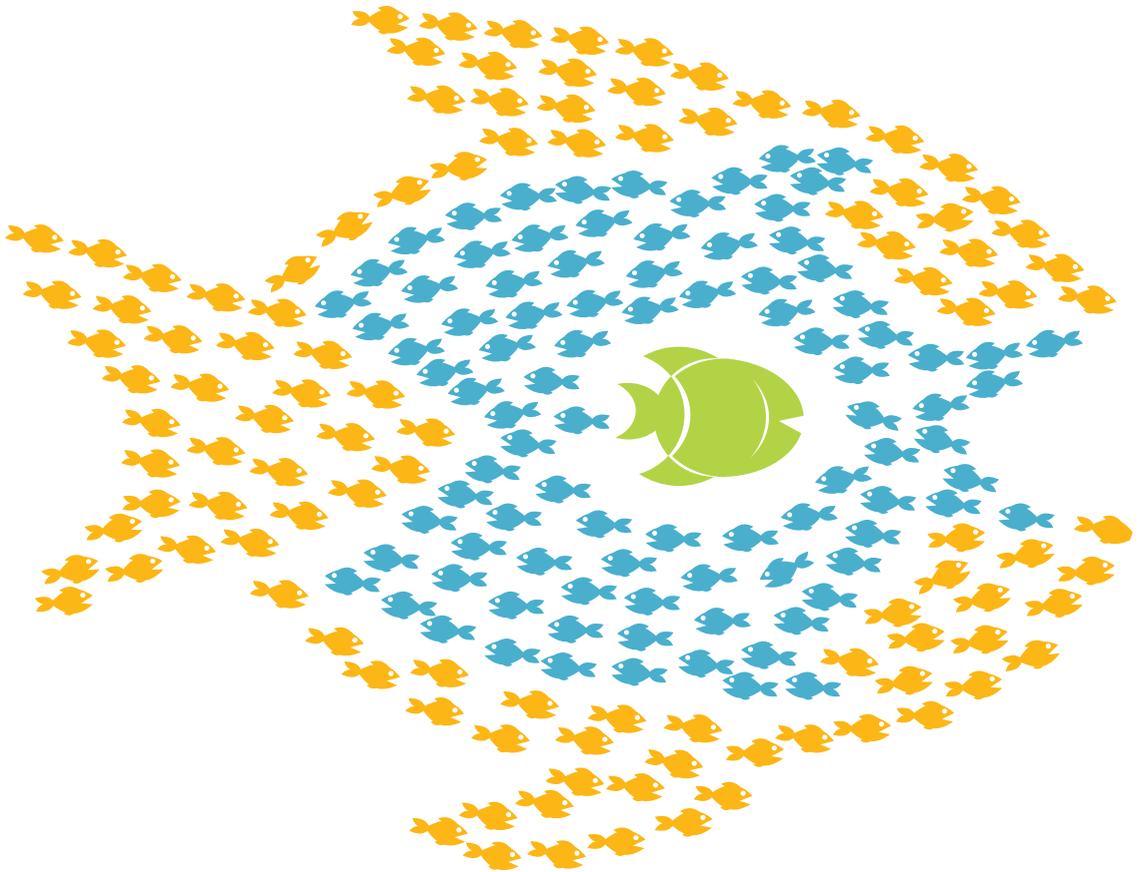


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JOURNAL



ELLIS Nature for the People / **BERNSTEIN** On Mother Earth and Earth Mothers / **MARRIS** Can We Love Nature and Let It Go? / **SHOME** Untapped Potential / **JUMA** Leapfrogging Progress

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NATURE FOR THE PEOPLE

TOWARD A DEMOCRATIC VISION FOR THE BIOSPHERE

BY ERLE C. ELLIS

Imagine a planet without wild places. A planet so covered with aquaculture, plantations, rangelands, farms, villages, and cities that wild creatures and wild places, if they still exist at all, linger only at the margins of working landscapes, cityscapes, and seascapes.

Is this the planet you want to live on? No matter who you are, I bet it's not. Your ideal planet would sustain both people and nature, leaving plenty of room for wild creatures to live and thrive in habitats free of human interference.

Why think about this? The answer is simple. If you aspire to live on a planet where wild creatures roam unhindered across wild landscapes, this is not the planet you are making. While times have likely never been better for most people, the opposite is true for the rest of life on Earth.

