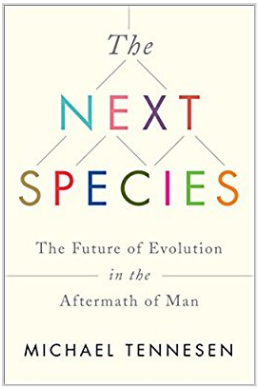

The Next Species: The Future of Evolution in the Aftermath of Man

By Michael Tennesen

Download now

Read Online

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen

While examining the history of our planet and actively exploring our present environment, science journalist Michael Tennesen describes what life on earth could look like after the next mass extinction.

A growing number of scientists agree we are headed toward a mass extinction, perhaps in as little as 300 years. Already there have been five mass extinctions in the last 600 million years, including the Cretaceous Extinction, during which an asteroid knocked out the dinosaurs. Though these events were initially destructive, they were also prime movers of evolutionary change in nature. And we can see some of the warning signs of another extinction event coming, as our oceans lose both fish and oxygen. In *The Next Species*, Michael Tennesen questions what life might be like after it happens.

Tennesen discusses the future of nature and whether humans will make it through the bottleneck of extinction. Without man, could the seas regenerate to what they were before fishing vessels? Could life suddenly get very big as it did before the arrival of humans? And what if man survives the coming catastrophes, but in reduced populations? Would those groups be isolated enough to become distinct species? Could the conquest of Mars lead to another form of human? Could we upload our minds into a computer and live in a virtual reality? Or could genetic engineering create a more intelligent and long-lived creature that might shun the rest of us? And how would we recognize the next humans? Are they with us now?

Tennesen delves into the history of the planet and travels to rainforests, canyons, craters, and caves all over the world to explore the potential winners and losers of the next era of evolution. His predictions, based on reports and interviews with top scientists, have vital implications for life on earth today.

Download The Next Species: The Future of Evolution in the A ...pdf

Read Online The Next Species: The Future of Evolution in the ...pdf

The Next Species: The Future of Evolution in the Aftermath of Man

By Michael Tennesen

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen

While examining the history of our planet and actively exploring our present environment, science journalist Michael Tennesen describes what life on earth could look like after the next mass extinction.

A growing number of scientists agree we are headed toward a mass extinction, perhaps in as little as 300 years. Already there have been five mass extinctions in the last 600 million years, including the Cretaceous Extinction, during which an asteroid knocked out the dinosaurs. Though these events were initially destructive, they were also prime movers of evolutionary change in nature. And we can see some of the warning signs of another extinction event coming, as our oceans lose both fish and oxygen. In *The Next Species*, Michael Tennesen questions what life might be like after it happens.

Tennesen discusses the future of nature and whether humans will make it through the bottleneck of extinction. Without man, could the seas regenerate to what they were before fishing vessels? Could life suddenly get very big as it did before the arrival of humans? And what if man survives the coming catastrophes, but in reduced populations? Would those groups be isolated enough to become distinct species? Could the conquest of Mars lead to another form of human? Could we upload our minds into a computer and live in a virtual reality? Or could genetic engineering create a more intelligent and long-lived creature that might shun the rest of us? And how would we recognize the next humans? Are they with us now?

Tennesen delves into the history of the planet and travels to rainforests, canyons, craters, and caves all over the world to explore the potential winners and losers of the next era of evolution. His predictions, based on reports and interviews with top scientists, have vital implications for life on earth today.

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen Bibliography

- Sales Rank: #1013234 in Books
- Published on: 2015-03-17
- Released on: 2015-03-17
- Original language: English
- Number of items: 1
- Dimensions: 9.00" h x 1.10" w x 6.00" l, .0 pounds
- Binding: Hardcover
- 336 pages

Download The Next Species: The Future of Evolution in the A ...pdf

Read Online The Next Species: The Future of Evolution in the ...pdf

Download and Read Free Online The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen

Editorial Review

Review
"An engrossing history of life, the dismal changes wrought by man and a forecast of life after the sixth mass extinction." (*Kirkus Reviews*)

"Tennesen is at his best when addressing the urgent environmental problems of today, particularly in his engaging discussion of water usage in New York City and Las Vegas." (*PUBLISHERS WEEKLY*)

"Simultaneously sobering and exhilarating, this wide-ranging survey of disasters highlights both life's fragility and its metamorphosing persistence." (*Booklist (Starred Review)*)

