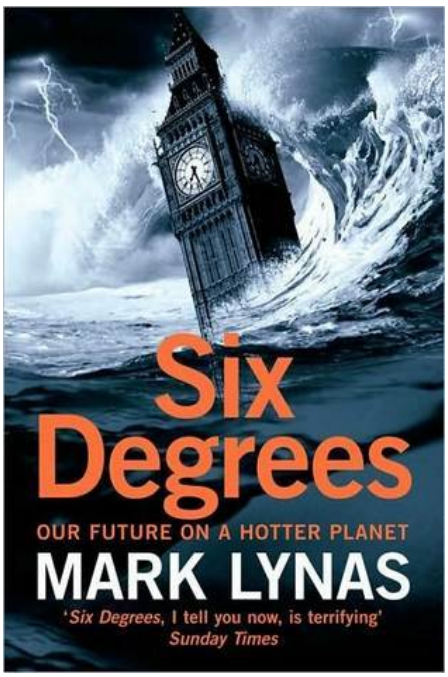

Six Degrees: Our Future on a Hotter Planet

Mark Lynas

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An eye-opening and vital account of the future of our earth and our civilisation if current rates of global warming persist, by the highly acclaimed author of ‘High Tide’.

Picture yourself a few decades from now, in a world in which average temperatures are three degrees higher than they are now. On the edge of Greenland, rivers ten times the size of the Amazon are gushing off the ice sheet into the north Atlantic. Displaced victims of North Africa's drought establish a new colony on Greenland's southern tip, one of the few inhabitable areas not already crowded with environmental refugees. Vast pumping systems keep the water out of most of Holland, but the residents of Bangladesh and the Nile Delta enjoy no such protection. Meanwhile, in New York, a Category 5-plus superstorm pushes through the narrows between Staten Island and Brooklyn, devastating waterside areas from Long Island to Manhattan. Pakistan, crippled by drought brought on by disappearing Himalayan glaciers, sees 27 million farmers flee to refugee camps in neighbouring India. Its desperate government prepares a last-ditch attempt to increase the flow of the Indus river by bombing half-constructed Indian dams in Kashmir. The Pakistani president authorises the use of nuclear weapons in the case of an Indian military counter-strike. But the biggest story of all comes from South America, where a conflagration of truly epic proportions has begun to consume the Amazon…

Alien as it all sounds, Mark Lynas's incredible new book is not science-fiction; nor is it sensationalist. The six degrees of the title refer to the terrifying possibility that average temperatures will rise by up to six degrees within the next hundred years. This is the first time we have had a reliable picture of how the collapse of our civilisation will unfold unless urgent action is taken.

Most vitally, Lynas's book serves to highlight the fact that the world of 2100 doesn't have to be one of horror and chaos. With a little foresight, some intelligent strategic planning, and a reasonable dose of good luck, we can at least halt the catastrophic trend into which we have fallen. But the time to act is now.

Six Degrees: Our Future on a Hotter Planet Details

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From Reader Review Six Degrees: Our Future on a Hotter Planet for online ebook

Margie says

While finishing this up I started reading Fat Chance: Beating the Odds Against Sugar, Processed Food, Obesity, and Disease. It made me appreciate the extent to which Mark Lynas does **not** take a particular side or cause in his exploration of global warming.

Lynas poured over journal articles and research papers, and then decided to organize the information according to degrees of warming. So there's a chapter dedicated to causes and effects of the warming of one degree Celsius, and then a chapter about two degrees of warming, etc. Unlike so many books about the ills of society, he doesn't focus on any one cause or effect. He simply presents the information, in an easily digestible format. He does this without at all speaking down to the audience. His writing is clearly grounded in the research.

It certainly kept me up nights. Scared the piss out of me, in some ways.

Lynas also does not focus on a particular solution to the problem. He notes that any one step we might take will not be enough, and then goes on to discuss how a combination of steps might play out in terms of reduction of ppm of CO2 released.

I found the book to be informative in the best possible way. He does single out Nebraska for some serious dissing, though.

To see the worst that even such a small change in climate can do, consider that most undramatic of places: Nebraska. This isn't a state that is high up on most tourists' must-see lists. "Hell, I thought I was dead, too. Turns out I was just in Nebraska," deadpans Gene Hackman in the film Unforgiven. A dreary expanse of impossibly flat plains, Nebraska has as its main claim to fame the fact that it is the only American state to have a unicameral legislature.

We love it when the best that can be said about us is that we have a unicameral. Really. Just...love it. Umm hmm.

Lara Messersmith-Glavin says

This text should be required reading for participation in the planetary exchange of resources; i.e. breathing, drinking, eating, excreting.

What Lynas has provided here is a comprehensive summary of international research on climate change and carbon emissions from a variety of perspectives and methodologies. The result is a harrowing projection of the kinds of shifts in ecosystems around the world - water tables, weather patterns, food production, biodiversity, ocean acidity - that are likely to occur if the average temperature of the earth goes up by as much as 6 degrees C. In each successive chapter, degree by degree, Lynas walks the reader through the gradual changes humanity can expect to experience, based upon a combination of state-of-the-art computer modeling, statistical probabilities, current observable trends, and historical precedence. The end result walks

a fine line between igniting profound motivation for change and tripping the wire of paralytic despair.

A major criticism I have of the work is that, in all but the sketchiest senses, Lynas fails to make the connections between the emissions/warming circumstances and the sociopolitical systems that have precipitated them. Only once or twice does he point directly to global capitalism and consumption at both the industrial and individual levels, and then to predict that - at the point of societal collapse - popular political theory may shift to point blame where it is "deserved." His intention is only to provide an accessible reference for the scientific research as it exists - a moral choice that, given the severity of the circumstances he describes, seems to me cowardly and untenable. Nonetheless, an important book.

Joe says

Read this on my step-father's request. I think he might have been trying to get me to shit my pants.

This is, roughly, one part robust scientific journalism and one part ecological-apocalypse-torture-porn. Working from several decades worth of scientific inquiry into both our current climate situation and periods of vast geologic/climactic upheaval, Lynas gives us a best guess global picture of what happens as the temperature rises, degree by degree, from one (sucky) to six (extinction of most plants, animals, people). Oddly enough I've found myself working in a lab that measures cosmogenic nuclides via accelerator mass spectronomy. Most of what they do (& the reams of academic papers I been collating into grant proposals) has a lot to do with the creating the hard data of the arcane geological studies Lynas draws on. The physicists (and machinists)in the lab are not liberal cooks with axes to grind, they're boring, incredibly sensible Indiana people whose politics (liberal and conservative) takes a back seat to their intense love of stabilizing the norm on their data. So when Lynas got into it about tipping points that will be reached in the next century and the resulting possibilities of firestorms, sulpher clouds, mass starvation, mass exodus & etc, I felt like my 13 year old self watching my first slasher flick: terror, fascination, and deep sadness at our need/desire to relate the baroquely fucked up. He lays it on thick and nasty in the last 1/3rd of the book. Just where his predictions become the most dire, their scientific scaffolding fades.

At the very least, apart from all the global warming etc, this book is an interesting study in the alarmist-literature dynamic between the dual objectives of a piece of alarmist journalism to be objective and to ruthlessly manipulate the fears of the reader.

Anyway, unless you're trying to convert a global warming disbeliever (through sheer terror), do not touch this book. It will blow your head off with a hand-canon.

