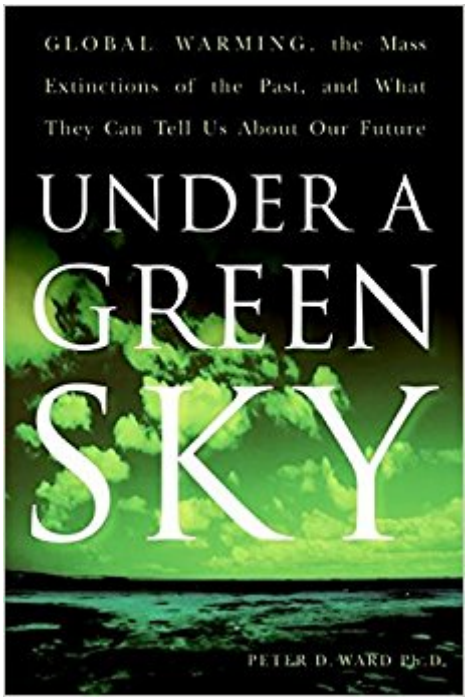
Under A Green Sky: Global Warming, The Mass Extinctions Of The Past, And What They Can Tell Us About Our Future



Synopsis

More than 200 million years ago, a cataclysmic event known as the Permian extinction destroyed more than 90% of all species and nearly 97% of all living things. Its origins have long been a puzzle for paleontologists, and during the 1990s and the early part of this century a great battle was fought between those who thought that death had come from above and those who thought something more complicated was at work. Paleontologist Peter D. Ward, fresh from helping prove that an asteroid had killed the dinosaurs, turned to the Permian problem, and he has come to a stunning conclusion. In his investigations of the fates of several groups of mollusks during those extinctions and others, he discovered that the near-total devastation at the end of the Permian was caused by rising levels of carbon dioxide leading to climate change. But it’s not the heat (nor the humidity) that’s directly responsible for the extinctions, and the story of the discovery of what is responsible makes for an fascinating, globe-spanning adventure.

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Customer Reviews

Popular science writer and paleontologist Ward presents breaking news about the link between past mass extinctions and global warming. Disarmingly engaging, Ward combines tales of his own punishing fieldwork with a piquant history of the controversies that have dogged scientists seeking the cause of the "mother of all extinctions" in the Permian period. This provides the foundation for a stunning discovery: evidence of past greenhouse extinctions. As Ward carefully parses the data and its implications, he observes, "the key to climate change seems to be both the level and the rate at which carbon dioxide rises in the atmosphere," no matter its source. Ward also illuminates the

symbiosis between ocean currents and climate change, then explains why, as the northern ice cap melts, it is likely that the Atlantic conveyor current system will be altered, thus accelerating climate change. Ward asserts that humankind has flourished during a remarkable period of climatic stability and notes how tragic it will be if our carbon habit brings this boon to a catastrophic end. An important addition to the necessary literature of global warming. Donna SeamanCopyright Ã Â© American Library Association. All rights reserved --This text refers to an out of print or unavailable edition of this title.

For RARE EARTH: Ã¢â ¬Å“A stellar example of clear writing . . .Ã¢â ¬Â• (American Scientist)Ã¢â ¬Å“A sobering and valuable perspective . . .Ã¢â ¬Â• (Science)

A little tedious to read, but interesting. This shows where we might be in a few hundred years at the rate we are going.

