

Ecosystem restoration: What if we build it, but they don't come?

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I'm of two minds about restoration. On one hand, I'm amazed and encouraged by the advancements made in fixing some of the damage we've done to marine habitats such as salt marshes, seagrasses, mangroves, and coral and shellfish reefs. New technologies and knowledge are creating possibilities we could only dream of in the past. On the other hand, I worry about our hubris, and whether we are really fixing the damage done, or just creating the illusion that we can successfully reconstruct healthy, functioning ecosystems. And I worry that, if this illusion is accompanied by the deception that restoring ecosystems is easy, we pave the way for wholesale pillaging of the earth.

Just a few weeks ago President Salvador Sanchez Ceren of El Salvador urged the UN General Assembly to support a UN Decade for Ecosystem Restoration from 2021-2030. This came out of the Bonn Challenge, meant to rally the world's nations to restore damaged forests, and is based on good progress already being made in Latin America through Initiative 20x20: *Healthy Lands for Food, Water and Climate*. But do we really know how to clean up the messes we make? Can we really make things right again after we raze the mangrove forests, dredge the seagrass beds, 'reclaim' land from the sea, armor our shorelines, and otherwise wreak havoc on nature?

I want to be optimistic, enthusiastic, encouraging. We could use more of that these days. But there are so many anecdotes that point to our failures in restoring ecosystems. We can recreate structure, and we do that well. But ecosystems are living, dynamic, and sometimes unpredictable things, and we rarely get the underlying dynamics right. We can reintroduce foundational species, but cannot begin to restock the system with the myriad microbial, plant, invertebrate, and vertebrate species that were once there. We built it, but they don't come....

Restoring the mud engine

Mangrove 'restoration' is a case in point. What passes for mangrove restoration in many parts of the world is tree planting. We're lucky that mangrove seedlings take well, and we're encouraged by how fast, and at what little cost, we can 'restore' a mangrove forest. But creating mangrove plantations does not equate to recreating mangrove ecosystems. And if one doesn't take care to understand why mangrove disappeared from a place, it is a fool's errand to plant seedlings in disturbed areas. We saw this with failed mangrove restoration in West Africa – great photo ops with community members and children delicately planting seedlings, only to have them die weeks later because the hydrological conditions were not conducive to mangrove. Jan van Dalssen, a Dutch ecologist formerly from Deltares, once explained to me why it is necessary to 'restore the *mud engine*' before bringing back plant and animal life when we attempt to restore wetlands. By this he meant that we need to understand the underlying hydrology and sediment transport, and the reasons mangrove or other wetland species died. Fix those problems first, then plant and reintroduce – then and only then can you hope for the best.

There are lots of examples where wetlands are being restored this way – dam removal to restore river flows, putting oxbows back in channelized rivers to promote natural water flows and sediment transport. But usually these are small patches of disturbed wetlands that then can be woven back into a larger mosaic of functioning wetlands across a wide scale. At the opposite end of the scale spectrum, when restoration is required across the wide scale it is a hugely expensive business. Look at the Florida Everglades restoration, 18 years, US\$16.4 billion and counting....

Among marine systems, our track record is best at bringing back stands of mangroves and patches of wetlands. But exciting new initiatives are having success at re-establishing seagrass beds, patching damaged coral reefs, and bringing back oyster reefs. Perhaps that's not surprising: these small wounds to marine ecosystems are generally the result of a single pressure or event such as dredging, ship grounding, or overexploitation. We can abate the pressure relatively easily, rebuild the structure, and let nature restore the processes that were once there.

But despite our progress, and our aspirations, we aren't very good at true restoration. We've gotten better and better at reconstructing damaged structure (planting trees or grasses, cementing living corals onto artificial reef platforms, etc.), but we have trouble bringing nature – in all its glory – back.

Letting nature heal herself

What we have gotten truly better at is enhancing degraded areas: that is, taking steps to ease the pressure(s) that lead to degradation and loss and letting nature rebound. One example is beach restoration. Beaches generally get a bad rap in the marine conservation and management community. They are recognized as having huge value for tourism and recreation, but they are largely ignored for their ecology and importance to the larger set of interconnected habitats of coastal systems. Unstable beaches can have knock-on effects on seagrass, coral reefs, and other important marine habitat – not to mention huge costs to municipalities, private landowners, and tourist resorts. For years the response to beach erosion was beach nourishment – a temporary quick fix. In fact, beach nourishment is only necessary when we muck things up so badly that coastal processes can no longer maintain dynamic natural beach systems. Now coastal engineering has elucidated ways to give nature a kickstart on recuperating, using flow-through groins and submerged breakwaters.

At a recent public hearing in Barbados, I was presenting plans on behalf of a coastal engineering firm hired by a developer to stabilize and widen a beach. After my talk I was taken to task by a marine ecologist colleague whom I very much admire. She didn't attack me for what was being proposed. She attacked me for my language: my claim that mitigating beach erosion, placing submerged structures offshore to be colonized by corals, and improving the drainage (and thus run-off issues) could amount to "enhancement". She found it distasteful to claim that humans could improve on nature.

I wasn't in a position to debate her, but I was listening. And it made me wonder. We accept that we have immense power to destroy nature. We pretend we have immense power to recreate nature. But we think it's disingenuous to propose to help nature.

I say let's drop the hubris and embrace the idea of enhancement. We may not be very good at restoring nature, but nature is good at restoring herself, if we let her.

Photos of the Holetown Waterfront Improvement Project (HWIP). Photo credits: Matthew Armstrong, Baird & Associates.

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