Jessica says

Reading this book was like meeting someone, falling madly in love, and finding out she's got a terminal illness, all in the space of twenty minutes. It's been a decade since I've thought about Science, and not being much of a nature girl I forgot how mindblowingly amazing and complex the Earth is. The best parts of this book really reminded me of that.

Did I say terminal illness? That's a bad metaphor, since disease seems sort of just to passively happen; also, we tend to think of illness as something slow and wasting that takes a long time to kill you. Reading this book is like meeting the most beautiful, fascinating woman who's ever existed, then watching her being sadistically brutalized, gang-raped, and tortured to death. I know that's a bit graphic, but the truth here is nasty. Of course, in an uncomfortable, Twilight-Zoney twist, one can't escape the reality that one numbers oneself among the rapists and torturers.... someone else on here compared this book to a slasher film, and it is one. If you've got a weak stomach or heart, this could be tough going.

So the premise of this book is that Lynas, a British science guy journalist I think, goes over all these academic articles about climate change and related topics, and describes what our planet might be like when average global temperatures rise by +1, +2.... +6 degrees. A lot of these scenarios are based on what we know about how the planet was the last time it was at these temperatures. Since "chilling" is obviously not the right adjective for these descriptions, I'll just have to warn that you might crap your pants. It's scary! The book has a Dante's Inferno kind of frame, and the whole project really is extremely Biblical. The sense one gets really is that we as a species have cast ourselves out of an incredible Eden and into a spiraling, multi-leveled, intensifying Hell that is, for the most part, not much fun to read about.

Six Degrees wasn't exactly a page turner. I did not enjoy most of it, which I'd like to blame on Lynas's writing style but which more likely has to do with the topic. Parts of it were really fascinating, especially all the stuff about how weather and water systems work, and the descriptions of geography and the changes over time in the earth's climate were very illuminating for someone like me who knows nothing about all this. But boy, what a downer....

Reading about this stuff is intense. I know the world's got a lot of problems and that there's no shortage of things to get one's panties in a twist about, but honestly nothing puts it all in perspective like global warming. I was surprised while reading this by the response I got from my friends. Most people really don't want to think or hear about global warming, which is pretty shocking honestly, since it's (a) kind of the main event and first priority for a lot of obvious reasons, and (b) something we can actually still affect at this point. The thing about all this is that it really is happening fast, as in, in our lifetimes. No one really knows how quickly things will get really bad, and there are certain tipping points and feedback loops that once you go past it's impossible to stop though no one can really say definitively how or at what speed this will all play out. Like, once the Amazon Rainforest burns down, we are irreparably Fucked. And by "we," I mean pretty much all of us creatures who live on this planet. The non-Biblical thing about all this is that it just isn't *fair*. It's not just the sinners who are being punished here, and the usual suspects will probably feel the heat least -- at least for a little awhile. As temperatures rise due to our bloated Western Sasquatch-sized carbon bootprints, it's the dainty Cinderella-slippered peoples closer to the equator whose habitats will be destroyed first, who'll run out of food and water and come surging up north.... Not the mention the animals, of course, and all other living things. We are taking this mother down with us like an obese and insane mall-shooting suicide, torching the whole place to leave a scorched ugly parking lot where there was once a beautiful shopping mall/planet.

But yeah, so i found out most people really don't want to think about global warming. You know, everyone's always so down on Holocaust deniers, and I know they're lame, but on some level I understand the impulse to pretend like something so terrible just couldn't have happened. But I don't understand the "global warming is fake" people, because this is a problem we actually can still do something about. It's also not something in the hazy and very distant future; these horrific scenarios Lynas describes could occur within our lifetime (BTW, for those of you looking to feel a bit better about still smoking or being childless, this book could do the trick). At the end of *Six Degrees*, Lynas basically outlines what he sees as our options right now. According to his information, he guesses there's a 93% chance that we haven't crossed the threshold yet into

Completely Fucked (though there is a 7% chance that enough ice has melted that we've activated some of those feedback loops, and are so screwed really fast, no matter what we do now). He says it's pretty much a done deal that global temperatures will climb one and probably two degrees, which will definitely suck and create a lot of problems; however, if we can get our collective shit together and peak emissions by 2015, we do have a chance of stabilizing before we reach three degrees, which is the point from which it seems there is no return, and everything escalates and our world turns to shit.

Of course, at the moment, nothing like this is happening. Current political realities are incompatible with what science is telling us needs to happen this second, and unless there's a seismic shift really SOON, humanity will almost certainly succeed in the most heinous act of matricide in the history of anything anywhere. At the beginning of the book Lynas takes people to task for complaining that learning about climate change is depressing. He says that's like sitting in your fiery living room being depressed that your house is burning down, instead of getting up and doing something to put out the flames. Reading about this is depressing, though: the damage we've already done, and the global lack of initiative to take action now. It's depressing.

I finished this book not really sure what I was supposed to do with this information. I'm pretty suspect of this school of independent environmentalism, this very individualistic American idea that if I bring my own bag to Whole Foods I can save the planet from destruction.... Clearly, collective action on a massive, global scale is necessary if this impending disaster is to be averted. Still, that doesn't mean I need to participate actively in grinding broken glass into the face of the woman I love as she dies. One thing this book made me feel is a lot more committed to living in New York. I've thought a lot in the last year about moving back to California, but when I think about being an Angeleno and driving every day, I get a sick feeling in my stomach, and I think that's right, more confidently now that I've read this. My carbon footprint living here's pretty reasonable, for an American, anyway, which is not saying much. I don't drive, I live in a small apartment, the only meat I eat is fish, I fly pretty infrequently, though I suppose I could fly less and buy more local food and what have you.... Reading this did make me think about how I feel good about those things, and then made me think more carefully about what I feel bad about. I could really do a lot better in terms of waste and consumption, and reading this book did motivate me to be more thoughtful about my consumption habits in a way I haven't been really since I moved here from Oregon several years ago.

Still, I remain really unclear on what the solutions are. Obviously my bringing my lunch to work and not taking airplanes is not going to stop the polar ice caps from melting, so what is? I'd try to think of a brilliant new form of renewable energy, but I'm not very smart. Maybe my contribution will be to call all my scientist friends regularly, and ask them to work on it. Emily? Are you reading this? Could you synthesize a solution in your lab?

I guess I should stop writing this book report and go do my job, though I have to say I do feel some loss of urgency about social problems. Aren't we just rearranging the deck chairs, really, with all these other things? I guess it's always that way, with each individual life. Still, there's something pretty awesome about the collective end of the world. It puts everything else in perspective, and it's scary and sad. I guess one comforting thought is that global warming now sort of seems like nuclear annihilation did during the Cold War. It's not like that threat is eliminated, but it seems like less of a pressing issue now than it was even when I was a kid. I don't know what needs to happen to be climate change's Berlin Wall or whatever, but I don't think it's impossible. I hope one day I do quit smoking and have kids, and I hope by the time they grow up they can look back at Lynas's book as an alarmist relic, like those old How to Survive the Bomb paperbacks you find in used bookstores sometimes, from the time before humanity started taking this shit seriously and really cleaned up its act.

Ted says

Expanded review

From the weeping ground there sprang a wind,
Flaming with vermillion light,
Which overmastered all my senses,
And I dropped like a man pulled down by sleep.

Dante, *Inferno*, Canto III:
Dante enters the First Circle of Hell

Gustave Doré's illustration of Canto III: Arrival of Charon.

Well the first circle of hell wasn't all that bad, comparatively – Purgatory.