Update 2014: My main quest for several years was trying to figure out if we'd go extinct or not. I am actually pretty hopeful that we may not, due to peak fossil fuels. See my article "Why we might not go extinct" at energyskeptic for details.----------There've been five major extinctions where 50-95% of life died. Below is a list of the mass extinctions Ward believes were caused by global warming - and he wrote this book to explain why human-caused global warming is probably going to cause another major extinction, probably the second worst in Earth's history (the worst being the Permian). Major extinctions are in capital letters.....Millions of years agoCambrian.....490ORDOVICIAN.....450DEVONIAN (several).....360PERMIAN (several).....253-247TRIASSIC (several).....205-199Toarcian.....190Jurassic-CRETACEOUS.....144Cenomanian-Turonian.....93Paleocene thermal.....55Ward is frightened by what he's learned:"I'm scared as hell, and I'm not going to be silent anymore! This book is my scream, ...Is [mass extinction] happening again? Most of us think so....Thus this book, words tumbling out powered by rage and sorrow, but mostly fear, not for us, but for our children."Here is Ward's description of what "life" was like during the Triassic greenhouse mass extinction to give you an idea of where Earth is headed for again:"No wind in the 120-degree morning heat, and no trees for shade.There is some vegetation, but it is low, stunted, parched.Of other life, there seems little.A scorpion, a spider, winged flies, and among the roots of the desert vegetation we see the burrows of some sort of small animals--the first mammals, perhaps.The largest creatures anywhere in the landscape are slim, bipedal dinosaurs, of a man's

height at most, but they are almost vanishingly rare, and scrawny, obviously starving. The land is a desert in its heat and aridity, but a dune less desert, for there is no wind.The land is hot barrenness.Yet as sepulchral as the land is, it is the sea itself that is most frightening.Waves slowly lap on the quiet shore, slow-motion waves with the consistency of gelatin. Most of the shoreline is encrusted with rotting organic matter, silk-like swaths of bacterial slick now putrefying under the blazing sun,Finally, we look out on the surface of the great sea itself, and as far as the eye can see there is a mirrored flatness, an ocean without whitecaps.Yet that is not the biggest surprise.From shore to the horizon, there is but an unending purple color--a vast, flat, oily purple, not looking at all like water, not looking like anything of our world.No fish break its surface, no birds or any other kind of flying creatures dip down looking for food.The purple color comes from vast concentrations of floating bacteria, for the oceans of Earth have all become covered with a hundred-foot-thick veneer of purple and green bacterial soup. At last there is motion on the sea, yet it is not life, but anti-life.Not far from the fetid shore, a large bubble of gas belches from the viscous, oil slick-like surface, and then several more of varying sizes bubble up and noisily pop. The gas emanating from the bubbles is not air, or even methane, the gas that bubbles up from the bottom of swamps--it is hydrogen sulfide, produced by green sulfur bacteria growing amid their purple cousins.There is one final surprise.We look upward, to the sky.High, vastly high overhead there are thin clouds, clouds existing at an altitude far in excess of the highest clouds found on our Earth.They exist in a place that changes the very color of the sky.We are under a pale green sky, and it has the smell of death and poisonWe have gone to the Nevada of 200 million years ago only to arrive under the transparent atmospheric glass of a greenhouse extinction event, and it is poison, heat, and mass extinction that are found in this greenhouse."It’s clear after reading this book that human caused global warming may cause a similar major extinction (we’re already in a 6th mass extinction from human-caused biodiversity loss). I find it hard to believe we will survive, though we’re such an adaptable species that one of the theories why our huge brains evolved so quickly was to cope with sudden climate change - it’s only the past 10,000 years that the climate has been steady enough to allow agriculture and civilizations to thrive.You were perhaps under the impression that asteroids caused all past extinctions, like the most recent dinosaur-killing one 65 million years ago, known as the K-T extinction in the Cretaceous period. Yes, that one was caused by an asteroid, but that’s the only one. Before the asteroid theory, most scientists thought mass extinctions were due to climate change, and Ward spends several chapters explaining why that theory turns out to be correct after all.Ward also shows how and why we know most other major and minor extinctions were due to sudden climate change and rapid global warming from:* Methane (natural gas) which is 20x more

