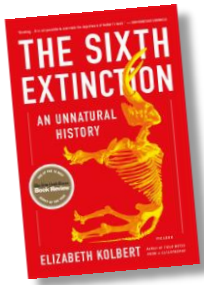


### **About the Summer Reading Program at the University of Vermont**

The Summer Reading Program is a new student's first introduction to the academic life of the University. **"The Sixth Extinction: An Unnatural History" by Elizabeth Kolbert** is the 2016 first-year summer reading book selection. The book challenges us to connect the dots of our planet's and our species' history and acknowledge the course we have set for ourselves. But it also challenges us to think beyond the narrative of the book to the great possibilities to affect critically needed change. Humankind must, once again, come to its own rescue.

### **The role of the book selection in campus-wide discourse**

UVM's first-year reading selection is intended to serve as a guidepost for discussions across our university and as a backdrop to intellectual discourse among our faculty, staff, and students. During the year, the book also will inform conversations about our academic programs and how we prepare and inspire our students, vision and re-envision our curricula and degree offerings, and how we posit the University of Vermont as a distinctive and impactful public research university.



### **Climate and Change: Reflections on "The Sixth Extinction"**

by D. Rosowsky, Fall 2016

*"When I looked into her (Suci the rhinoceros') very black eyes, I could have sworn I saw a flicker of interspecies recognition."*

### **INTRODUCTORY THOUGHTS**

A good book comforts us. A great book challenges us. This year's first-year reading selection, "The Sixth Extinction" by Elizabeth Kolbert, is a *great* book.

This book opened our eyes, engaged our minds, expanded our thinking, at times shrunk our significance, contextualized our evolution and our existence, and reminded us of both our fragility and our ephemeral nature. It also made us uncomfortable, uneasy, and uncertain at times. I can't imagine a university's first-year reading selection, or any book, doing more than that.

This is a science book, a history book, a diary of personal essays and interviews, a detective novel, and a field guide. The book warns of cataclysmic change but also offers glimpses of cautious optimism, a tip of the hat to humanity and our capacity for (if not record of) stepping up to meet challenges. Modern humans are really quite remarkable, as the book points out. We are unique in our ability to conceptualize complexity, to collaborate on complicated tasks, to compromise, to reason, and to seek out the unknown.

Elizabeth Kolbert's book forces us to come to grips with the realities of humanity's past, including cataclysmic events, and recognize our own vulnerabilities as pieces of a delicately balanced ecosystem. The book asks us to look back over vast periods of time, and then challenges us to look forward – to what may be far shorter periods of time – at the uncomfortable reality of how humankind has impacted our planet and its very ability to sustain us.

“The Sixth Extinction” provides timely and thought-provoking information for all of us, but perhaps most importantly for two groups: (1) scientists and policy experts, scholars and thought-leaders, and (2) young people who are just beginning their university education. The first group are those who are not only advancing the conversation, they are at the leading edge of discovery and the forefront of action as what can only be called the *climate crisis* unfolds. The second group (which includes our students) are those who will shape the conversations in the years ahead and respond to the crisis – and in doing so, will innovate, discover, create, advocate, and propel our planet and its people toward a more sustainable future.

## LESSONS AND LEARNING: TWO SIDES OF THE SAME COIN

*“There have been five mass extinctions during the history of life on this planet. These extinctions they described as events that led to a ‘profound loss’ of biodiversity.”*

We learn of the five major extinction events that came before us, and what science tells us (where it is able) are the most likely causes of those events. And we learn that we exist in what is very likely the next in the series of major extinction events – the sixth extinction – and that this event, happening not in glacial time but in human lifetimes, is the result of human beings. We read the evidence, we listen to the science, and we come face-to-face with the facts. But it pushes us to a place of discomfort, if not disbelief, that we could have been the cause. And yet, there it is, in black and white text, in full-color graphs, in scientific journals and the popular press. To deny it is akin to denying the sun or the moon. Ours is the generation grappling first with this truth. But it is the next generation – our students’ generation – that will get past debate or blame and move on to real action. That’s why I love the choice for this year’s first-year read for the University of Vermont. We attract, prepare, enable, and launch great scientists, great leaders, and great innovators. Our graduates are doers. They lead by combining passion, compassion, and action. Armed with a world-class education and a university pedigree synonymous with academic rigor and quality – that stresses collaboration and responsibility, humility and humanity – our students change the world. They are thought-leaders *and* action-leaders. They are bright and inquisitive, committed and engaged, responsive and responsible.

