Ecology Without Wilderness: Tending the Global Garden We Call 'Nature'

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Too often, ecologists focus on attaining an ideal that's no longer possible. An excerpt from the new book, Rambunctious Garden.

We have lost a lot of nature in the past three hundred years--in both senses of the word lost. We have lost nature in the sense that much nature has been destroyed: where there was a tree, there is a house; where there was a creek, there is a pipe and a parking lot; where there were passenger pigeons and Steller's sea cows, there are now skins and bones in dimly lit museum galleries. But we have also lost nature in another sense. We have misplaced it. We have hidden nature from ourselves.

Our mistake has been thinking that nature is something "out there," far away. We watch it on TV, we read about it in glossy magazines. We imagine a place, somewhere distant, wild and free, a place with no people and no roads and no fences and no power lines, untouched by humanity's great grubby hands, unchanging except for the season's turn. This dream of pristine wilderness haunts us. It blinds us.

Many ecologists spend their lives studying the most pristine places they can find, and many conservationists spend their lives desperately trying to stop wilderness from changing. We cling to fragments of "virgin" or "old growth" forests, to the "last great places," the ever-rarer "intact ecosystems," but they slip through our fingers. Like slivers of soap, they shrink and disappear. And we mourn. We are always mourning, because we can't make more of such places. Every year there are fewer of them than the year before.

Yes, nature is carefully managed national parks and vast boreal forest and uninhabited arctic. But nature is also the birds in your backyard; the bees whizzing down Fifth Avenue in Manhattan; the pines in rows in forest plantations; the blackberries and butterfly bushes that grow alongside the urban river; the Chinese tree-of-heaven or "ghetto palm" growing behind the corner store; the quail strutting through the farmer's field; the old field overgrown with weeds and shrubs and snakes and burrowing mammals; the jungle thick with plants labeled "invasive" pests; the carefully designed landscape garden; the green roof; the highway median; the five-hundred-year-old orchard folded into the heart of the Amazon; the avocado tree that sprouts in your compost pile.

Many conservationists are opening up their definitions of nature and embracing a whole suite of possible goals beyond the familiar "pristine wilderness" goal. They find that when they do, they can use all sorts of new tools and approaches. But even those who are interested in expanding their conception of nature run into problems. The notion of a stable, pristine wilderness as the ideal for every landscape is woven into the culture of ecology and conservation--especially in the United States. Take the baseline. Virtually every scientific study of environmental change uses or assumes a baseline. Baselines are reference states, typically a time in the past or a set of conditions, a zero point before all negative changes. In the past, a place's default baseline was often before Europeans arrived. Today, as we learn

more about how indigenous inhabitants of places from Australia to the Americas changed their surroundings, it is sometimes set to before any humans arrived. For many conservationists, restoration to a prehuman or pre-European baseline is seen as healing a wounded or sick nature. For others, it is an ethical duty. We broke it; therefore we must fix it. Baselines thus typically don't just act as a scientific before to compare with an after. They become the good, the goal, the one correct state.

But ecosystems are slippery, and setting a baseline is not straightforward. The Hawaiian islands are some of the remotest islands in the world, home to hundreds of species that live nowhere else, many of which are rare and at risk for extinction. Earlier ecologists might have used 1778, the year Captain James Cook landed in Hawaii, as the baseline date for the island chain. But restoring the islands' ecosystems to the way they were in 1777 would be restoring them to a state very much shaped by the Polynesians who had been living there for at least one thousand years: a semidomesticated landscape filled with species the Polynesians brought with them, including taro, sugarcane, pigs, chickens, and rats, and missing others, including at least fifty species of birds, who were hunted out by the first arrivals.

But if we set a date thousands of years back, safely before any humans arrived, we run into another problem. Ecosystems are always changing, whether humans are involved or not. Ancient forests with trees thousands of years old may feel timeless to us. We are a short-lived species with a notoriously bad grasp of timescales longer than a few of our own generations. But from the point of view of a geologist, a paleoecologist, or some other expert with "deep time eyes," ecosystems are in a constant dance, as their components compete, react, evolve, migrate, and form new communities. Geological upheaval, evolution, climatic cycles, fire, storms, and population dynamics see to it that nature is always changing. On Hawaii, volcanic activity wipes the slate clean on any given slope every few hundred years, and occasional new arrivals to the islands, washed ashore or drifting in on the wind, adapt to their new home and find a place for themselves in its ecosystems.

Once we pick a date from amid this muddle, another problem emerges. Even when we use all the scientific tools available to look backward in time, from fossil pollen records to the climate information enshrined in tree rings, we don't always know what places looked like thousands or even hundreds of years ago.

The final and perhaps most vexing issue with prehuman baselines is that they are increasingly impossible to achieve--either through restoration or management of wild areas. Every ecosystem, from the deepest heart of the largest national park to the weeds growing behind the local big-box store, has been touched by humans. We have stirred the global pot, moved species around, turned up the thermometer, domesticated a handful of plants and animals, and driven extinct many more. We have definitively changed the entire planet, and it is getting increasingly difficult to undo all these changes at any one place.

In Hawaii, the lush tropical plants out the hotel window looked gorgeous, but I knew that many of them had been introduced by people and were now considered a threat to the native species. I also knew that Hawaii has been called "the extinction capital of the world," and that a whole list of beautiful birds are either gone or near gone. And yet the islands are thick with conservationists who have not given up on the ideal of Hawaii as it once was.