warming than carbon dioxide* Carbon dioxide from volcanic eruptions* An anoxic bottom layer of the ocean that spewed out bubbles of poisonous hydrogen sulfide gas, killing most life in the sea and on landThe Asteroid K-T extinction theory. Ward asks "was there ever a more news-friendly science story? Dinosaurs, death, asteroids, everything but alien sex."In 1980 Science magazine published the dinosaurs-killed-by-a-giant theory. Critics asked how creatures outside the impact area were killed. Alverez replied:* From darkness. The impact created huge amounts of dust, cutting off the sun's power by up to 20% for 8 to 13 years.* The blackout caused much of earth to freeze for a decade and back then the earth had a hothouse climate, so plants weren't adapted to freezing temperatures* Drought from 90% less rain. The rain that did fall was acidic (from sulfur)* Massive fires* Ten years of darkness, frost, dryness, fires, and acid rain killed plants on land and plankton in the oceanHow was this hypothesis tested? It's important to understand how the asteroid theory was proven, because later on it becomes obvious that there's no evidence for asteroids causing any of the other mass extinctions.1) All over the world evidence of the asteroid was found in a very thin layer, easily detected by its combination of iridium, shocked quartz, and glassy spherules.2) Paleontologists studied fossils before and after this thin impact layer. If species disappeared suddenly this would be in favor of the asteroid, if they disappeared gradually that would argue against the Alvarez theory.Why Paleontologists were opposed to the Asteroid theory.In the very early years of science, extinction was not thought possible - God and his creations never changed or disappeared.Mass extinctions left clear fossil records because they were so huge and went on for such a long time. Gradually it became clear there'd been immense extinctions, perhaps caused by floods and other disasters. This theory became known as Catastrophism.By the 20th century scientists rejected the notion of sudden catastrophic events and came to believe extinctions took place over millions of years. Perhaps long, slow climate change. Other theories included disease, less oxygen, changing sea level, rising predation.Attack of the K-T Extinction theory - volcanic activity killed the dinosaursNon-impacters challenged the theory by proposing that large-scale volcanism produced the impact layer. Iridium is found in Hawaiian lava, and vast areas of India were getting covered with lava at the same time as the K-T extinction.The lava, also known as flood basalt, flowed from giant cracks in the land, not volcanoes. In addition to lava, ash, dust, and huge amounts of volcanic gas are thrown into the air (including hydrogen sulfide, methane, and carbon dioxide).K-T extinction wins, but raises new questionsIn the end, most scientists accepted the asteroid over the volcanic theory. But this did bring attention to past flood basalt regions, and new research on them, leading to the startling conclusion that the largest volcanic eruptions closely correspond to the times of the greatest mass extinctions the past 500 million years.The greatest

mass extinction in the history of the planet was the Permian, which occurred 251 million years ago (mya). At the same time, the most gigantic flood basalt -- the Siberian Traps, flowed for 4 million years ago at the same time (252-248 mya).The Triassic mass extinction 200 mya happened at the same time as another huge volcanic flood basalt 202 to 199 mya.The K-T extinction theory was accepted so quickly because geochemists could rapidly test samples from the 1/8th inch thin K-T layer all over the world. But meanwhile paleontologists were plodding along. It takes a huge amount of time to find fossils from dozens of feet of geological layers, and find enough fossils to be statistically meaningful. What geochemists could do in days was taking paleontologists years.Ward was one of the paleontologists, searching for fossils in the asteroid layer and discovered that not just microbes, but larger animals, such as ammonites, disappeared after the meteorite fell. Walter Alvarez sent him a warm letter of thanks.Ward compares the event to an earthquake. Even if you aren't destroyed by the shaking, you may die later from lack of water, power, food, disease, or crime.Many paleontologists refused to ascribe all extinctions to asteroids.Luis Alvarez was so frustrated by that he called paleontologists "stamp collectors."This led to more and more to the idea that unless proven otherwise, all past mass extinctions were the result of an asteroid or comet hitting the earth. It became the new paradigm. Anyone who disagreed wasn't likely to be appointed to the prestigious National Academy of Science.The K-T (Cretaceous) extinction didn't last long - life bounced back quickly, the creatures at the bottom of the ocean survived quite well, unlike other major extinctions where there might be a 5 million year void with few fossils before life recovers.An overlooked extinctionWhile scientists were examining the K-T extinction, some of them noticed yet another mass extinction 5 million years later (60 mya). This extinction was came from the depths of the oceans - most likely the bottom layer of water warmed up, which reduced oxygen enough to cause a die-off.How could this happen? It appears the earth got even warmer from volcanic activity both on land and in deep-sea spreading centers. The difference in temperatures between the equator and rest of the planet went from 63 degrees Fahrenheit difference to just 43 F. This greatly reduced the number and severity of storms since there weren't clashes of hot and cold air to generate them, and the wind died down three-fold. Fewer storms in turn caused the planet to become much drier. The heat evaporated surface water, making it more salty, dense and oxygen free. This heavier layer plunged down to the bottom, killing deep-sea life.Some mammals and plants were affected on the land as well from the hot, dry climate, made worse by greatly increased volcanic activity, but the die-off wasn't nearly as bad as the K-T extinction 5 million years earlier.This extinction is ominous given current conditions. The oceans and land now have life-giving circulation - cold, oxygenated water sinks and flows along the bottom from the poles to the tropics, and warm

