Essay: Bailing Out Nature

How to keep nature solvent as global warming drains its reserves
By Anthony D. Barnosky

Nature, like money, is hard to do without, both pragmatically and emotionally. Pragmatically, it supplies ecosystem services valued at tens of trillions of dollars annually, like clean water, food, even wine. Emotionally, nature simply makes us feel good—so much so that people of all continents have protected 12 percent of Earth's land as nature reserves.

We set those places aside because at some basic level, nature hits that pleasure place in our brain, according to Yale psychologist Paul Bloom. And we want our children to find the same pleasures that we do.

The question nowadays is whether those pieces of nature we have left can survive the ever-growing pressures of humanity. Most recently, those pressures have come to include global warming.

The basic problem is this: we're making it too hot, too fast, and as global warming causes dramatic local climate changes inside the hard boundaries of our nature reserves, the species within them—many of them already endangered—will have no place to run to.

Global warming has already reduced populations of many kinds of species in crown-jewel nature preserves. In Yellowstone, the world's oldest national park, three-fourths of the common amphibian species are suffering dramatic reductions due to extended drought in the Northern Range. In Yosemite, half of the small mammals have shifted where they live in response to rising temperatures and as a result some mammal species are poised to disappear from the park—which hasn't happened since it became a park more than a century ago.

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It's a worldwide problem. In South Africa's Kruger National Park, the animals you expect to see—like roan antelope, tsessebe, and kudu—are getting scarcer and scarcer, apparently because the dry season is just getting too dry. As these big herbivores go, the big predators tourists flock to see will go too, along with many other species. Computer models suggest that in the next few decades in Africa, many species that have healthy populations now will be moved onto the endangered species list just due to the impacts of changing climate—not even taking into consideration simultaneous land-use changes that are destroying habitat. In the arctic, polar bears are on the brink, to the extent that their mating cycle is so disrupted that they are intermingling with grizzlies to produce the occasional pizzly bear, an evolutionary dead-end. Even Earth's biggest biodiversity bank, rainforests, seem likely to suffer vast losses of species under new climate regimes.

As a paleoecologist, I have spent my career trying to understand how animals and plants adapt to change, particularly climate change, and on that backdrop it becomes very clear that all these things are out of the ordinary. But you don't have to be a scientist to see what global warming is doing to nature. Take a drive from Denver to Grand Junction, Colorado. As you cross the Rockies, you'll see what used to be when I was growing up, verdant pine forests but which now are vast landscapes of dead, dry sticks—a result of pine beetle populations exploding because winter temperatures are no longer cold enough to keep the beetles at bay.

To put it in words we're used to these days, global warming is driving nature towards bankruptcy. And the traditional way we've tried to keep it solvent will no longer work, because the effects of global warming on species distributions and interactions, added to the long-recognized threats of habitat fragmentation, invasive species, and growing human population, already is draining nature's bank in a new way.

That promises to continue, if not accelerate, over the next few decades. Even if the most optimistic scenarios of the Intergovernmental Panel on Climate Change play out, by the year 2040 or so—when my kids are about the age I am now—Earth will

be hotter than it has been since humans evolved as a species.

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Bailing out nature under these circumstances is not impossible, but does call for a new perspective on what we are trying to save. Nature conservation up to now has taken a “one-stop-shopping” approach: save a big enough tract, and you automatically save all the species within it, their ecological interactions, and the feelings of nature and ecosystem services those ecological interactions provide.

In the Age of Global Warming, such one-stop shopping no longer will work. What it will take to save individual species and ecosystem services will be different than what it will take to save that pleasurable feeling that nature gives us.

Saving species is essential, of course, for many reasons, not least among them the moral imperative and to save ecosystem services. But the new problem is this: to save endangered species in a warming world we may be forced to move species trapped in places that are changing too quickly for them to survive—in essence, more and more human management of ecosystems. Already, conservation scientists are discussing plans for “assisted migrations,” in a Noah’s Ark approach that would move endangered species from climatically-unsuitable places to climatically-suitable ones. Prevailing ecological wisdom says introduced species do more harm than good; yet, what is the right choice when moving a species would save it from extinction?

Perhaps an even bigger conundrum is that moving species around is exactly the opposite of what is required to save the “real thing” of nature—places where the species were not put there by people, and where the interactions of species evolve without a heavy human hand.

How to bail out one aspect of nature (its species) without bankrupting another (its wildlands)? The answer may well lie in creating the concept of two separate-but-equal kinds of nature reserves. One kind, so-called “species reserves” will be needed to save certain species, even when the feeling of the wild has to be sacrificed. The other, “wildland reserves” will need to explicitly preserve natural ecological processes—that wild feeling—even as we watch individual species in such reserves disappear.

In species reserves, our children will see species we’ve saved, that otherwise would have gone extinct—but they will see that in zoos, too. In wildland reserves, they will experience that feeling of raw nature, even though the species they see there may not be the same ones we see today.

Other parts of the solution lie in keeping existing reserves intact, adding more where we can, and connecting as many natural areas as possible with migration corridors that allow species to move from one to the next as climate changes. And of course it is critical to slow global warming through methods that Congress is now debating and also through personal choices about how we use energy, such that we end up at the best-case warming scenario rather the worst-case.

But perhaps the most important thing to do at this stage is to recognize the enormity of what we actually lose if nature goes bankrupt. Yes, we lose trillions of dollars in ecosystem services, and we lose individual species. But also at risk are wild places themselves, places that feed the human psyche with a kind of pleasure that we are hard-wired to receive but can get from nothing else. Wallace Stegner maybe said it best: “We simply need that wild country available to us, even if we never do more than drive to its edge and look in. For it can be a means of reassuring ourselves of our sanity as creatures, a part of the geography of hope.”

As we strive to save nature in this age of global warming, it will be critical not to lose sight of that important emotional connection to wilderness in the race to make ecosystems produce for us and to save species. Ecosystem services, biodiversity, and wilderness form nature’s Holy Trinity. We could exist with the first two without the third. But the geography of hope lies in saving all three.

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