"Climate change is the canvas on which the history of the 21st century will be painted."
Mark Lynas

A friend who recommended this book to me said there was a point in the book at which he couldn't read further. I was able to finish the book, though not happily, and not without pausing several times and laying it in my lap, overcome by sadness.

The "degrees" in the book's title are Celsius degrees.

The book has six chapters, starting with "One Degree" and ending with "Six Degrees". In each chapter Lynas has collected, from a wide variety of sources, various projections of changes in the earth's weather patterns, sea-level and ecology, which have been associated with an increase in global temperatures of that amount. He has then formed these projections into a well-organized narrative.

I want to first make the following observations: (1) I believe it's fairly accurate to say that the temperature changes referred to in the chapter headings are relative to a historic baseline temperature from around the year 1950. (2) The effects reported in each chapter should be looked at as "roughly" projected to occur at that degree of warming, without being too precise about it. They might, with a better crystal ball, be more accurately placed in the chapter on one side or the other.

One Degree (up to 1 C, 1.8 F)

This chapter pretty much summarizes effects that have been apparent for quite some time now, and have been reported in mainstream news. These include the melting of the snows of Kilimanjaro; the well-documented decrease in size of almost all glaciers on earth; the effect of even this lowest level of warming on many plant and animal species; coral reef troubles in a warming ocean; the weather effects of the warming air containing more moisture; and rising sea level.

Lynas takes the opportunity here to cover some basics, such as how fast climate and related earth systems are believed to have changed in the past (pretty fast in some cases), the changing climate in medieval times, long term droughts that have occurred in the past thousand years. He also points out that a temperature change of six degrees above current levels would be the same differential as current temperatures are above the temperatures at the depth of the last ice age 18,000 years ago.

He also introduces the subject of climate tipping points. A tipping point is a state in a system at which, with a very small forcing pressure away from that state, an entirely new equilibrium is suddenly reached. Example: a wobbling canoe will rock back and forth until it tips in one direction just a bit too far. Then it overturns and stops wobbling. (See http://en.wikipedia.org/wiki/Tipping_...)

The first climate-induced tipping point that we are likely to observe will be in the Arctic. Temperatures are now rising in the Arctic at twice the global rate, having risen between two and three degrees in the past 50 years. The event that is talked about is the point at which, because of positive feedback, the loss of Arctic sea ice will become irreversible. This is currently projected to occur sometime in the next twenty to thirty years by various scientists.

Two Degrees (1.1 to 2 C, 2.0 to 3.6 F)

- Acidic and warming oceans
- Effect of acidity and warming on plankton, the “bedrock” of the ocean food chain
- “Chemical ocean conditions 100 years from now will probably have no equivalent in the geological past”, possibly leading to extinction of many key organisms. 78)
- Summers like that of 2003 in Europe may become the norm, and “extreme” heat at that time could kill hundreds of thousands
- Effect of extreme heat on plants – under this sort of stress they become carbon emitters rather than carbon absorbers
- Two to six weeks per year of additional fire risk in all countries bordering the Mediterranean

And then there’s sea-level rise

In a warming world, one of the most anticipated (and feared) effects will be a rise in sea levels. How much, and how fast, are questions that had no clear answers in 2008, and still don’t. Clearly, the more global temperatures rise, and the longer they remain at or above any given level, the more rise will occur.

The reasons for sea-level rise in a warming world are basically two. The first is related to the warming of the water in the ocean itself, due to expansion of the water as it heats up. This effect is well understood, and has probably been the main cause of the sea level rise so far, which is estimated by the US EPA to have been 6-8 inches in the last hundred years, an average rate of a tad under 2 mm per year. (In its 2001 report the IPCC projected an average annual rise of 2.2 millimeters, about .09 inches; but when Lynas’ book was written the rate was estimated to be 3.3 mm, 50 percent greater.)

The second reason for rising sea levels is the melting of ice which is currently trapped in glaciers and (more significantly) in the two great ice sheets which cover most of Greenland and Antarctica. These ice sheets will be the major source of any very significant and very fast sea level rise which might occur. Complete melting of the Greenland ice sheet would add 20-24 *feet* to global sea levels – a devastating amount, given that many of the largest cities in the world lie quite close to sea level. The south polar ice sheet contains much more ice

– enough to add *2oo* feet to global sea levels.

Few scientists, if any, foresee the Antarctic ice sheet melting *entirely* in anything shorter than hundreds of years. The Greenland ice sheet is another matter, which Lynas covers in fair detail in the Two Degree chapter.

http://science.howstuffworks.com/envi...

NEW (3/26/17)
Note however that even since I wrote the words above (a couple years ago maybe?) much more knowledge about the physical forces working on the Antarctic ice shelves has been acquired. In light of this, much more sophisticated models for the movement and melting of Antarctic ice have been developed, and some of these models are now predicting that huge parts of this ice, enough to raise the sea-level as much as ten feet, could let go by 2050.

TIME OUT

The 2-degree rise is, of course, what has been talked of for twenty years as the peak temperature rise which must not be exceeded. This was recently agreed to by essentially all countries of the world in the COP21 Paris conference, with the more stringent goal of capping the rise at 1.5 degrees "if possible". The latter proviso (with a mechanism which might lead to the lower rise) was inserted into the agreement at the extreme urging of island nations and other countries who will be most affected by sea-level rise.

Three Degrees (2.1 to 3 C, 3.8 to 5.4 F)

For an analog to the three degree world, paleo-climate studies suggest the Pliocene – three million years ago. CO2 concentrations in the atmosphere appear to have been in the range 360-400 ppm. Today this number has just recently topped 400.

But Pliocene-like conditions globally will take a long time to take place, because of the planet's "thermal inertia": *temperatures will always lag behind changes in "forcing" from solar radiation or greenhouse gases.*

Models suggest that concerted action on our part could hold back the onset of 3 degrees rise for a century. On the other hand, BAU (business as usual) could result in these temperatures being here by 2050. "The choice is ours, and the clock is ticking." What I'm quoting was written, of course, in 2008, already seven years in the past.

- Perennial drought in most of southern Africa, "far off any scale permitting adaptation"
- Recovering rainfall in Northern Africa
- Botswana, Namibia, Angola, Zimbabwe, Zambia experience increasing dune activity; further down the warming road, much of the area buried under sand
- El Nino may become not only stronger, but permanent; this would have various effects around the globe, but many would be very large, and very bad, for the regions affected.

= =

Okay, that's where I left this review the first time I worked on it.

Here's an article from a couple years ago, which suggests that we're on a path toward Four Degrees, but also states that there's a ten percent chance of hitting Six Degrees by 2100.
http://www.independent.co.uk/environm...

New …Okay, one more chapter. Here's that Four Degree world we seem on a path to.