Less than one quarter of Earth's land remains without human populations or land use. Wild species, especially wild animals, are going extinct faster than they can be counted. The cause is mostly habitat conversion and loss, combined with unregulated hunting and resource use, pollution, competition with species transported from other parts of the world, and increasingly, global changes in climate.

The case has been made many, many times that transforming the planet in this way is ecologically, economically, and ethically unsustainable. These claims and their supporting evidence are important. Yet facts and rational arguments are not nearly enough to change the way things are going.

To sustain Earth's wild places and wild species into the deep future, an unprecedented level of social change will be required. The good news is that the roots of this great social transition are already evolving. By engaging with these evolutionary processes of sociocultural change, human societies might ultimately produce and sustain a far better world than the one we are creating now.

1.

This planet is the way it is because our societies made it that way. There is no control room on Earth. No one is in charge of the planet. And no one is intentionally destroying nature. People transform ecology to make a living. We humans, as individuals and societies, are shaping this planet while we are busy

making other plans. Planetary change is social change, and contemporary societies are transforming the world at rates and scales unprecedented for any other species in Earth's history. Such is the nature of the Anthropocene.

Human transformation of Earth is nothing new. As Earth's "ultimate ecosystem engineers," humans have always transformed environments to sustain themselves, using ever more complex tools, from fire and social strategies for hunting and foraging to domesticating species, grazing livestock, tilling soils, and building global supply chains to service urban supermarkets.

Since our species began to spread across the continents more than 60,000 years ago, human societies have grown in scale from a few dozen individuals to hundreds of millions. Through processes of cooperative ecosystem engineering, the potential productivity of a single square kilometer of land has gone from sustaining fewer than ten individuals supported by foraging and hunting to sustaining thousands through intensive agricultural practices. Energy use per individual has also scaled up by a factor of more than 20, from the burning of biomass to cook food to the use of fossil fuels and nonbiological energy sources (like solar, wind, and nuclear) to do our work. This energy now powers the flow of materials, energy, biota, and information across the globe, and human societies, as a result, have emerged as a force of nature.

These unmatched capacities to shape Earth's functioning are based on socially learned and socially enacted behaviors. Unlike beavers, ants, and other species whose abilities to alter environments by building dams and nests are biological, humans must learn from others how to hunt, farm, trade stocks, or even live together. Humans are ultrasocial — the most social species that has ever existed on Earth, unable to survive or to reproduce without learning how to live from and with others. It takes a social group, a village, a nation-state, or a global trading system for humans to make a living, or to transform an environment. And it takes social learning — culture — to make it all possible. Through millennia of social change and cultural evolution, human societies have accumulated cultural capacities that have enabled us to become very good at making Earth's ecology work for us.

Humans reshape environments through social processes that vary hugely both within and among societies and change as societies change. In some societies, most individuals engage directly in altering environments to sustain themselves, as with hunter-gatherers and subsistence farmers. In others, some farm, make things, or serve others, while some trade, tax, or govern. In this way, the myriad social processes that sustain humans and transform environments have come to function entirely through trust, cooperation, competition, and exchange among complete strangers through social networks that extend across an entire planet.

Current levels of inequality within and among societies may never have been greater than they are today. The demands of some individuals, social groups, and societies shape Earth's ecology far more than those of others. In this way, human transformation of environments might be chalked up to bad people doing bad things. Yet, the reality is far more complex.

Human societies, even some small bands of hunter-gatherers, have long been socially differentiated, with unequal sharing of power, resources, and opportunities among individuals and social groups structured through historically and culturally determined societal processes. Societies characterized by relatively equitable social relations have proven just as capable of mismanaging their ecosystems as the more unequal ones — witness the mass megafaunal extinctions caused by hunter-gatherers at the end of the Pleistocene. Moreover, like social inequality and harmful social relations, the patterns and processes of unsustainable environmental management and resource extraction reflect the social relationships, exchanges, and institutions of the societies that produce and sustain them.

As with the societies we live in, the planet we have inherited from our ancestors, and the one we are making now, is a social construct, shaped physically and culturally by the perceptions, values, aspirations, tools, and institutions of societies past and present. These social structures and processes have changed across generations as the cultural practices and institutions that produced them have evolved. In the Anthropocene, Earth's ecology changes with us. Environmental change is social change, and social change is cultural change.

2.