"Looking for a scary book? Pick up a copy of Michael Tennesen's "The Next Species: The Future of Evolution in the Aftermath of Man." It doesn't offer the bogeymen du jour [but] explores something far more terrifying: the end of the world as we know it. For real…The research that drives our understanding of mass extinctions is complicated and spread across several scientific fields, but Tennesen has done an excellent job of simplifying it for a general readership. ("The Next Species" would be excellent source material for a timely TV series in the style of Carl Sagan's "Cosmos.")" (*Richmond Times Dispatch*)

"[Tennesen] takes up nothing less than the task of telling the whole biography of life on Earth in just over 250 pages – and succeeds with a sunny aplomb that would be beyond the abilities of most actual professional scientists… as good-natured a hymnal as any stubbornly egotistical species could want." (*Open Letters Monthly*)

"The best part about *The Next Species* is how much you will understand without having to be a scientist. Tennesen translates highly technical information into a fascinating, if a bit gloomy, account of our planet" (*DCist*)

About the Author
Michael Tennesen is a science writer who has written more than 300 stories in such journals as *Discover, Scientific American, New Scientist, National Wildlife, Audubon, Science, Smithsonian*, and others. He was a Media Fellow at the Nicholas School of the Environment and Earth Sciences, Duke University, and a Writer in Residence at the Cary Institute of Ecosystem Studies in Millbrook, New York. He lives in the California desert near Joshua Tree National Park with Maggie, his wife.

Excerpt. © Reprinted by permission. All rights reserved.
Next Species

Prologue

WE HAVE NO IDEA WHAT WE'RE IN FOR

IT WAS MID-MORNING, June, during the tropical dry season, as the Peruvian army Mi-17 helicopter lifted us off from a military base near the town of Ayacucho, Peru, on the western side of the Andes Mountains

and slowly ascended toward the crest of the magnificent range. The expansive dry terrain below was spotted with cactus, shrubs, and wide stretches of open space, interrupted only by small villages covered in a fine layer of the local dust.

These slopes constitute the eastern boundary of the Atacama Desert, one of the driest spots on earth. It gave no hint of the verdant rain forest that awaited us just beyond the summit of the Andes. But as the helicopter crested the mountains, the eyes of the passengers—a military crew and an international team of scientists—opened wide at the sudden appearance of the headwaters of the Amazon River and the thick blanket of deep green vegetation that cloaked the mountains on this much wetter terrain.

Inside the helicopter, the group of celebrated biologists, part of the Rapid Assessment Program, had been sent here by the Washington, DC–based environmental group Conservation International to do a quick and dirty survey of the wildlife in the tropical forest region of the Vilcabamba, one of several mountain ranges within the eastern Andes under threat by oil and mining interests. Conservation International wanted to know if the area was rich enough in the number of plant and animal species to warrant the use of the group's limited funds to save it. The more species there were, the more likely that some would survive the current environmental crisis.

I sat with the scientists on uncomfortable metal benches bolted to the wall, gear piled high around us. Most were dressed in khakis with an assortment of high-top boots, a few beards, and several parkas. They all tried to peer out the cloudy glass portals and the open door of the cabin, excited by their first look at the tropical forest they'd come to study. A Peruvian soldier, wearing no seat belt, one arm hooked through a wall handle adjacent to the open door, was perched dangerously with his legs and gun dangling out the helicopter. Insurgents had wounded one of his comrades the day before, and he scanned the forest below, looking for trouble.

Our view stretched eastward over the Amazon Basin where the sun had already begun to heat the tropical forest, turning its moisture into towering thunderheads, which by noon would begin to assault the eastern face of the Andes with wave upon wave of mist and rain. The result of all this water was a lush tropical menagerie, an area scientists consider to be the most biologically diverse of all the remaining forests on earth. The enormous number of species of fauna and flora in the Andes and in the adjoining Amazon Basin is as vital to the health of the tropics as it is to the world. This area gave birth to many of the terrestrial plants and animals on earth and is thus responsible for much of the world's species diversity—its "biodiversity." Scientists tell us that nature is currently heading toward one of the major catastrophes of its existence, a deadly crisis brought on by the land use activities of man, resulting in the plummet of species numbers. Our best hope and why so many scientists were aboard this helicopter was that the tropics could serve as a repository from which nature could resurrect replacements in the future.

There is reason and precedent for this hope, which is why these scientists are studying this specific landscape: during past ice ages, for example, most Andean animals and plants moved down from the precipices and held out in isolated pockets of rain forest at lower elevations. While glaciers scoured much of the earth, closer to the poles, destroying all life that could not get out of the way, the Andes and the Amazon functioned as a warm safe haven from this frozen assault.