Four Degrees (3.1 to 4.0 C, 5.6 to 7.2 F)

- In Egypt, with **rising sea levels**, Alexandria's long history will be drawing to a close. 1.5 million people displaced. Ever larger parts of the Nile delta submerged.
- Bangladesh will lose a third of its land area, displacing tens of millions.
- Coastal cities all over the world – from Mumbai to Shanghai, New York and Boston to London, Venice, New Orleans and Miami - will face perhaps insurmountable problems, costing hundreds of billions of dollars to remedy – if the money can be found.
- Pressures on societies will be immense. "Inland cities will face a constant stream of refugees from coastal areas, with thousands – perhaps even millions – arriving all at once when major storms hit."
- Four degrees will be more than enough to allow the melt line in **Antarctica** to cross both the Ross and Ronne ice shelves. If either breaks up, "nothing will stand in the way of total collapse for the entire West Antarctic sheet and rapid inundation for the world's coastlines." [Now, ten years later, the situation is Antarctica has grown significantly worse than it then appeared.]
- **China** faces threats which pile on top of rising temperatures: massively growing resource use (from all over the world), desertification, pollution at a level unknown in the developed West, unravelling ecosystems. But with temperatures risen by four degrees, China's agricultural production could crash, with rice, corn and wheat yields declining by nearly 40 percent. Lyman doesn't even add, in this chapter, the enormous threat of dwindling Himalayan glaciers, which feed most of the largest rivers in China and provide the water for irrigating its crops.
- **Food production** will be a problem in many places. Heat waves and declining rainfall will make almost all of Australia unable to support significant crop production. India's states of Rajasthan, Punjab, together with neighboring Pakistan, are all regions that "will be hemorrhaging people in the biggest human migration ever seen, with hundreds of millions on the move in search of food and water." [Yes – in an area of the world occupied by two antagonistic nations both nuclear-armed.]
- A 2007 IPCC report identified the following "hot spots for future drought": southwestern North America, Central America, the Mediterranean, South Africa – as well as Australia.
- "Migration is the traditional human adaptation to crisis, but this time there will be nowhere to hide. Civilizational collapse, like the blast wave of a neutron bomb, will sweep around the globe."
- **Weather** will go increasingly haywire. In southern Europe new deserts will be spreading. One study projects heat waves "could be up to 65 days longer" across Spain, Portugal, southern France, Italy, Greece, and Turkey. "Summer … will be the season Europeans will dread in a four degree world."
- **Snowfall totals** will plummet by 80 percent across the continent. The level of the Caspian Sea is projected to drop by more than 10 meters.
- "Given their crucial role as the 'water tower of Europe', the impacts of snow cover changes and glacial disappearance in the Alps will propagate throughout the continent, since the Rhine and Danube rivers

headwater there.” Even constant precipitation will throw off all sorts of things, since the rivers could be subject to vast flooding following winter rains (rather than snow), and with much reduced flow at other times (lesser snow melt).
- The chapter concludes with a section called ‘Siberian Roulette’, about the possible tipping point of massive CO2 [and methane] release of a thawing tundra. [Global warming is occurring “fastest and most” in the Artic regions, as has been long projected. Temperatures in Alaska in the 2016-17 winter have at times approached **fifty** degrees F above normal. Bogs and lakes have appeared in remote parts of Siberia where they have never been seen before.]

The last two chapters are left to you, dear readers, to contemplate. As suggested in a comment below, “read ‘em and weep.”

Five Degrees (4.1 to 5.0 C, 7.4 to 9 F) 0

Six Degrees (5.1 to 5.8 C, 9.2 to 10.4 F) 0

Though humanity can still take steps to avoid (at least) the Four, Five and Six Degree worlds, **these steps will apparently, for now, have to be done without participation from the single country in the world that has probably put more CO2 into the atmosphere than any other.**

Sad

I have friends who have written perceptive reviews of the book.
https://www.goodreads.com/review/show...
https://www.goodreads.com/review/show...
and shorter, https://www.goodreads.com/review/show...

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Previous review: Nickel and Dimed
Random review: Anna Karenina
Next review: The House of Writers *dystopia in Scotland*

Owlseyes says

[Though a violent movie, one cannot

Paul Bryant says

The subject of this book is the fast approaching Global Fry-Up. Oh, I hear you cry, spare me another jeremiad about this boring topic! Yes – I'm with you. It is horribly tiresome. Okay, every time you turn on the news you get death, financial crisis, war, ghastliness. The news is always bad except for the last little bit of amusing oddness they throw in to stop you hanging yourself from your wardrobe door. Let's add to that the general feeling that many people have as they get older that everything is getting WORSE –music, movies, politicians, taxes, everything. Okay, then came Global Warming, which is Bad News to the power of a million. In the introduction this guy Mark Lynas tells the story of how he was in the toilet at one of his early presentations of this Six degrees material.

"I overheard a conversation in which an audience member apologised to another for dragging them out to something so depressing. I was truly shocked. Depressing? It had honestly never occurred to me that Six Degrees might be depressing."

Well in Six Degrees Mr Lymas presents us with a series of terrifying cataclysmic visions of what life on earth will become after the earth heats up degree by degree. It's depressing all right. Because what is the ordinary punter's reaction going to be, assuming she isn't an influential scientist or on a government advisory committee? What can we do? Run out and quickly not go on that foreign holiday? Dash out and decline to renew your car? Swiftly consume less every day for the rest of your life? The global warming crowd are the all time downers. Mr Lynas thinks his book is a call to arms. But i think it's a call to phone in sick and watch Curb Your Enthusiasm dvds all day long.

There's a lot I don't get in these debates. For a start, I don't even get why there's even an argument between the Global Warming-is Caused-by People crowd and the No-it-isn't, it's-a Natural-Phenomenon sceptics. Because these two groups seem to agree that whoever's causing it, it's happening. So both sides should stop arguing and try to figure out a better solar panel. The pathologist is contacted after the patient has been pronounced dead. Or are the warming deniers simply saying that we should carry on partying like it's 1999? Are they that genuinely idiotic?
Anyhow, the whole thing also seems to assume that everyone is in favour of the human race and that we should all be earnestly striving for the continuation of the species. This assumption is a very easy one and should be challenged, and it was too, by a bunch of extremists some years ago called the Deep Greens who thought humanity was a virus or pestilence and the quicker it exterminated itself the better. You can see their point if you take the long view. Humans are doing all they can to wreck this pretty blue spinning complex biosphere. Hey! Humans! Leave that planet alone! I can see that argument. So I go back and forth on the question of whether humans should be preserved.
Also, right now, the population of the planet is approaching 7 billion. It's too many, especially if 6 of the 7 billion start to acquire stuff the other billion takes for granted, like golf and patios and cars. Do you think they all bicycle to work because they're fitness enthusiasts? Not at all. They all want cars because they're just like us. I remember a quote from a farmer in Yemen back in the 1980s. A left wing journalist asked him about his political affiliations. Well, he says, I'm a communist now. Then his face lit up. But one day I hope to be a capitalist!
So, it's a great shame, and all, but in the future there will have to be a decision made about how many people we can allow on the planet. And there will have to be a cull. I'm sorry but this is probably a seats-3 billion planet. So we'll have to agree on who we should get rid of. Yes, it will probably be an upsetting time. But I think everyone will be able to agree that the people who should be got rid of are the nasty people. Imagine if everyone left alive on the planet after the cull was nice – how lovely that would be. No more war, no more tax avoidance and no more public littering. And very few politicians. So, they'll invent a nice-ometer. This

will measure a person’s niceness. If you drop below 50% niceness you’ll have to go. Now this system would have amazing benefits even before any serious culling started. Just announcing it will make everyone start anxiously being nice to each other , having Golden Rule parties, doing unto others before they even knew they wanted it doing unto them People will be donating their entire salaries to worthy causes, every blind person will have four or five seeing eye dogs, it will be remarkable. I haven’t thought the whole thing through but I can only see benefits. I hope I live to see it. Although the chances of any device measuring me to be more than 50% nice is, if I’m honest, remote.

Clare O'Beara says

I read this book summarised in the Sunday Times when it was published in 2007 and have now read the full horror story. Lynas is a journalist who has lived on a few different continents and now lives in UK, so he is better at communicating the science than many pure scientists. He collected the papers and charts about what would progress if the world warmed as it was set to do, and presented the evidence of the effects per each degree upwards. He largely succeeds in being unbiased, except to add that he would like the planet to survive in its current form and it would be lonely without all the major species such as Siberian tigers.