tropical water flow from the equator north to high latitudes, warming Europe and other regions.One extinction event that happened so quickly it's literally a sudden black layer in rock layers all over the world is the Cenomanian-turonian, 110 mya. This was a really bad oxygen-free suffocation that affected the entire ocean, not just the deep-see creatures.This time the entire ocean went stagnant. With no currents bringing oxygen to the depths, oxygen was quickly used up, and the oxygen kept disappearing until it reached the top, killing off all the other creatures above, even the plankton at the base of the food chain. The Cenomanian-turonian isn't the only mass extinction caused by warm oceans.The Permian extinction--Mother of All Mass Extinctions--up to 90% of species diedIn the K-T extinction there's lots of life in the fossil record, then the asteroid hits, and there's a lot less life after that (though it recovers quickly).But the fossil record of the Permian is very different - creatures started dying for a long time before the worst depths of the extinction. A slow choking to death.But there was one event worse than all the others that took place over 165,000 years. This die-off killed many land plants as well. The extinction was so severe it brought the earth back to the conditions before complex animals and plants had evolved 600 million years earlier, the Precambrian, which also ended with a large-scale extinction.Based on the geochemistry of the rock layers and the fossil record, here are the killers paleontologists suspected:1. Very little oxygen in all layers of the ocean. Like red tides today, sometimes the oceans suddenly lost oxygen, killing massive numbers of sea organisms2. A sudden onset of global warming from the Siberian lava eruptions. This would also generate a lot of acid rain.Notice that an asteroid is not on the list - no iridium rich layers were found. Yet people couldn't imagine any other way for so much life to die so rapidly. And a couple of times scientists thought they'd come up with impact evidence (a false iridium layer and an Australian crater that turned out not to be a crater). Great fanfare accompanied these false discoveries, but they were based on shoddy work that had to be retracted. Like most retractions, the press and public didn't hear about it, and continued to believe that asteroids had caused the previous mass extinctions.In 2000, a new potential killer emerged:3. Large amounts of methane gas in the air, perhaps from methane hydrates meltingIn 1996 it was proposed that the oceans in the Precambrian were stratified, with the bottom layer dead and full of carbon dioxide.4. Eventually the carbon dioxide (and methane) began bubbling to the surface like a giant soft drink, and continued belching into the atmosphere. This would kill off marine creatures but does not explain why so many land animals died off.In 2002 scientists discovered that the Triassic-Jurassic (T-J) extinction was similar to the Permian with a die-off, a return of life, and another die-off, followed by pulses of lesser extinctions into the Jurassic. More species died in the T-J extinction than any other mass extinction, and at least half of all marine life died (less is known about how much land life went extinct--not