Today, the eastern Andes Mountains is one of the few places on earth where new species, animals not yet discovered by science, still abound. The area is classified as a global hot spot, a terrain with dense biodiversity, featuring many species found nowhere else in the world. It is in areas like this, in dark and difficult corners of the globe that scientists hope nature might survive man's current assault, and new species could reappear.

The mountainous terrain below our helicopter featured an area known as “cloud forest” where trees were shrouded in mosses and ferns. The canopies were filled with orchids and bromeliads that cast their roots into the leaves and humus in the crooks of the trees or into the bark of the branches in place of dirt.

Many of the species here had what Wake Forest University biologist Miles Silman described as “shoestring distributions.” The area where they can grow and reproduce may stretch horizontally for hundreds of miles but vertically only a few hundred feet. “I can throw a rock over the elevational distribution of some of these plants,” said Silman. He fears that climate change could push species uphill too fast for them to adapt.

There is a reason they call this “cloud forest.” It could take several days to land in such an area because of the constant cloud cover. The first day we tried, our army helicopter was turned back by the weather, and the pilot decided to visit the Asháninka Indians instead. Tribal members all came out to greet us. Their faces and arms were streaked with berry juice, a jungle version of makeup. A woman offered us chicha, a liquid made from yucca that is masticated and fermented by the tribal women, which the pilot told us to accept, to avoid gravely insulting the community. The Asháninka still took game from the local forests and fish from nearby streams.

On the third day, the clouds finally broke and we landed. I was one of the first people out of the helicopter, and my boots sank deeply into the boggy soil. I turned to the scientist behind me and told her I thought this was the wrong place. But she would have none of my hesitancy. “This is it,” she said, and gestured for me to get going. Within hours we’d unloaded the gear and hacked our way with machetes through the forest to a knoll where we cleared an area and set up a functional though very damp camp.

The tropical Andes contain about a sixth of the world’s plant life in less than 1 percent of its land area. White-faced monkeys, spider monkeys, and mantled howler monkeys swing through the trees and fill the damp air with their screams and roars. Puma, bear, white-lipped peccaries, and mountain tapirs patrol the woods looking for dinner, while the birds, bats, and butterflies shadow their movements. There are more than 1,724 species of birds in an area the size of New Hampshire—better than double the number found in Canada and the US combined.

The Vilcabamba Range is cut off from the surrounding mountains by the deep valleys of the Apurímac and Urubamba Rivers. Rising like an island in a sea of jungle, it is as isolated as an island surrounded by ocean.

Life is unique in the tropics. Animals often specialize, living off a single plant or groups of plants. Some flowers have long, curved tubes that can only be pollinated by certain species of hummingbirds with similarly curved bills. But there are also cheaters, like the flowerpiercer, a bird that can use its hooked bill like a beer can opener, notching little holes at the bases of flowers so that it, as well as bees and small hummingbirds, can get at the nectar without having to go through the flowers’ long tubes.

One night about a week into our trip when the rains started coming down, the resident herpetologist Lily O. Rodríguez and I put on headlamps and headed out into the deluge looking for new species, since rains brought out the different frogs and amphibians. Rodríguez started telling me stories about how these animals learn to specialize in the face of intense competition. She said that some of the frogs here don’t have tadpoles; they sit on their eggs like chickens. Other frogs store their tadpoles in leaves above streams into which the tadpoles fall once they hatch. And then some tadpoles have huge mouths to hold on to their favorite rocks when the streams run too fast.

The rains grew heavier and we put on waterproof army ponchos over Gore-Tex parkas. But this didn’t stop Rodríguez from climbing out on a wet, slippery tree limb when she thought she heard a new frog croak. She

found nothing out on the tree limb that night, but she came across twelve new species in the course of our four-week visit.

The wonder of evolution is exemplified in these rarefied, verdant corners, where life adapts to tiny ecological niches of nature that require elaborate maneuvers for others to take advantage of. The question is: Will nature provide the necessary niches and maneuvers to meet the future? Will the tropics be part of the rescue, if there is one? And will modern man be along for the ride?