*“There are all sorts of seemingly disparate reasons that species are disappearing. But trace the process far enough and inevitably you are led to the same culprit: one weedy species.”*

This generation arrives at college acknowledging the climate crisis, if not yet fully understanding it. They acknowledge that humans are the cause of it, they acknowledge the pace of it, and they acknowledge the responsibility of responding to and mitigating the effects of the crisis falls to present generations and not those millennia or even centuries away. They lay blame not to shame any individual or corporation, but to galvanize and energize companies, communities, and governmental agencies to be part of the search for solutions. They know that no shame-induced behavioral change or sudden knee-jerk piece of legislation will lead to an end to the crisis, but that it will take concerted and coordinated efforts by all of us, at all levels and all around the globe, to affect change, to slow the rate of damage to our ecosystem. The Intergovernmental Panel on Climate Change (IPCC) now tells us that reversing damage is not possible, that we have passed the tipping point. Our responsibility now is to slow the rate of damage – whether through technological advances, new policies, or behavioral change. It seems likely, in fact, it will need to be a combination of all of these. And there is no better place than the University to explore these strategies, and more importantly the intersections of them. Technology, policy, and behavior are not mutually exclusive. Rather, they are – as Douglas Hofstadter (distinguished professor of cognitive science

and comparative literature at Indiana University) once described Gödel, Escher, and Bach in his book of the same name – an eternal golden braid. Universities teach us how the strands intertwine and support one another, through fields like: behavioral economics; cultural anthropology; engineering ethics; ecosystem dynamics; science, technology, and policy; complexity of social systems; bioethics; sustainable entrepreneurship; and ecological economics. There are experts in all of these disciplines among the faculty at the University of Vermont. Don't let it be a matter of serendipity that you had a class with one of these experts during your four years here, make it a priority. Students and their faculty advisors should work together to develop an intentional plan of study, that ensures these incredible opportunities are realized.

*“Extinction and evolution were to each other the warp and the weft of life’s fabric,  
or, if you prefer, two sides of the same coin.”*

This book challenges us, first to reach back across our planet’s history to the arrival of the first humans, and later modern humans. First, we learn that modern humans came on the scene, more importantly in the context of their world-altering impact, their outward migration started only a short time ago, in relative terms<sup>1</sup>. Reading this books requires us to “shift gears” and to redefine periods of time. For this challenge, it is not human lifetimes that are used to measure change, but epochs, millions of years, and what we learn later are both the arrival and the disappearance of entire species. But something happens as the author deftly takes us closer to the present-day. We start to recognize things, time periods become shorter, and we become uncomfortable with the story arc Kolbert has defined in such detail. Perhaps this discomfort is the author’s intention, the point of the book. It is in the modern day that we are challenged the most. After all, this is our time, and what we do today will affect the time belonging to our students and to our children. Here the author, confident in the case she has laid out, challenges us do three things: *acknowledge*, *admit*, and *act*. She challenges us to *acknowledge* the historical record of scientific fact – the best our science can tell us, which even if imperfect is certainly of the right order of magnitude; to *admit* the role humankind has played in altering our ecosystem; and to *act* – armed with this knowledge and this humility – to affect positive (or at least less negative) change.

## WALTER ALVAREZ, ONE WEEDY SPECIES, AND THE ANTHROPOCENE

In this magnificent book, we learn of the Cuvier, Lyell, and Darwin – and the differences in their theories of evolution. We learn of the American journalist Revkin and the Dutch chemist Crutzen – and their term and defining conditions for “The Anthropocene.” (Whether that term is accepted as the definition, and name, of a new epoch is something, we learn, is being taken up this year by the International Commission of Stratigraphy.) But more than Lyell, Darwin, or Crutzen – the name that keeps showing up in Kolbert’s book, woven (it seems) throughout chapters, foreshadowed in generations of discovery, is the geologist who “more or less by accident” rewrote the history of life, Walter Alvarez. It was Alvarez who discovered the first traces of the giant asteroid that ended the Cretaceous period and caused “what may have been the worst day on the the planet earth.” On that day, with that impact, some three quarters of all species were wiped out.