Though only about half of Earth's land is currently used for agriculture, forestry, settlements, and other human infrastructure, most of the remainder represents lower-productivity lands left unused for economic reasons. Look out any airplane window and the evidence is clear. The steep slopes of hills and mountains remain the lesser-used lands almost everywhere — islands of remnant and recovering vegetation lost in a sea of agriculture and settlements.

Earth as a whole is no different. The greatest areas still unused by us are its coldest, driest, and least productive regions — the Sahara, northern Siberia, and other major deserts and frigid polar regions — with the exception of remote areas of dense tropical forest in Amazonia and the Congo.

By the numbers, existing global conservation efforts appear robust, including designated protected areas covering about 15 percent of Earth's land. Some are quite large — a million square kilometers in Greenland (0.8 percent of Earth's land), half a million in the Sahara (0.4 percent), and between a third

and a half a million in southern Africa (0.2–0.4 percent). Some marine protected areas are even larger. Total global protection has also been increasing rapidly in recent decades. There are now hundreds of thousands of terrestrial protected areas around the world.

While these efforts to conserve habitats and wild species are vitally important, they reveal a troubling weakness. The parts of Earth we've protected so far have been the easy ones, the parts that mostly remained unused because they were too cold, dry, steep, or remote to develop cheaply. In contrast, Earth's most favorable climes and most fertile and accessible lands are for the most part already in use. We've taken the better half of Earth's land and left the rest.

Outside deserts and polar regions, the land we've left behind or protected is a patchwork of remnant and recovering habitats dispersed across and embedded within the engineered mosaics of used lands and infrastructure that sustain our societies. The EU has more than 120,000 protected areas, but more than two-thirds are smaller than 100 hectares. By fragmenting and shrinking habitats into ever smaller and less connected parcels, Earth's wild species have been subdivided into smaller, more isolated, and more vulnerable populations exposed to the myriad pressures and disturbances that come with proximity to human societies. This is especially true for the vertebrate species who, like us, require extensive habitats to survive.

It's hard enough to sustain wild habitats and wild populations in the small disturbed fragments we've marooned within our working landscapes. Yet we are making it even harder. With near certainty, global temperatures will rise by at least 2 degrees this century. To live within the habitats they are adapted to, some species are going to have to migrate hundreds to thousands of miles toward the poles in the coming decades. They will need to cross farmlands, cities, and highways to avoid extinction.

For these and other reasons, even if land use were kept just as it is right now, extinctions would likely continue to increase into the future. Yet natural habitats continue to fall to deforestation, unsustainable harvests, and conversion to agriculture, settlements, and other forms of land use. In this time of unprecedented human prosperity, ensuring that the rest of Earth's species can make it through the Anthropocene will require figuring out how to free up and reconnect habitats across Earth's most productive half.

3.

Thanks to increasingly productive agricultural systems, more food has been produced per person every decade since the 1960s without a major increase in the global area of land cultivated for crops since the 1970s. With more than

7 billion people on Earth, rates of population growth are also on the decline and should top out at 10 billion or so this century.

With careful management, projected human populations can be sustained using even less land than today, and more room can be set aside for other species in protected areas across the continents. Agricultural intensification and urbanization continue to enable societies to produce more with less, leaving behind huge areas of marginal lands in the process. The same trends that enabled forest recoveries in the developed world almost a century ago are moving well along in China and increasingly in many other developing countries. With the right kinds of policies and development — like job creation in cities that pulls rather than pushes the rural poor to better opportunities — large swaths of land can be released for other uses, conservation included.

Enhancing the productivity of land over time is no small feat, nor is urbanizing in an equitable fashion, nor sustaining wildlife in protected areas surrounded by human development. But the greatest challenge of them all, the grand challenge of the Anthropocene, is to bring these three crucial endeavors together fruitfully across the vast tapestry of shared spaces we've constructed. Most of the anthropogenic biosphere is now shared space — patchworks of remnant, recovering, and less-used habitats we've left embedded within our producing landscapes. Within these mosaics, wild creatures still make their living within the human world, where sometimes they can even thrive.

To expand the wild spaces needed to sustain the rest of life on Earth, it will be necessary to redesign and rebuild the anthropogenic landscapes we've constructed to sustain ourselves. We've become very good at making Earth's most productive lands work for us. We've crisscrossed the continents with roads and other connective infrastructure that have made contemporary societies the most interdependent that have ever lived on Earth. It is time to put the same design and engineering prowess to work expanding and reconnecting wild habitats.