* * * *

The palpable haste of modern biologists is due partly to the fear that we may be at the start of a mass extinction event—a loss of over 75 percent of plant and animal species. Such events have occurred only five times in the past 600 million years, when animals first appeared in the fossil record. And now scientists suggest that a sixth mass extinction may be under way, given the known species losses over the past few centuries and millennia. A recent report in the science journal Nature from biologists at the University of California, Berkeley, states that we could reach the extreme of a mass extinction in as little as three centuries from now if current threats to species are not alleviated.

It took Homo sapiens less than 200,000 years to reach a burgeoning population of one billion in 1800, but by 2000 we topped off at six billion, and by 2045 we are projected to reach nine billion. It is an unprecedented surge of growth, with unimaginable risks and innumerable side effects—the wellspring of a raging crisis.

And yet it is a dilemma man appears to ignore, though it is becoming more difficult to disregard as the list of earth's endangered plants and animals keeps growing due to our multiple assaults on the environment. We have become a deadly virus to nature.

Our massive overpopulation and accompanying decimation of earth's natural resources, if pursued unabated, may lead to man's own demise. Yet, as great as our footprint has been, from a geological perspective, we've done all this damage in a brief moment. If one looks at the entire history of earth as a twenty-four-hour day, we only entered the picture around the last seconds of that day. We work fast.

Of course, earth will recover, no matter how devastating our brief visit here. After all, just because it may mean the end of man, it won't be the demise of all biological life. Life is resilient. Plants, animals, and microbes will survive, adapt, diversify, and proliferate. New plants will evolve to vanquish our monocultures of corn, wheat, and rice. With far fewer animals around, those species that survive the bottleneck of extinction will move into newly abandoned spaces. With little competition, they will thrive and rapidly evolve.

It's all happened before.

Recoveries followed all the mass extinctions, no matter their causes. The Ordovician extinction event 443 million years ago destroyed 86 percent of species with a barrage of alternating glacial cycles. The Devonian event 359 million years ago took out 75 percent of species with a one-two punch of global cooling and global warming. The Permian event 252 million years ago destroyed 96 percent of species with a Siberian supervolcano. The Triassic event 200 million years ago took out 80 percent of species with a combination of global warming and ocean acidification. The Cretaceous event 65 million years ago destroyed 76 percent of species with the impact of an asteroid. Though we have identified the prime suspects here, each of these mass extinctions had multiple causes.

The best known, the Cretaceous extinction 65 million years ago, was the primary result of an asteroid impact, though it had help from a supervolcano, the Deccan Traps in India—traps being large regions of volcanic rock with step-like plateaus and mountains that are typical of flood basalt eruptions. The Permian extinction 252 million years ago, the child of a volcano, also had help from the collapse of ocean currents, among other causes. Yet, despite their enormous destruction, the Permian extinction opened the door for the dinosaurs, and the Cretaceous extinction opened the door for mammals and man.

Extinction is a powerful creative force, says Douglas H. Erwin, a paleobiologist at the Smithsonian Institution. In his book Extinction: How Life on Earth Nearly Ended 250 Million Years Ago he writes, "From the wreckage of mass extinctions the survivors are free for bursts of evolutionary creativity, changing the dominant members of the ecological communities, and enabling life to move off in new and unexpected directions."

Anthony Barnosky, a professor of integrative biology at the University of California, Berkeley, and principal author of the Nature paper, says that the critical component in determining if we are headed toward a mass extinction event is the status of critically endangered, endangered, and vulnerable species. "With them, Earth's biodiversity remains in pretty good shape compared to the long-term biodiversity baseline. But if most of them die, even if their disappearance is stretched out over the next 1,000 years, the sixth mass extinction will have arrived," he says.

He thinks that if we save the species now considered in trouble, we may have a chance. But our work at saving endangered species has resulted in many cases of what paleontologists refer to as "dead clade walking"—"clade" meaning groups of organisms. An example of lingering species is the California condor, which is threatened by lead poisoning, lethal pesticides, and expanding urban areas. It has cost millions of dollars and countless hours of work to preserve critical habitat, raise captive birds, and release them to the wild—but will the California condor be here for the next thousand years?

And if so, will other birds survive the bottleneck of mass extinction? Will reptiles, fish, insects, mammals, and perhaps even man survive? And how will they differ from the current versions of their species? That is what we will investigate here.

* * * *

This book looks at past extinction events, the evolution of man and nature, evolutionary changes already under way, and the evolutionary changes likely to occur. Our title, The Next Species, is used in its plural sense. We are interested in the next species of marine and terrestrial animals as much as we are in the next species of man. The research was built on scientific papers, books, as well as personal visits and interviews with experts. Its vision is based on fossil evidence from the past, studies of the present, and expert predictions of the future.