We're now nearly at two degrees already, and this after the global economic meltdown of 2008 onwards. Partly of course, we know that the carbon already output is still present, cosily insulating the Earth and damaging ecosystems like coral reefs and burning forests. And partly we can see evidence of increasingly filthier oil being produced and transported using increasingly more power.

The really scary part is that we can see the feedback cycles mentioned in the book, and we're advised that from three degrees, the next cycle is kicked into action, which brings us inexorably to four degrees and the next cycle etc. right the way to the author warning us that six degrees may prove a distressing read. Each degree is more powerful and destructive, from hurricanes becoming super-hurricanes to multiple species extinction to desertification of cropland to belches of methane from frozen subsea strata to hydrogen sulphide, already seen off Namibia, being released in a silent murderous planetary devastation.... sorry, it got away with me there.

And for each degree we are not just looking at one computer model, but looking at hard evidence from past aeons. Whatever is being described has all happened before and left fossil evidence. The layer of burned earth, the layer of mud rich with fossils followed by a layer of mud empty of the remains of life, the evidence of massive landslides which indicate huge tsunamis, the desertification following overgrazing and deforestation causing societal collapse. Coming soon to a supermarket near you.

Some suggestions to stave off ultimate destruction are mooted at the end of the book. We need seven or more wedges of change to improve; planting more trees, using less coal and more gas, driving less, ceasing to fell and burn rainforests, etc. But the main drive is to reduce fossil fuel use and gain power from other sources instead, not as well as oil and coal.

I've been a naturalist and careful consumer and secondhand user and recycler and energy saver and environmentalist all my life. Please do the same. It matters. We've only got one more generation to keep Earth under three degrees of warming, and after that, it seems to me that nothing can stop the increase.

Notes are P281 - 333 and index 335 - 345. I found eleven names in the index which I could be sure were

female. The notes and sources however cite scientific references by last name and initial.
This is an unbiased review of a library book.

David Schaafsma says

I saw this book when it first came out in 2008 and deliberately did not pick it up. But's it's not exactly as if I have been in denial. I'm a long-term environmental activist. As a young man in the sixties I read Aldo Leopold's Sand County Almanac and Rachel Carson's Silent Spring. I was there for the first Earth Day, when it appeared we all began to realize we were killing the planet. I've long been a reader and (sometimes) supporter of various ecoterrorist/environmental acts and movements. I know my Edward Abbey (Desert Solitaire). I'm a long supporter of principles of ecological democracy, resource sustainability, and the like. I'm in a group on Goodreads, The Transition Movement, where some people discuss climate change, read books. And this five star rating is not because I "enjoyed" reading this, believe me, but because it's a gift that science has given us that we shouldn't just ignore or be in denial about.

Anyway, I read Bill McKibben's The End of Nature, https://www.goodreads.com/book/show/1...

and his more recent (2010) Eaarth: Making a Life on a Tough New Planet

https://www.goodreads.com/book/show/7...

and some other such realistically frightening books, so I thought I might just pass this one by. I have kids and don't like to imagine a future in greater chaos than the present we now face. I guess that's a kind of denial, but sometimes there's only so much bad news you can take. And then we elected a climate denier who has in place various billionaires sympathetic to this suicidal position, include Rex Tillerson, Exxon Mobil CEO, as possible Secretary of State. But my friend Alan told me I must read this now, so I did.

So, in 2001, the Intergovernmental Panel on Climate Change (IPCC) released a landmark report projecting—based on current trends and practices--average global surface temperatures to rise between 1.4 degrees and 5.8 degrees Celsius (roughly 2 to 10 degrees Fahrenheit) by the end of the 21st century. At 1 degree Celsius, most coral reefs and many mountain glaciers will be lost, which we are now seeing. A 3-degree rise would spell the collapse of the Amazon rainforest, the disappearance of Greenland's ice sheet, and the creation of deserts across the Midwestern United States and southern Africa, which we are also starting to see to some extent. Lynas does a work of synthesis, drawing on the latest scientific articles, the latest computer models, and prediction based on past warm events in history. Each chapter is titled by a degree, from one to six, and tries to give you a good idea of what scientists think might happen as temperatures rise more and more. And what we face—or largely, in the US, at least, choose to ignore—is horrifying, unless we can make dramatic decisions to reverse course.

"We see, like things with faulty vision,
things at a distance," he replied. "That much,
for us, the mighty Ruler's light still shines.
When things draw near or happen now,
our minds are useless. Without the words of others
we can know nothing of your human state.
Thus it follows that all our knowledge
will perish at the very moment

the portals of the future close.”
--Dante, Inferno, Canto X
The Sixth Circle of Hell

Clearly, we are heading toward at a bare minimum solid two degree global rise, within a short time, as each year we break heat records, as the polar ice cap melts and the oceans warm and grow oily. What can save the planet from this climate disaster? You all know it: Putting an almost complete stop to carbon emissions at the very least by 2050. Are we seeing positive signs? Sure. Some entire countries are making the now dramatic shift to alternative sources of energy. But some of the major polluters are just now coming around, and slowly. What will Donald and Rex do, in the face of the Paris Accord, which was a pretty tepid first step? It’s depressing, yes. But don’t give up, Lynas says, do all you personally can to “be the change,” to stop the planet from dying. Read books like this that will not lead you to despair, but activism.

He suggests this, from Dylan Thomas:

Do not go gentle into that good night.
Old age should burn and rave at close of day;
Rage, rage, against the dying of the light.

Amen.

See Ted’s Environmental Book List if you want to put your toe in this water, or jump in head first:

https://www.goodreads.com/story/show/...

But if optimism/ hope is not the direction you have been taking lately, and you need a good dose of slap-in-the-face realism with your wake-up call, you might also consider a recent article in The New York Magazine by David Wallace-Wells that is getting a lot of attention:

The Uninhabitable Earth
Famine, economic collapse, a sun that cooks us: What climate change could wreak — sooner than you think.

http://nymag.com/daily/intelligencer/...

Tim Ellis says

At one degree the western plains
of the US will be starved of rain,
Bankrupted farmers will pack up and flee
as desert restakes its claim.
There'll be no ice cap on the Arctic,
we'll lose the rivers of Kilimanjaro,
and frost that keeps the Alps secure
won't do it any more.
The Barrier Reef will bleach and die,
mountain animals will reach the sky
chasing the cool, and those that can't fly

will join the dinosaurs.
Tropical storms expand their domain
to bludgeon new regions - Brazil, Spain -
and hope is lost for those islanders who
look fearfully out on the rising sea,
like the ten thousand residents of Tuvalu.
This flows from warming of only one degree,
and we can't prevent it now.
We aim to stop at two.

At two degrees the North Chinese
will suffer the uttermost drought.
The rising acidity of the seas
will wreck the phytoplankton
(you don't know much about
these microscopic plants - but take my word - they sanction
most of the life in the ocean.)
Low marine pH will spell
a different biochemistry
and shellfish unable to make a shell.
Heat will kill, every summer in North Europe;
around the Mediterranean forests will burn.
As Greenland melts we'll battle to shore up
our coastal defence as the seas rise in turn.
India's swamped under monster monsoons,
Peruvian cities like Lima will die
as glaciers thaw and rivers run dry.
California's water will peter out soon,
and across the world crop yields plummet.
If we choose not to act at the Paris climate summit
our planet will come to resemble the moon,
OR
the biggest challenge will be a billion refugees
IF
we stabilise the climate at two degrees.