To design, engineer, and construct a planet that will sustain wild species through the Anthropocene demands a triple focus: production and protection must be advanced together, and the interface between the two must function toward both ends. At the same time that less-productive lands are reclaimed for wildlife, these must be protected and reconnected through the dense webs of human infrastructure that still divide the lands we've left unused. Corridors of unbroken habitat, free of human pressures, must be built at scale to connect the largest protected areas across continents. Protection will only work if it forms a continental web of wildlife mobility that serves the large and the small, the slow and the fast, in the movements they must make to survive across the Anthropocene.

The good news is that creating multifunctional landscapes capable of pro-

ducing high yields for humans while enabling species to live and move are increasingly common management strategies in Europe, Japan, and some other developed nations. But there will always be trade-offs. In Iowa, for instance, one of Earth's most productive agricultural regions, converting 10 percent of land area to linked prairie strips delivered disproportionately large conservation benefits and connectivity, but also reduced corn and soybean production. While conservationists and even many farmers prefer the crop/prairie mosaic to wall-to-wall crops, missed yields must be made up for production elsewhere — likely in less-productive areas requiring more land. Moreover, creating multifunctional landscapes of this sort can also create and sustain local conflicts — some violent — among farmers, pastoralists, conservationists, and wildlife, especially when the trade-offs are unequal, as they often are.

For these reasons, sustaining production and protection in the same landscape is a demanding social project. It requires intensive and ongoing negotiations and investments shared among landowners, governments, the public, businesses, and other stakeholders. Yet such efforts are expanding around the world, including collaborations among diverse land management and conservation institutions to interconnect habitats across continents. But new strategies and even new institutions will not be enough. Protection and connection at the planetary scales needed to sustain wild creatures and wild spaces through the Anthropocene will not succeed without connecting deeply with the abiding human love and concern for wild nature.

4.

Contemporary industrial societies are not the first to value and conserve wild places and wildlife. From the traditional tapu areas of Polynesia (the source of the word “taboo”) to the sacred groves of India, the Maasai's eschewal of game hunting in East Africa to the royal hunting grounds of Europe — through to the millions of acres of public lands designated by Teddy Roosevelt — countless forms of conservation have cropped up for millennia, emerging from the cultural priorities of the societies that created them. It is likely that most, if not all societies, from the days of hunter-gatherers to the present, have practiced some form of conservation, and that some of these efforts helped to sustain biodiversity for generations.

Yet the social consequences and effectiveness of conservation practices reflect the cultural behaviors, institutions, perspectives, and aspirations of the societies that enact them. In most of the examples above, limits to habitat use or hunting served to reinforce and reproduce social inequality. The imposition of tapu areas by priests helped sustain their privileged role in Polynesian societies.

Royal hunting grounds and bans on hunting specific species served as much to signify royal power as to conserve wild game. Colonial game preserves and early conservation areas imposed through the repression and removal of indigenous peoples reflect the worst forms of cultural dominance. Even Roosevelt's more democratic conservation ethos developed from his hunting experiences in just such environments. Conservation in this sense can sometimes represent nothing more than a "green grab" imposed by elites on the less powerful.

Yet this is clearly not the only cultural path to conservation. The Maasai's cultural prohibitions on the consumption of game have long been reproduced through a form of identity politics; to be Maasai is to herd cattle and not to hunt for sustenance. To live off one's cattle is to be an honored member of society — not to is to lose one's social standing. The peaceful coexistence of Maasai cattle with vast herds of wild herbivores is an amazing thing to behold; from an agricultural perspective, a lot of grass is being given away for free. Yet with few exceptions, this has been the cultural norm among the Maasai for hundreds of years, and their rangelands have helped to conserve the most diverse mammalian megafauna assemblages left on Earth.

In the developed world, conservationists have sparred for more than a century over an appropriate cultural stance for preserving the world's natural resources, lands, and wildlife, a conflict exemplified by the debate between John Muir, staunch defender of "Nature with a capital N," and Gifford Pinchot, "wise-use" conservationist. The ensuing split between ecocentric and anthropocentric philosophies has roiled environmental efforts for decades, resulting in conflicts over what nature to conserve and why. Even Aldo Leopold's calls for a "harmony between men and land" failed to resolve this dispute. Debates along these lines continue in arguments about the need for explicit valuation of land or ecosystem services to justify conserving them.