I visited more than seventy scientists from Harvard, MIT, Duke, the Smithsonian Institution, the American Museum of Natural History, UC Berkeley, Stanford, the University of Indiana, the University of London, Oxford University, the Max Planck Institutes, and more. We spoke on the phone with many others.

Many, like Hans-Dieter Sues, curator of vertebrate paleontology at the Smithsonian, think that extinction is a normal process of life. "Virtually 99.999 percent of all life on the planet has gone extinct," says Sues. "And so will Homo sapiens. Maybe in one thousand years we will have figured out how to do interstellar travel, so if things go haywire down here, we can take off and go somewhere else. But it's just as possible we will mess around with our own genome and create some sort of race of superhumans, and they'll drive us to

extinction.”

This book looks around the world for lessons in evolution. What can past mass extinctions teach us? Can pristine ecosystems exist in war zones and nuclear accidents? What can 30,000-year-old fossils under Los Angeles tell us about the diversity of life? Will scientists rewild the Americas and Europe with elephants, cheetahs, and lions? Will jellyfish and giant squid dominate the oceans? Does disease fester in a world devoid of its native species? And what about the chances of an escape to Mars?

We’ll also explore the possibility of other forms of life evolving. Could isolation in the wake of a mass extinction provide the evolutionary opportunity for another species of man? Will genetics provide our children with better minds, longer lives, and unique bodies? Or will scientists figure out how to upload the human mind, making our bodies obsolete, so that we live on as robots or avatars in a virtual world.

The possibilities abound.

Users Review

From reader reviews:

Edward Stewart:

This The Next Species: The Future of Evolution in the Aftermath of Man book is not really ordinary book, you have it then the world is in your hands. The benefit you have by reading this book will be information inside this guide incredible fresh, you will get data which is getting deeper anyone read a lot of information you will get. This kind of The Next Species: The Future of Evolution in the Aftermath of Man without we realize teach the one who reading it become critical in imagining and analyzing. Don't be worry The Next Species: The Future of Evolution in the Aftermath of Man can bring any time you are and not make your bag space or bookshelves' become full because you can have it in your lovely laptop even cell phone. This The Next Species: The Future of Evolution in the Aftermath of Man having fine arrangement in word and also layout, so you will not feel uninterested in reading.

Theodore Huff:

Precisely why? Because this The Next Species: The Future of Evolution in the Aftermath of Man is an unordinary book that the inside of the publication waiting for you to snap it but latter it will shock you with the secret that inside. Reading this book beside it was fantastic author who have write the book in such amazing way makes the content inside easier to understand, entertaining method but still convey the meaning completely. So , it is good for you for not hesitating having this ever again or you going to regret it. This unique book will give you a lot of advantages than the other book possess such as help improving your expertise and your critical thinking method. So , still want to postpone having that book? If I have been you I will go to the book store hurriedly.

Jeffrey David:

This The Next Species: The Future of Evolution in the Aftermath of Man is completely new way for you who has fascination to look for some information since it relief your hunger of information. Getting deeper you onto it getting knowledge more you know or you who still having little bit of digest in reading this The

Next Species: The Future of Evolution in the Aftermath of Man can be the light food to suit your needs because the information inside that book is easy to get by anyone. These books produce itself in the form that is reachable by anyone, yep I mean in the e-book application form. People who think that in guide form make them feel drowsy even dizzy this guide is the answer. So there isn't any in reading a e-book especially this one. You can find what you are looking for. It should be here for an individual. So , don't miss it! Just read this e-book sort for your better life and also knowledge.

Shawn Hernandez:

You can find this The Next Species: The Future of Evolution in the Aftermath of Man by look at the bookstore or Mall. Simply viewing or reviewing it could possibly to be your solve difficulty if you get difficulties for your knowledge. Kinds of this book are various. Not only by means of written or printed but can you enjoy this book simply by e-book. In the modern era similar to now, you just looking from your mobile phone and searching what your problem. Right now, choose your current ways to get more information about your reserve. It is most important to arrange you to ultimately make your knowledge are still change. Let's try to choose right ways for you.

Download and Read Online The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen #MWAX1HCVNP6

Read The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen for online ebook

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen books to read online.

Online The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen ebook PDF download

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen Doc

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen Mobipocket

The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen EPub

MWAX1HCVNP6: The Next Species: The Future of Evolution in the Aftermath of Man By Michael Tennesen