At three degrees most of Southern Africa
succumbs to the sand dunes that lurk beneath the soil.
A permanent El Niño brings floods to California
and the Amazon burns like a chip pan full of oil.
Drought, fire and salt will devastate Australia,
in Central America prolonged rainfall failure
triggers mass migration.
While India sustains unprecedented floods
its neighbour Pakistan is a wasteland of baked mud,
their juxtaposition mirroring the fate
of the eastern and western United States
where the eastern seaboard gets swamped by mega storms
but the country is dry as a straw bale in the west;

they abstract all the water as the continent warms
till the Colorado River is a channel of dust.
The Sahara jumps the Mediterranean,
Africa falls to the scourge of malaria.
There's mass extinctions, mass starvation, mass migration:
it couldn't get worse, but it does...

At four degrees we've lost control
there's melting ice at both the poles,
superstorms, high seas, erosion,
the whole of the tropics hot as an oven
and fight as we might we've already lost
as methane exudes from thawed permafrost

pushing us up to five...

Where the Amazon's a desert.
The sea's devoured the land.
Southern Europe's pleasant
countryside is sand.
But the ocean sediments hold the REAL trouble.
Think it's bad? Now it gets dire
when methane hydrates start to bubble
belching catastrophic eruptions of gas,
shooting the temperature higher and higher
till human populations are dying en masse
and we get to six degrees.

Dead seas.
Unbearable heat.
No wildlife, no trees.
Nothing to eat.
Disease.
Defeat.

All of us can make a thousand lifestyle changes
to stop emitting carbon; cut back and conserve,
but most of it's in vain when world finance arranges
to sink humongous stakes in the search for more reserves.
Examine the statistics - it's staggering to learn
our two degree target means we can't afford to burn
a fifth of what already has been found.

Divest!
Protest!
Foment unrest!
- the aggregated evidence attests
our only hope's to keep it in the ground.

We got no choice but keep it in the ground.
We got no choice but keep it in the ground.

Clif Hostetler says

This is a 2007 (2008 in USA) book about global warming. It summarizes the results from scientific papers on climate change, and it uses successive chapters to describe the world's climate at 1°C, 2°C, on up to 6°C rise of average temperatures. The effects are compared to paleoclimatic studies, with six degrees of warming compared back to the Cretaceous geologic period.

Since this book is already ten years old it's interesting to compare its predictions to what has actually happened since it was published. This book predicted that we would reach 400 ppm of atmospheric CO2 by year 2015. According to this website, 401.51 ppm was reached in 2015.

The 2008 worldwide recession reduced CO2 emissions, so I was hopeful that it may have delayed reaching the 400 ppm mark. These GRAPHS show that total emissions of CO2 into the atmosphere actually decreased in 2009. (This is one of the few good things about a recession.) But the resulting rate of increase to atmospheric CO2 concentrations as shown on this GRAPH is barely detectible.

This book indicates that if we're able to stop the rise in CO2 at 400 ppm we are still doomed to a probable increase in average world temperature rise of 2°C which will result in increased severity of to storms in the weather, increased pH in oceans that will cause bleaching of coral reefs, and moderate rise in ocean levels. These things are already happening.

However, if CO2 concentrations rise to 450 ppm (3°C average temperature increase) we will probably pass the threshold for carbon cycle feedback. Carbon cycle feedback refers to various biochemical reactions that respond to rising temperatures in a manner that causes still more increased CO2 discharge to the atmosphere.

If the CO2 concentrations continue to increase to 550 ppm it will probably result in an increase of 4°C to average world temperatures which will probably pass the threshold for Siberian methane feedback. Siberian methane feedback refers to the expected release of methane caused by thawing of the permafrost in the arctic regions which will allow initiation of the organic decomposition of organic material previously held in a frozen state. This causes organic carbon to be converted into atmospheric CO2. At some point the warming of ocean temperatures may cause the release of methane hydrate (a greenhouse gas) that is currently trapped at the bottom of the ocean under the load of high water pressure.

If the CO2 concentrations continue to increase to 650 ppm it will probably result in an increase of 5°C. It will be the first time the earth has been that warm since the Pliocene geologic period 5 to 3 million years ago. That's the era of when the hominid fossil "Lucy" was living. The oceans will have risen sufficiently in this world to dramatically change the shape of the exposed land mass.

If CO2 concentration reach 800 ppm the earth's temperature will reach the 6°C rise threshold which will be the highest temperatures since the Cretaceous geologic period 145 to 66 million years ago. This was the time when dinosaurs dominated, the only mammals were small creatures, and there were certainly no humans alive at the time.

This book suggests that humans are clever enough to probably survive in a world of 6°C rise, but the earth would almost certainly not be able to support today's population. Of course there are plenty of uncertainties in these predictions, and climate change deniers like to emphasize this point. But uncertainty could go the other way, and conditions could be worse than predicted. The reason climate change deniers can sound believable is because there is a long lag time in these changes. If CO2 concentrations stopped at today's levels the earth's temperatures would continue to rise and the ocean levels would continue to rise for 30 to 50 years.

Since this book was published ten years ago some of the predicted correlation between temperatures and CO2 may today be slightly different based on more advanced modeling. But it's my understanding that the general order of magnitude of expected changes are much the same.

Unfortunately, climate change has become a political issue with conservatives generally being skeptical of climate science and liberals being advocates of it. Here's a **LINK** to a NYT article (April 27, 2017) that indicates that there is an organized effort underway to send an anti-climate change booklet to virtually every science educator in the USA. Unfortunately, a recent survey indicates that some science teachers show signs of being influenced by this misinformation. The following is taken from the NYT article.

> A survey of 1,500 American science teachers published last year in the journal Science found 30 percent of those surveyed said they emphasized in their classes that recent global warming "is likely due to natural causes." Less than half also correctly identified the degree of consensus among climate scientists that human activities are the primary cause of global warming.

It's difficult to imagine any credentialed science teacher being influenced by this propaganda. All teachers I know would recognize it as politically motivated misinformation.

The following link is to a six page summary of *Six Degrees* by Mark Lynas:
http://www.sustainablewoodstock.co.uk...

The following link is to the report, "Climate Change 2014, Synthesis report, Summary for Policymakers." This is a 32 page report. Its contains some excellent graphs in color.
http://www.ipcc.ch/pdf/assessment-rep...

Gordon says

This is an superb book for anyone interested in global warming, which should include all who inhabit this planet. It paints a picture of what happens to the Earth at each step as it warms up by one additional degree Celsius, all the way up to six degrees above today's temperature. Needless to say, things get very ugly by the time we get to three degrees, let alone six. The latter translates to another mass extinction. Which, come to think of it, we're already going through.

This is not the cheeriest of texts. In fact, I recommended to my father that he NOT read it -- why does he need to worry about this kind of thing at the age of 85? -- but he read it anyway.

If you're looking for both knowledge and motivation to get more involved in the movement to shift to a "green energy" economy, this is a great book to read.

Radiantflux says

25th book for 2016.

I am in awe at the amount of studies Lynas must have read to come up with this very detailed and accessible summary of the climate change literature (up to 2007) detailing step by step the changes to the Earth as it slowly heats up degree by degree.

I knew that a 2-3 degree C increase was bad, but I really had no idea how terrible it really was before reading this book. No more Amazon rainforest, no more coral reefs, mass flooding of cities, starvation of millions, loss of much of the biodiversity of life etc. What is worse is that once we are in the 2-3 degree warming range feedback mechanisms may well force us into the nightmare world of 4-5 degrees plus.