But the key to a global social effort to sustain Earth's ecological heritage is to stop believing that there is any single best way to value nature. Humans shape their environments in accordance with their cultural beliefs, values, and practices. Some like their nature "pristine," some like it managed productively, and some just like it on TV. But each of us, in our own individual and socialized way, wants wildlife and biodiversity out there; biophilia is basic to human psychology, perhaps as ingrained as our need to be social.

There are so, so many ways to value nature — whether it be a pasture full of cattle, a plot of land, a city park, a protected wilderness area, a hunting preserve, or a whole world that needs saving. Scientific evidence combined with legal and economic frameworks will of course continue playing an important role in conservation. Yet these won't be nearly enough. When it comes to hard decisions about values and sharing, people's goals, incentives, and actions are

shaped by cultural norms at the individual, group, and societal levels. Even within the increasingly globalized societies most people now live in, different people in different social groups make value-based decisions very differently. With such an amazing diversity of cultures of nature, how could any specific ethical or value-based approach bring people together around a common global project to conserve Earth's ecological heritage?

5.

Given the deeply social nature of conservation and the vast diversity of our cultural preferences toward it, building a common global conservation project will not be easy. Yet three basic approaches to fostering the collective aspirations behind such a project would seem necessary. The first is to be all-inclusive — to celebrate all nature values across all value systems that exist around the world. The second is to seek out and appeal to those values already held in common. And the third is to disseminate and promote new or existing values with the potential to broadly support the project. All will likely be needed if human aspirations are to reshape a better world both for people and the rest of nature.

Ironically, though, stories of environmental doom have come to dominate the discourse today. Narratives warning of a “sixth mass extinction” and many other environmental crises do have a substantial scientific basis and have helped to put serious concerns about biodiversity loss on the map. Yet such negative messaging has also been shown to be not only dismal and depressing but also disempowering, off-putting, and generally unsustainable. Most importantly, visions of future catastrophe are unlikely to motivate the vast majority of people whose lives turn on their own daily struggles, no matter how popular such narratives might be among some educated elites in developed nations.

For more than a century, appealing directly to a shared love of nature has bolstered conservation efforts. Increasingly, calls for “Earth Optimism” and “Nature for All” have gained traction, directing attention toward the successes and positive aspirations of conservation movements around the world, rather than their problems and failures. Indeed, there is increasing evidence to suggest that people respond more actively to positive, aspirational messages that empower them to act toward better outcomes. Even in the midst of their daily struggles, all people aspire to a better life. These aspirations are many, but they are not infinite, and many are held in common. Aspirational natures, natures that represent what people want, might thus serve as the ultimate guide to expanding conservation into a truly universal human project.

In his 2016 book *Half-Earth*, Edward O. Wilson proposed what is likely the most proactive and grandly ambitious aspirational vision of conservation

ever. While roughly anchored in science, Wilson's vision focuses more broadly on making the biosphere great again through an unapologetically enormous project that would protect and restore half of the planet to conserve biodiversity into the deep future. The precise way forward is not made clear in the book, but his vision is radically simple, crisp, and clear — a better Earth for the rest of nature will also be a better Earth for us.

The appeal of *Half-Earth* lies in its simplicity. Sharing Earth half-and-half sure seems like a fair shake for both parties. While the political, economic, and other social implications of such a project are staggering, as a positive, easy-to-embrace vision of a way forward, it might be impossible to beat. Moreover, done right, such a plan would almost certainly facilitate the conservation of Earth's ecological heritage into the deep future.

Half-Earth and the related Nature Needs Half project are almost impossibly grand visions for Earth's future. Yet their combined appeal to human love of nature and aspirations for a better future are likely the most universal of any call for conservation in human history. Crisis narratives and scientifically defined environmental limits might engage some people, but their focus on planetary problems with complex technocratic solutions is almost impossible to grasp at a personal level.

Empowering people to join a popular social project that everyone can understand and act on in their own ways might be just what it takes to change Earth for the better. Such efforts build on a basic trust in humans and the shared values they hold in nature around the world. In these times of unprecedented global connectivity and interdependence among human societies, the time has never been riper for a global social enterprise to reshape our planet for the better.

6.

The devil is, of course, in the details. It would take deep, deep pockets to purchase conservation rights to 35 percent of Earth's land to top up the 15 percent already protected (a wild guess: about four billion hectares at an average cost of \$100 to \$1000 per hectare). Even if funds were available, what would prevent such a scheme from becoming merely the greatest green grab ever?