enough fossils). Both of these extinctions don't look anything like the K-T extinction, which is another reason scientists began to think maybe not all extinctions were caused by asteroids.One pattern seen in the fossil record of these two dreadful extinctions was that more nautiloids (deep water) than ammonites (surface water) died during the worst of it, yet the opposite was true in the K-T asteroid die-off - this time the surface water was more deadly. Scientists thought this might be from the high acidity and toxins raining down after the impact, killing off most life, including plankton, in the top 100 feet.By 2004 scientists had found out asteroids definitely didn't cause the Permian, T-J, or Paleocene extinctions, but still didn't have a mechanism to explain why so much life died. Sure, a slowly changing, warming climate and endless spewing flood basalts would be unpleasant, but creatures could move towards the poles to escape the heat.But the clues were there, waiting to be found in fossils, ocean currents, volcanoes, and noxious lakes in Micronesia. Ward discovered a clue while diving in an inland lake on Palau full of jellyfish, though at the time he didn't know it. Below the jellyfish, the deep water was purple and lifeless, because there was no oxygen. Before animals evolved, this may have been what ancient seas were like (Canfield oceans) - full of toxic hydrogen sulfide, very unlike our thoroughly oxygenated oceans today.Microbiologists were the first to crack the mystery by discovering they could infer the presence of fossil microbes in the chemicals and organic residues left behind in the rock - no need to actually find a fossil. Scientists applied this technique to the mass-extinction boundaries and found the biomarker hydrogen sulfide in these layers.In 2005, Lee Kump, at Pennsylvania State University, an expert in ocean chemistry and other scientists were the first to publish a paper hypothesizing that hydrogen sulfide was involved in both the land and sea mass extinctions.These nasty, toxic oxygen-hating organisms exist now in deep anaerobic places like the Black sea. The lower layer is full of hydrogen sulfide and the upper layer is full of oxygen. The two layers coexist until oxygen levels drop above, and then the balance is tipped to favor the deep-sea anaerobic bacteria, which produce even more hydrogen sulfide. At some threshold the hydrogen sulfide layer could abruptly rise to the top, killing marine life above.The hydrogen sulfide would keep rising and release bubbles of extremely poisonous hydrogen sulfide gas into the atmosphere, killing land plants and animals as well. This horrifying scenario is known as the Kump hypothesis. Adding to the killing were huge amounts of carbon dioxide and methane coming from ocean bottoms and the largest eruption in the history of the earth - the Siberian Traps. This amplified greenhouse warming, and made the hydrogen sulfide even more deadly -- lethality increases with warmth.Worse yet, hydrogen sulfide destroys the ozone layer, which shields Earth from UV rays, and this is quite likely what happened, because we can see fossil creatures damaged in a way that looks like it was caused by radiation. UV killed ocean phytoplankton (at the bottom of