My first stop was a group of experimental field plots testing the feasibility of restoring lowland forests on the Big Island's wet side. The plots are hidden in a forest on the Hawaii Army National Guard Keaukaha Military Reservation. Growing on flat land with plenty of rain, most forests of this type had

been cleared for agriculture. What was left, or what grew back, is now dominated by plants from places other than Hawaii.

Rebecca Ostertag of the University of Hawaii at Hilo explained why these "invaders" are so prevalent on Hawaii. Hawaiian plants, having evolved in isolation for up to 30 million years, generally grow slowly and use resources less efficiently than continental plants, which evolved with more competition. Similarly, Hawaiian birds and animals are mostly helpless against introduced diseases. Avian malaria has knocked off many bird species; there were no mosquitoes on the islands until recently, so birds there never evolved any defenses to the mosquito-borne disease. Hawaiian raspberries and roses have even lost their thorns, and Hawaiian mints their minty defense chemicals, because there were no plant-eating animals around to fend off. Such mellow Hawaiian species are pushovers for the scrappier mainland species that humans brought to the islands. Today half of the plants in Hawaii are nonnative. In many lowland forests only the large trees are native; under them grows a carpet of introduced seedlings, just waiting for the day the giant natives fall. Some ecologists call such places "forests of the living dead."

At the army base, mynah birds from Asia stood in the road. The air was soft and humid. Ostertag and I met up with her colleague, Susan Cordell of the U.S. Forest Service, and a graduate student named Joe Mascaro from the University of Wisconsin, Milwaukee. Together we headed out to the study plots. After hopping a fence intended to keep out feral pigs, we pushed through a jungle of foliage from everywhere: trumpet tree with its huge star-shaped leaves, a native of Mexico, Central America, and Colombia; bingabing, a small tree with big parasol-like leaves, from the Philippines; tasty strawberry guava, from the Atlantic Coast of Brazil; purple-flowered Asian melastome; "Koster's curse," a little shrub originally from Mexico and parts of South America; and albizia, another immigrant from Southeast Asia. Many of these species were introduced not only deliberately but methodically--aerially seeded in the 1920s and 1930s after large forest fires to prevent erosion. The experts figured that Hawaiian plants would grow too slowly to do the job effectively. The resulting cosmopolitan forest is green and dense, with creepers hanging everywhere. Underfoot, dead leaves like starched, crumpled brown napkins made a terrific crunch.

Suddenly we stepped into a clearing. Here plants were spaced widely apart, with black lava rock covered in chartreuse moss visible in between. This was one of the study plots: small squares in which every single non- native plant had been ripped out by hand. To get these spaces to a purely native state, researchers had to pull up and remove almost half the vegetation, a process that took about a week's worth of labor per thousand square feet for the initial clearing and epic bouts of weeding thereafter. As a result, the plots look a bit sad and empty, like someone's living room in the middle of a move-out.

Here, I could get a better look at the typically less showy Hawaiian natives, including tree ferns; lama, a hardwood in the ebony family; the vaguely Mediterranean-looking 'ohi'a tree with feathery bunches of bright red stamens; and the sweet-smelling maile vine, used for making fragrant leis.

The plots weren't created to be showplaces, however, but as experiments to see whether a native Hawaiian forest would bounce back if all the introduced species were removed. With all those aggressive tropical invaders exiled, would the native flora tap into the soil nutrients, rain, and newly available sunlight and grow vigorously to fill up the space? When I visited, it had been five years since the experiments began. Disappointingly, the mature native trees had grown very little. As Ostertag and Cordell put it, "The native trees may either be responding to the treatments very slowly and still undetectably, or they may be unable to respond at all." The researchers were pleased, however, to see quite a few native seedlings appear on the sun-dappled forest floor.

These removal plots were weeded out for a specific experiment. But they also represent, in miniature, what many conservationists would love to do for huge swaths of the planet: rip out the introduced species, make way for the natives, and return the area to the way it used to be, making the baseline the goal.

But their baseline just isn't achievable without spending a huge amount of money and time. "I think that people that are interested in protecting Hawaii's flora and fauna have resigned themselves to it being in postage-stamp-size reserves," said Cordell, sadly.

Of course, Osterag and Cordell's forest is in particularly bad shape. But are ecosystems that aren't so trashed perhaps redeemable? The answer is no, at least not in Hawaii. As we thrashed through the nonnative-dominated forest that encircled the weeded plots, Ostertag and Cordell mostly saw failure. But Joe Mascaro, the grad student who accompanied us, saw something less value-laden. He saw the future, and as an ecologist, he found it interesting. He saw plants interacting together in new ways, with new creatures dispersing their seeds, new competitions for resources. He expects that there will be some casualties when species come in contact for the first time--"local extinctions and whole ecosystem types that will evaporate," he predicts--but he does not expect that the resulting ecosystems will be worthless just because they are changed. They will still store carbon in the bodies of their trees, keeping it out of the atmosphere where it would contribute to global warming. They will still harbor many species. They will still smell cool and green. At the very least, he says, they should be studied, because they are probably more representative of today's Earth than any so-called "pristine" forest. "These ecosystems, like it or not, are going to be driving most of the natural processes on Earth," he says.

We are already running the whole Earth, whether we admit it or not. To run it consciously and effectively, we must admit our role and even embrace it. We must temper our romantic notion of untrammeled wilderness and find room next to it for the more nuanced notion of a global, half-wild rambunctious garden, tended by us.

Excerpted from Emma Marris's Rambunctious Garden: Saving Nature in a Post-Wild World (Bloomsbury USA)