The first step in reshaping half of Earth's land into a global conservation reserve is to recognize that this would introduce the most challenging land reallocation process in history. Sharing the planet (unequally) with one another is hard enough. Sharing land equitably across ecoregions — including Earth's most productive and densely populated regions — would demand global trade-offs in that are hard even to imagine. Whose half will be conserved or restored?

Where will lost agricultural production be made up? Who will win and who will lose in the great global land trade-off? Who will compensate whom?

Another key question is whether land allocations should be guided by expediency — wherever land is cheap or available for political or other reasons — or by ecological priorities — where species or habitats are rarest and most in need of conservation. To date, expediency has been the rule. Yet this strategy cannot ensure that the full diversity of Earth's habitats and species will be conserved or that habitat connectivity across continents will be possible.

A truly equitable, effective, and sustainable global conservation system will need to be more than a global land deal or a global property portfolio in the hands of a few powerful institutions. An equitable system is far more likely to emerge as a shared social project evolving from the bottom-up aspirations of the world's people, their societies, and their dynamic environments over the very long term. It will take sustained social learning, cultural negotiation, and cooperation across societies to shape conservation and connectivity across Earth's producing and protected lands.

This will mean multilevel, not top-down, modes of governance, defined by strong local and regional institutions, as well as novel forms of social collaboration among private and public stakeholders at all levels. Elinor Ostrom's research into the sustainable shared management of forests and other common-pool resources illuminates many of the institutional practices that might facilitate such collective management of a shared reserve covering half the Earth.

Such coordination is already off to a promising start in many regions supported by international initiatives like the Convention on Biological Diversity, the Yellowstone to Yukon project, the Landscape Connectivity call to action of the World Business Council for Sustainable Development, and many others. Emergent networks of nonprofits, philanthropic organizations, and private-sector groups are also taking on the challenge of global conservation and connectivity and finding common ground in shared values like "planetary health" and Earth stewardship.

To continue moving forward, the selection, design, and management of protected areas and the connections between them must continue to evolve and diversify if they are to serve the needs of all people and all species. In particular, the notion of a dichotomy between used lands and protected areas will need to transition into a continuum of strategies for integration, from interconnected regional national parks and indigenous reserves to urban green spaces, prairie strips, hedgerows, wildlife bridges, dam removal projects, and experiments with conservation management. Diverse solutions and creativity will be essential to navigating the compromises that will make a shared planet valuable to people and viable for wildlife.

As humans increasingly become an interconnected and interdependent global species with stabilizing populations and broadly rising welfare, it is an increasingly imaginable, if daunting, prospect that our societies might yet pool our resources to construct, connect, and sustain a global ecological niche that includes the rest of life on Earth. With 15 percent of Earth's land already protected and another 2 percent on the way, protecting 50 percent of Earth's land is at least in the realm of possibility.

What this shared planet might ultimately look like remains largely the domain of visionaries and science fiction. Perhaps it might evolve into a simple binary world, half urbanity and intensive agriculture, the rest protected, untouched — nature somewhere else. Yet I for one do not believe that such a world is either possible or desirable; the planet is shared now, and always will be. The question is not just how much to share, but how to share it.

Imagine a planetary dashboard, like a ballot box, in the hands of every person on Earth. What would Earth look like if we all voted to construct a globally connected reserve covering half of Earth's land? Unfortunately, the answer is not simple at all.

Would this create a global patchwork of organic farms, green cities, and interconnected habitat? Or separate seas of dense cities and farms, with protected wilderness areas far away? If habitats are to be restored and protected in Earth's most productive ecoregions, how will this loss of production be made up? By clearing larger areas in less productive ecoregions or by increasing yields on existing farmlands? Will shared spaces, where people and wildlife coexist in close proximity, increase, or would they disappear? Will nature feel closer or farther away? These are just some of the hard questions.

Either way, the people, together, will decide. Different people in different regions will likely do things differently. But ultimately, the call for an aspirational social movement to conserve half of Earth for the rest of nature will need to serve as a call to develop better, and to develop differently, and not as a call to end development.

Over centuries, Maasai culture shaped productive, shared, and incredibly biodiverse landscapes. This is a gift to every one of us on Earth now and in the future. The megafauna and landscapes they helped to sustain might yet outlast the Great Pyramids or New York City. As Earth's first ultrasocial ecosystem engineers, we as a species will continue to shape the world. What will be our legacy? It is hard to imagine a greater gift to the future than a planet as richly diverse or richer than the one that evolved in the millions of years before our common ancestors first walked the plains of Africa. /