After reading it's impossible to understand why the World doesn't simply ban internal combustion cars, close down all coal power plants, massively invest in renewable energy, nuclear etc etc. The world our children and grandchildren are going to inherit is going to be awful if we don't take the science of global warming far more seriously.

It became obvious to me reading this book that we are rapidly reaching a point where geo-engineering (with all its inherent problems) will be conducted simply to mitigate the worse effects of warming. Whether a techno-fix will really fix anything is anyone's guess, and shows how close we are from destroying the global culture we have built up over the last few thousand years. No one should be under any illusions that civilization will survive a 3-4 degree temperature increase.

And suddenly Elon Musk's dreams of setting up a Mars colony - Elon Musk: Inventing the Future - to safeguard humanity start looking more sane, which is a measure of how insane things are really getting.

How stupid and short-sighted are we?

A must read for anyone who is interested in issues of climate change or simply interested what sort of World their children will probably live in.

Laura says

** **My review is a call to action for anyone in healthcare in particular, as well as the general public.****
I finished *Six Degrees: Our Future on a Hotter Planet* several days ago, but wanted to let the book's subject matter sit with me a few days before I wrote a review. Plus, I've been freakin busy! There are many insightful reviews on the subject matter itself, so I'm going to focus more on what the book meant to me as a human, and as a nurse. Bottom line: our earth is warming up. What is *causing* the warming, and how *severe* the warming will be constitutes almost all the discussion on climate change in mainstream media...when any discussion occurs at all. But as another astute reviewer put it--while the patient is alive we focus on the symptoms and a cure. Autopsies occur AFTER the patient dies. So, with our planet, I fear that we are so focused on the cause that we won't address the symptoms or a viable cure until its too late.

Mark Lynas has written a book that does just that...focuses on the symptoms. He outlines what each increasing degree Celsius means for our environment, and by extension us. His book is rooted in a 300 item long bibliography of scientific studies. His lens is broad, and his chapters encompass the entire globe, cataloging changes from the Amazon rain forest, to to the Savannah of Africa, to the Alps, to the poles. It may be hard for readers to wrap their mind around the scale of projected changes, to remember that each of these large areas contains countless villages, communities, neighborhoods, families. People whose entire way of life may very well change.

When I finished the book, my first thought was...how am I a nurse in a large university teaching hospital...and we aren't talking about this. We aren't actively participating in local or state governmental policy or taking action to advocate for our community. Some nurses, maybe even dozens of nurses are, but there isn't a collective, unified action. So then I wondered...are there any platform statements by nursing/health organizations? Turns out there are some, but many are woefully outdated. Here's one from the WHO--

> Environmental Health...also refers to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially adversely affect the health of present and future generations.

1992

And here's another quote, also from 1992, from the International Council of Nurses.

> The concern of nurses is for people's health--it's promotion, its maintenance, its restoration. The healthy lives of people depend ultimately on the health of Planet Earth--its soil, its water, its oceans, its atmosphere, its biological diversity--all of the elements which constitute people's natural environment. By extension, therefore, nurses need to be concerned with the promotion, maintenance, and restoration of health of the natural environment, particularly with the pollution, degradation, and destruction of that environment being caused by human activities.

Much more recently the Ohio Nurses Review released a paper in September, 2016. They agree with many of the predictions that Lynas laid out in his book--namely the looming threats to public health of temperature related death and illness (heat stroke), air quality impacts, increasing extreme events (heat waves, hurricanes, tornadoes, mudslides, floods, wildfires, and drought), growing food insecurity, and increased vector-borne diseases. These are serious threats to populations, and nurses need to educate themselves so that they can educate and advocate for their communities. We need to be doing this now!

I'm well aware of the educational challenges though. Almost 10 years after this book was published, a large percentage of Americans still refuse to believe that climate change is real. An even smaller percentage believe that climate change will affect them personally. Lynas does a great job of discussing the forms that denial take. Here are some of the major ones: 1. denial of responsibility (I'm not the main cause of the problem) 2. rejection of blame (I've done nothing wrong) 3. powerlessness (nothing I do makes much of a difference) 4. comfort (It's too difficult for me to change my behavior) 5. fabricated constraints (there are too many impediments and 6. faith in some kind of managerial fix or technological "white knight" which will solve the problem for everyone. This is a problem that requires grass roots, mass effort.

To close, Florence Nightingale wrote the first rule of Nursing in 1859. Back then wounded soldiers lay in squalor in dank wards. She famously said "Keep the air within as pure as the air without". In 2017 we must

care about the air without. We must fight for its purity.

Antonomasia says

Why is climate change not the biggest issue for the loudest group of protestors in the West these days? I'm starting to wonder. Why do student firebrands (who are usually middle class and comfortable, often protesting about things that don't directly affect them) mostly treat it as a secondary issue, some way further down the list than their main concerns? Why are SJWs **S**JWs and not **C**JWs? What if we'd had as much progress in legislation and in attitude change among the media in the last five years as there has been on trans issues, for instance? (That would also give a better chance of a stable society in which there would be peace and space enough for trans issues and needs to still be considered significant in fifty or a hundred years time.) Even many people who aren't personally invested in trans issues talk about the subject differently now. Then there's the loudening in feminism over the same timespan; perhaps feminism is more comparable to climate change and environmental issues as something already widely recognised as important, which had been further down the agenda for a while. Climate science is easier to make sense of than the works of Judith Butler.

If you look at this graph of climate during the 200,000 years modern humans have been here you'll notice that for the first 188,000 years the climate was very unstable compared to the last 12,000 years.
Guess what also happened around 12,000 years ago?
Agriculture developed along with cities and civilization...
our relatively prosperous interlude may prove to have been a lucky aberration, thanks in large part to the massive boost in food and energy that our civilisation derived from fossil fuels. This same fossil energy boost, of course, while allowing our species to proliferate massively in numbers and construct wonderful, complex societies in little more than a historical instant - could in the longer term prove to be our undoing...
Where no refuge is available, and crops and water supplies fail, civil war and a collapse into race or community conflicts seems-sadly-the most likely outcome.

These mostly-twentysomethings voxpopped by *Vice* in July might not consider themselves the SJW type, but evidently there's a problem of understanding: it will require signficant levels of crisis, like food shortages affecting middle class Britons, for them to want to do much about it. By which time a lot more damage will have been done, with more again waiting in the wings, due to the time lag involved in cause and effect. Would six similar people in 2005 or 2010 thought that sexism and racism were huge problems they and the media should be continually aware of? I doubt it, they would have probably thought it could be a lot worse in the UK. But those, for whatever reason are the issues that got pushed to the top of the agenda by the types of activists that manage to set it. Anyway, this difference of priority might have just shot to near the top of my reasons to be annoyed with SJWs (from my also leftwing, narcissism-of-small-differences position).

Humans are hopelessly short-termist, and nowhere near enough of them think that nature is more important than their own species or specific examples of it. As was said in another book I read recently, Gwynne Dyer's Climate Wars (which I also read simply because it was on Scribd, rather than because it was my first choice among books on climate change), some of them have learned a lot about international co-operation (e.g. the UN) over the last seventy years, besides (not mentioned in the book) huge changes in Western countries in general attitudes and legislation on domestic violence, corporal punishment, animal cruelty and so on. But humans as a mass do continue their old ways that got them where they are today, of putting themselves first although they are more of an endangering than an endangered species. Another Vice article - based on the opinions of one psychologist - suggests that lifestyle change needs to be sold to the public as

fun and improvement. (But what about all those people who are satisfied with government austerity policies because they see a national budget in the same way as a household budget? With the right rhetoric and, crucially, media support, I'm sure they could be got on board. And some others, at least, are fear-motivated or have some degree of interest in simplification, back to the land etc. I don't think the same shiny bright green hipster message works on everyone.)