Alvarez published a famous paper on the asteroid theory. His paper was met by mixed reviews. Even the scientific community took time to come around. The year it was published, the venerable *New York Times*

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<sup>1</sup> Modern humans first migrated out of Africa around 120,000 years ago, while the first modern humans pushed into North America around 13,000 years ago.

weighed in saying “Astronomers should leave to astrologers the task of seeing the cause of earthly events in the stars.” What year was that paper published? What year was it first shown that a giant asteroid impacted the earth, a “terrible, horrible, no-good day at the end of the Cretaceous, and wiping out 75% of the earth’s species?” It was 1980, just 36 years ago. Walter Alvarez asserted “we are seeing right now that a mass extinction can be caused by human beings” – a statement that was as bold as it was damning. Human beings, that “one weedy species,” it seems, was the cause. Or as anthropologist Richard Leaky warned, “*Homo sapiens* might not only be the agent of the sixth extinction, but also risks being one of its victims.”

Defining conditions, terms, and characteristics of the *Anthropocene* are presented throughout the second half of the book. The Anthropocene is usually said to have begun with the industrial revolution or perhaps later, with the explosive growth in population that followed World War II. It’s with the introduction of modern technologies – turbines, railroads, coal-fired plants, and engines – that humans became what Kolbert calls “a world-altering force.” One defining feature of the *Anthropocene* is that the world is changing in ways that compel species to move, and another is that it’s changing in ways that create barriers – roads, clear-cuts, cities – that prevent them from doing so. Kolbert refers to “the hash” the *Anthropocene* has made of the principles of geographic distribution. “If highways, clear-cuts, and soybean plantations create islands where none existed before, global trade and global travel do the reverse.”

It is precisely the qualities that makes us human – according to anthropologists and evolutionary biologists, our restlessness, our creativity, our ability to solve problems and complicated tasks – and what evolutionary geneticist Svante Paabo describes as “some madness” or “some sort of Faustian gene, a freak mutation that made the human insanity and exploration thing possible” – that pushed modern humans outward and forward: exploring, discovering, conquering, building, industrializing, powering, creating, and expanding. Now our madness gene has us setting sights on colonizing Mars. Faustian indeed.

So now we have the *Anthropocene*, a new epoch defined by modern human beings’ actions – and the results of those actions – upon the planet and the climate. Among the many geologic-scale changes Crutzen (the Nobel Prize winning Dutch chemist who coined the term) cites:

- Human activity has transformed between one third and one half of all the land surface of the planet.
- Human activity has damned or diverted most of the world’s major rivers.
- Humans use more than one half of the world’s readily accessible fresh water runoff.
- The manufacturing of fertilizer produces more nitrogen than what is produced naturally by all terrestrial ecosystems.

More significantly, human beings have altered the composition of the atmosphere. We know today that human beings, in their inevitable expansion and industrialization, in burning through coal and oil deposits, are putting carbon back into the atmosphere that has been sequestered for hundreds of thousands - if not millions of years. “In the process,” Kolbert writes, “we are running geologic history not only in reverse but at warp speed.” Warming today is taking place at least ten times faster than it did at the end of the last glaciation, and at the end of all those glaciations that preceded it. “To keep up,” Kolbert points out, “organisms will have to migrate, or otherwise adapt, at least ten times more quickly.” *Adaptation*, it would seem, is the key to any species’ future. And *adaptation* – informed, educated, responsible, and sustainable – is the key to humankind’s future.

We are the most evolved species on the planet (the most evolved the planet has ever known), we are the *cause* of the current crisis (one happening not on the scale of generations or even centuries, perhaps, but certainly less than geologic scale), and we are the best hope to identify solutions and affect needed change. Humankind must come to the rescue. It is our responsibility. We are the scientists, the engineers, the humanists, the species with the “madness gene” (remember that?), and the species that can analyze and think critically and work together to solve complex problems. If not us, then who?