the food chain) as well as land plants (even now phytoplankton are being destroyed under the large ozone hole in Antarctica).Evidence for an oxygenless ocean kept coming in. Lots of sulfur-rich pyrite (fool's gold) was found - it only forms in the absence of oxygen. Geochemist Roger Summons of MIT found hydrogen sulfide producing bacteria at the P-T extinction boundary.Right now we have an ocean full of life, nutrients mixed and stirred by cooling and warming currents. But our ocean could convert to the two bad kinds of stratified oceans as the planet warms (we are warming the earth at a rate unprecedented in Earth's history, too fast for creatures to adapt to). First would come an anoxic ocean with low oxygen, and as warming continued, the really nasty, scary Canfield ocean with no oxygen, taken over by bacteria that use sulfur for food. Canfield oceans also inhibited nitrogen formation, which plants need to grow.There is lots of evidence that there was a Canfield ocean at the time of the P-T mass extinction. And it looks like this may have also been true of the second, T-J extinction.In 1997 Anthony Hallam and Paul Wignail published a book called "Mass Extinctions and their Aftermath". Their data showed that 12 of the 14 mass extinctions they wrote about had poorly oxygenated oceans.It's important to remember there have been times when the earth almost froze life to death, snowball earth. It took very little, just parts per million, of greenhouse gases to end these frozen ice ages. Just a few hundred parts per million of carbon dioxide more can do the reverse and heat the world up drastically -- very rapidly.We know from ice cores, carbon isotopes, the work of paleobotanists on fossil leaves, and other ways that corroborate each other, how much carbon dioxide and methane were in the atmosphere in the past (which Ward describes in detail).Here's Ward's summary of how global warming greenhouse mass extinctions occur:"The [hydrogen sulfur] gas rises into the high atmosphere, where it breaks down the ozone layer, and the subsequent increase in ultraviolet radiation from the sun kills much of the photosynthetic green plant phytoplankton. On its way up into the sky, the hydrogen sulfide also kills some plant and animal life, and the combination of high heat and hydrogen sulfide creates a mass extinction on land.Another reason life will soon get hard is that for most of the past millions of years, and especially between 200,000 and 10,000 years ago, the average global temperature changed as much as 18 degrees F in just a few decades, and 10 F within 10 years. Right now the average global temperature is 59 F. Can you imagine how agriculture would be affected if the average temperature plummeted to 40 or rocketed to 75 in less than a century? We have no idea what that would be like, but we can be sure that such drastic temperature changes would generate storms of incredible size and power. Hurricanes like Katrina would strike several times a year, every year, not just once a decade or century.Many scientists believe we are going to increase temperatures to point that will cause the greatest mass death of humans in all of history. We are likely to have levels of carbon dioxide not

seen since the end of the Eocene epoch 60 million years ago, which occurred right after a greenhouse extinction. There were crocodiles and palm trees at the poles. There will be no hiding from tropical diseases like malaria.Ward concludes that there WILL be another greenhouse extinction.The 6th mass extinction is already well underway, from biodiversity loss caused by humans. Global warming will make this much worse: A 2005 paper in Nature estimated that global warming will drive more than a million species to extinction by 2050. Only 1.6 million species have been identified so far - this is an extinction rate of more than 60%. That's second only to the Permian extinction.And this first million is just the beginning. If we shift to a new kind of oceanic conveyer current system we could end up with an anoxic ocean that would eventually become a Canfield ocean. Just the anoxic ocean alone would kill off most species in the sea as happened in past extinctions.It's not going to happen overnight. Ward describes the process on page 179. As glaciers and ice sheets melt, even a rise of just a few feet will displace hundreds of millions of people and drown a good chunk of where our food is grown since so much of our agriculture exists on the large deltas at the ends of rivers.So many people live near coasts that a 25 foot rise will displace 25 to 50% of all people on earth, and there's another 175 feet to go before the melting is done with over the next 900 years. At some point all the freshwater entering the ocean may shut down the conveyer belt system, freezing Europe and destroying much of their agriculture.I hope you'll read this book, obviously I've left a lot out, especially the long descriptions of how scientists figured out what was going on - which is really fascinating. It would be like spending a day with a famous detective and getting an inside view of how they solve crimes.I'd like to thank the publisher, Smithsonian books and Harper Collins for printing this book. Many publishing guidelines flat out state that only positive books will be accepted. Even when books are published warning us that x, y, or z is bad, there's always a chapter at the end full of optimism that we can lick the problem. I guess I can't blame the publishers - people won't buy books without happy endings. Fine, stick your head in the sand and let your big old wagging butt above get kicked - but doesn't anyone care about their children, about nearly 7 billion humans or more dying, and homo sapiens going extinct? We may be the only sentient species in our galaxy (search the web for "rare earth" theory or read Peter Ward's bookÃ Â Rare Earth: Why Complex Life Is Uncommon in the UniverseWard, despite flat out saying we are causing a mass extinction from global warming, cops out in the end, and says he doesn't think we'll go extinct. I hope he's right.Ward wrote this book in 2007 before the 2009 "Planetary Boundaries: Exploring Safe Operating Space for Humanity Ecology and Society" was published. This paper lists nine ways we're driving ourselves extinct - global warming is just one of them (see my summary of this paper searching on: energyskeptic planetary boundaries).I wonder what Ward

