems more broadly is that the preconditions for effective conservation governance are political and relational before they are technical. They require the slow, patient work of building shared understanding, negotiating institutional roles, and generating the procedural trust that compliance depends on. This work is rarely funded. It rarely appears in project logframes. It is almost always where the actual leverage lies.

A Different Way Forward

This paper does not propose a plan for Samaná Bay. That is a deliberate choice, not a gap. In complex adaptive systems, solutions cannot be imported or imposed as fully formed architectures. They must emerge through co-design once the permission exists to design together, and once the diagnostic work has been done to understand what the system is actually doing and why (Ostrom, 2009; Berkes et al., 2003).

What can be said with confidence — drawn from field experience, systems theory, and the comparative literature — is that any viable governance pathway in a complex coastal system like Samaná will be built around a small number of sequenced principles. Legitimacy must precede authority. Governance must precede finance. Integration must precede scale. And learning must precede certainty. The sequence is not arbitrary. Each condition is load-bearing for the next.

The papers that follow in this series develop each of these principles in detail, grounded in what I have observed in Samaná and informed by evidence from comparable systems globally. They are arguments in development, not settled conclusions. Samaná is still at a stage where the governance window is open. What this series documents is the reasoning that should guide how that window is used.

Closing Reflection

Several years ago, I stepped away from conservation work because I had stopped believing that donor-driven project architectures matched the realities I was seeing on the ground. Returning through Samaná Bay has been a clarifying experience. The problem was never commitment, or intelligence, or the state of the science. It was system design — specifically,

the persistent mismatch between how interventions are structured and how living systems actually behave.

Samaná does not need saving. The bay's ecological and cultural foundations are still largely intact. What it needs is stewardship designed for how living systems actually work: adaptively, relationally, sequentially, and with the patience that governance legitimacy requires.

That is a harder design brief than most conservation programmes are currently configured to deliver. It is also the only one with a credible track record.

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