## LENSES, ‘UVM2020 VISION’

I always read our first-year book through multiple lenses. The first is that of our incoming students, and the second is that of our faculty and staff. I want to see how this book can inspire learning and discovery, can provide ‘connective tissue’ across multiple courses and co-curricular activities in the first year, and can serve to both motivate and challenge students as they transition from home and high school to campus and college. I want to see how this book can open eyes and minds and hearts, and expose students to new fields of study, disciplines, majors, academic pathways, and careers. The third lens is that of a university provost. I look for opportunities for the University to fulfill its best destinies – providing a higher education to young people, driving social and scientific advances, strengthening communities and states through social and economic development as well as access to cultural and educational opportunities, and inspiring and enabling innovation. Universities provide unparalleled opportunities for scholars and students of vastly different disciplines to work together, to learn from one another, and to tackle complex problems. This is one of the reasons companies and organizations are so eager to partner with universities.

This book, of the four I have read since becoming provost at Vermont looking through the lens of a university provost, has been the most exciting. I am an engineer by background, and have been a faculty member for the last 26 years. My research over the last 15 years or so has focused on characterizing hurricane wind hazards for purposes of civil infrastructure risk analysis. Over the last eight years, my research group has been focused on the effects of climate change on the hurricane hazard. So I have been steeped in the scientific literature, the regularly updated reports by the IPCC, and the evolving models. When I came to UVM, I felt instantly that *this was a university that could take a leading position in preparing students for the challenges of a warming climate*. Our strengths in science, the environment, and human health – combined with our commitment to sustainability and social issues – and our location in a state known for being innovative and independent made this sound quite reasonable, certainly possible, and very exciting.

My thinking continued to evolve as we contemplated and launched university-wide general education requirements; as we invested in people, facilities and programs in the critical STEM fields that underpin both our understanding of climate change and the technologies that are critical to solutions; and as we worked together over the last three years to envision and enliven a university-wide Institute for Environment, expected to launch this fall. But it was reading this book that caused me to ask this bold question: What if we were the first major university to require *all* of our undergraduate students to have a minor or certificate in Climate? Why not? After all, professionals in every discipline will be required to come together to address the complex issues around climate change, and all of us will live in a world impacted by these changes. And why not UVM? We have nationally recognized faculty and programs in the environment and natural resources, climate studies, energy, water, complex systems, global and population health, policy, sustainability, food systems and agriculture, political science, and more.

My hope is that the faculty will take this challenge up in their departments, schools, and colleges, bringing a proposal forward to the Faculty Senate for its consideration. This is the right time and, I believe, the right place to contemplate a university-wide certificate or minor, built around elective slates of courses decided upon by the faculty, in Climate. This idea is bold – as some call it, a BHAG (big, hairy, audacious goal) – but it is not far-fetched. Nor is it out-of-reach. We have the courses and the experts. We have the students with the interest and passion. We need only the will to make this happen. Such a requirement can be a discriminator for UVM and can fortify our position as a national leader among major universities.

In the meantime, as the faculty contemplate whether and how best to advance such a requirement, I am asking our newest students – members of the Class of 2020 – to take it upon yourselves to select courses that will prepare you as broad and curious thinkers, engaged and informed partners, innovators, and leaders, ready to address the myriad challenges we face resulting from our changing climate. Build your own certificate or minor. Use your electives wisely and with purpose. Look at course offerings across departments, speak with faculty about those courses, and ask their advice in putting together smart slates of courses. Remember those intertwining strands I mentioned earlier. Make our faculty your partners. They are exceptional teacher-scholars, highly respected in their fields, and they want to help you make the most of your four years at the University of Vermont. You can be the first UVM class in which *all* students take courses in Climate. Go be that class, the great Class of 2020.

This year's book, *The Sixth Extinction*, is about 2020 hindsight. Make your class about 2020 foresight.