thinks now? He’s certainly written several of the most important books every published for the public on the state of the world, in addition to Rare Earth above, read:The Flooded Earth: Our Future In a World Without Ice CapsThe Medea Hypothesis: Is Life on Earth Ultimately Self-Destructive? (Science Essentials (Princeton Hardcover))

Excellent read on the subject of climate change, clearly written and easy to understand - and convincing! I recommend this to all who live on planet earth.

The first five chapters of this book is a narrative of how Ward and his fellow scientists accumulated the findings that led to the hypotheses presented here as well as those published less than a half-year earlier in his book "Out of Thin Air", which I recently reviewed. But then in Chapter 6 Ward envisions how our thoughtless actions today are producing global conditions like those that brought on mass extinctions in the past. The remaining chapters elaborate on that theme.In both books Ward convincingly argues that, unlike the asteroid that killed off most dinosaurs 65mya, the other mass extinctions were the result of global warming caused by increases in volcanic carbon-dioxide and methane. He describes how the global warming disrupted ocean currents which normally keep the oceans oxygenated, resulting not only in asphyxiation but in the production of toxic hydrogen-sulfide. In addition, in his "Out of Thin Air" he argues that periods of low oxygen drove the evolution of animals’ respiratory systems which proliferated in periods of high oxygen.The first-half of "Under a Green Sky" engagingly describes both the fieldwork and controversy geologists and evolutionary biologists contend with in their professional lives. In contrast, his earlier "Out of Thin Air" meticulously traces the evolution of virtually all animal lineages over the past half-billion years by referring to a sequentially highlighted graph of oxygen levels during each age. While this first-half of "Under a Green Sky" is more engaging reading,Ã Â Out of Thin Air: Dinosaurs, Birds, And Earth’s Ancient AtmosphereÃ Â is meatier.The latter-half of "Under a Green Sky", which was written early in 2006, seems mostly redundant perhaps because since then Al Gore’s "An Inconvenient Truth" is managing to initiate much of the action Ward advocates, altho he does provide some information I was not aware of.

Explore Global Warming (About Our Changing Climate) From Zero to Sixty on Hedge Funds and Private Equity: What They Do, How They Do It, and Why They Do The Mysterious Things They Do They Hurt, They Scar, They Shoot, They Kill: Toxic Characters in Young Adult Fiction (Studies in Young Adult Literature) The Great Extinctions: What Causes Them and How They Shape Life The Employee Experience Advantage: How to Win the War for Talent by Giving Employees the Workspaces they Want, the Tools they Need, and a Culture They Can Celebrate The 100 Best Business Books of All Time: What They Say, Why They Matter, and How They Can Help You Miracles: What They Are, Why They Happen, and How They Can Change Your Life Can I tell you about Asthma?: A guide for friends, family and professionals (Can I tell you about...?) Can I tell you about Epilepsy?: A guide for friends, family and professionals (Can I tell you about...?) An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It The Wonder of Birds: What They Tell Us About Ourselves, the World, and a Better Future Child's Introduction to the Night Sky: The Story of the Stars, Planets, and Constellations--and How You Can Find Them in the Sky Understanding Girls with ADHD, Updated and Revised: How They Feel and Why They Do What They Do Working: People Talk About What They Do All Day and How They Feel About What They Do Defeating ISIS: Who They Are, How They Fight, What They Believe Queens of the Ice: They were fast, they were fierce, they were teenage girls (Lorimer Recordbooks) Historical Thinking and Other Unnatural Acts: Charting the Future of Teaching the Past (Critical Perspectives On The Past)