## CLOSING THOUGHTS FOR OUR STUDENTS

*"All of a sudden, organisms find themselves facing conditions for which they are, evolutionarily, completely unprepared."*

To our students, you are here at one of the most important times in human history. It also happens to coincide with one of the most important times in your lives. These points have many names – turning points, pivot points, inflection points – and they represent points of decision, investment, change, and commitment.

As this year's first-year reading selection makes clear, our climate (indeed our planet) is at an inflection point. But we also stand on the brink of what will surely be the most transformative and wondrous discoveries in all of human history. We are in an era of massive information, big data, and complexity. We are closer to understanding the origins of matter, the history of the universe, and the human brain than ever before.

When I went to college, landing on the moon had become commonplace and we had successfully flown a reusable shuttle into space and back again. As you start college, medications exist that allow those diagnosed with AIDS to live long and full lives, and cloning is no longer science fiction. Just imagine where we will be a generation from now. Now ask yourself, "What will my role be in creating that future?" – one of energy security, one with clean and plentiful water, one without malnutrition, one of global peace and mutual understanding, one in equilibrium with our planet and its resources, and one with fewer diseases and less suffering. It's a tall order, I'll admit. But so was the charge to place a person on the moon, or to put a computer on your wrist, or to harness solar energy at scale, or to map the human genome. We've done all that. It's on to the next challenges.

The global challenges we face now are complex. They will require highly educated problem-solvers with new skill sets – some yet to be defined. But beyond disciplinary depth (or depth in two or more disciplines) and climate literacy, the problem-solvers must be *culturally competent*, and possess a *world view*. We are now, without question and not subject to political affiliation or interpretation, a *global society* – more interconnected and interdependent than ever before. Our population continues to grow but our planet has never been smaller.

A student's four undergraduate years really do go by in the blink of an eye. But what each student takes from this time is immense: knowledge, understanding, values, and friendships. The University of Vermont, like any great university, provides students with access to myriad courses, programs of study, co-curricular experiences, student activities, community engagement and service opportunities, and (unless they are fortunate, like my colleagues and me, to work in higher education) a broader range of people, cultures, backgrounds, and beliefs than they will ever see again.

But *we* only provide you, as students, with *access* to all of this. The *value* only exists if *you* take full advantage of what we offer, if you make informed and purposeful choices, and if you truly make the very best use of your four years as an undergraduate student.

*“Certainly humans can be destructive and shortsighted; they can also be forward-thinking and altruistic.”*

You can look at this inflection point our planet faces as either scary or hopeful. I choose the latter, without hesitation. I believe in each one of you. You are bright, you are motivated, you are curious, and you are passionate. And I am confident that your choices, your decisions, your investments, and your commitment will ensure our future – your future, and your future's future.

I guess all this is to say we are counting on you. We have high hopes for you and we are excited for what you will achieve.

Now let's get started. Your planet is calling.

*“(We will) at the distance of a hundred millions years or so, be able to tell that something extraordinary happened at the moment in time that counts for us today. This will be the case even though a hundred million years from now, all we consider to be the great works of man – the sculptures and the libraries, the monuments and the museums, the cities and the factories – will be compressed into a layer of sediment not much thicker than a cigarette paper.”*

*“Another possibility – considered by some to be more upbeat – is that human ingenuity will outrun any disaster human ingenuity sets in motion.”*



*David V. Rosowsky is the Provost and Senior Vice President at the University of Vermont. A civil engineer with degrees from Tufts University (BSCE, 1985; MSCE, 1987) and Johns Hopkins University (PhD, 1990), Dr. Rosowsky is also a Professor of Engineering in the College of Engineering and Mathematical Sciences at UVM. He has been a university faculty member for 26 years, has held endowed chairs at Oregon State University and Texas A&M University, and has held leadership positions at Texas A&M University and Rensselaer Polytechnic Institute. He is a Fellow of the Institute of Science, Technology, and Public Policy at the Bush School of Government and Public Service at Texas A&M University; a fellow of the American Society of Civil Engineers; a Fellow of the Structural Engineering Institute; and a registered Professional Engineer. Dr. Rosowsky is a native New Englander, born and raised in Massachusetts.*

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