As you would expect from a nine-year old book about a fast-changing area of science, *Six Degrees* was sometimes a burden to read because of wondering, and checking whether, some piece of research has been superseded or confirmed (and there are hundreds of studies mentioned here – it's essentially a synthesis of climate modelling and palaeoclimate research up to 2006) – and then there is looking at up to date info about carbon emissions, Arctic ice, etc. to see to what extent that might alter the book's conclusions.

Broadly, it still correlates with recent events and research (particularly because it takes into account the point that palaeoclimate findings turned out to be more sensitive than the models used up to time of writing) ; since then there have been rises in carbon concentrations to the landmark 400ppm, a number of record hottest years approaching an average 1.5C above pre-industrial levels, and reductions in Arctic ice are more or less in line with the book. Perhaps the most significant change between then and now is fracking. (The greenhouse conditions under which shale oil and gas was created millions of years ago make it seem a Pandora's box of a substance.) And - somewhat related - the dip in oil prices that has disincentivised alternatives. [Thanks Leah for the reminder in comments.] Renewable energy use has gone up a bit but not as much as it needs to, and more dramatic positive developments are tentative, like this Icelandic carbon capture scheme which has successfully changed CO2 into rocks.

A new modelling study from Canada, on what may happen by 2300 if all known fossil fuels were burnt exceeds the global average six degrees Celsius rise after which this book is named, and suggests eight degrees (higher in some places, lower in others); interestingly media reports of the study mention conditions similar to those cited by Lynas as possibly occurring from average 5-6 degree rises. Without reading other papers cited by the Canadian study and by those Lynas outlined, it's impossible to say whether this is because temperatures are now thought to have been higher in the Eocene, or for some other reason. (For 6 degrees or more, he suggests a super-fast verson of the end-Permian extinction, the largest one ever known.) That National Geographic report on the study makes a good point that limiting considerations of potential changes up to 2100 now looks short sighted. If human longevity continues its recent pattern (which it may not due to less healthy lifestyles, as well as environmental changes that may occur in the intervening decades) then most western kids born now would be alive then, as pensioners. It's not as far away as it used to be.

The book is sort-of organised around possible average temperature rises of 1,2,3, 4, 5 and 6 degrees above pre-industrial levels. Reports of that study confirms my general impression that Lynas had given more weight to studies which displayed direr consequences at each point, i.e. without being able to recall exactly which other articles I meant, I felt that he often cited consequences commonly associated with a degree or two higher than where he mentioned them. Which is not to say that there is no value in the book, or that 1-2 degrees of warming do not have significant consequences for ecosystems and food production. It is perhaps more a problem of organising the material. Climate systems are very complex and trying to present them, and potential events within and affecting them, in the linear form of words, rather than, say, a series of animated 3-D flowcharts and diagrams, is inevitably a challenge. Including worst case scenarios can easily make them more noticeable because they can't help be more dramatic. And you can't have a decent survey without including the best and worse cases.

A number of the modelled scenarios and political possibilities were similar to those in *Climate Wars*, such as

war between India and Pakistan over water supplies (various world river systems and their reliance on glaciers and seasonal snowmelt being described in more detail here), famines in China resulting from failure of river systems, and desertification in the southwestern USA. Other, different ones, were addressed in greater detail - these similar books need their USPs - poor Botswana, for instance, which appears to have a poor chance of not becoming a desert, actually the entire country. Predictions for regions of Africa get more attention here: the Sahel may for a while become greener and get higher rainfall, but only for a few decades at most. Other models suggested a simpler drying and heating up. Either way, at some point, millions if not billions of refugees will try and escape famine and probable wars by going north to Europe (where the Mediterranean countries will themselves be increasingly parched and infertile) or south to South Africa, dwarfing the current Syrian and Eritrean exoduses. [exodi?] Northern Europe and Canada should be relatively okay climatically (and everybody will want in) - although this ranking of countries' preparedness for global warming must have its limits considering the UK, Netherlands and Denmark's relative vulnerability to sea level rise - and reading these things I do worry for online friends in hotter parts of the world, them or their [potential] children, especially in the most politically tense regions.

As might be expected from an author who'd previously written a book on sea level rises, changes in the oceans get detailed attention here, from the decrease in plankton at the base of the food chain and coral bleaching, to one of the great wildcards of climate change, the possible release of large quantities of methane (a far more potent greenhouse gas than CO2) stored in sea beds, which erupted during some prehistoric extinction periods, and can be stimulated by seismic activity or landslips. (The Mesolithic Storegga Slide, which swept away Doggerland and made Britain an island, was also associated with one of these).

One of the observations that feels most credible in the Northern Hemisphere is an increased severity of storms - at least as much as hotter summers - as a marker of global warming. Americans have their huge hurricanes, but Britain has its own more modest equivalent changes. In the times in my adult life when I've lived in houses and flats with outdoor space, I'm positive there has been far more frequent running outside into storms to stop things blowing away than there ever was when I was a kid. This sort of thing didn't used to need doing every year, never mind several times a year, sometimes more than once a month. And there was a lot more loose stuff in that garden then than I would keep lying around. It seems a more consistent change up to this point than the variability of winters: 1981...2011 and those mild grey 90s Christmases between.

Lynas suggests significant tipping points after which it will become very difficult for humans to control global warming, two in particular. The first is the drying-out of the Amazon rainforest (the world's largest tree-based carbon sink - not just the home of a lot of wildlife and Sting's favourite aboriginal people, as one could be forgiven for thinking on the basis of certain 1980s campaigns) and its succumbing to forest fire, releasing all that carbon into the atmosphere. This is indicated as likely at 3 degrees of warming - other estimates may vary.
Next, and perhaps itself impossible to avoid if the Amazon were to burn, due to the increased heating from all that carbon, the full scale melting of Siberian permafrost and the release of the gases stored in that.

Humans can be enormously interesting and they have discovered and created some amazing things, so yes it will be a shame if there are no more of them, or if the decent, empathic and talented ones all disappear with pretty much only the blindly bellicose and the extremely religious remaining (albeit with the possibility of descendants with different temperaments).
However, Lynas belongs firmly to the category of environmentalists I call "human-first" as opposed to "nature-first" and I strongly take issue with the following which seems little short of a secularised version of the religious homilies that the Earth was created for man to use:
The planet might even be better off without Homo sapiens, some might suggest. Notwithstanding the moral

questions that this sort of attitude raises (it is a bit like saying the Nazi Holocaust didn't matter because the high post-war birth rate soon replaced the six million dead), it is far from clear that life will always go on. Although earlier in the book he does acknowledge *In Gaian terms, I suppose, the planet would be trying to restore a balance.* I find the Gaia concept too sentimental by name, but underneath I probably do see things similarly, finding humans torturing and deliberately harming other humans infinitely sinister and repellent a very different matter from the processes of nature itself, even though measured soleley by pain in those who do not feel that way, there may be little difference. Don't most people find it sadder that humans might destroy everything, not just themselves?

In the worst case scenario of an end-Permian level extinction, *It took 50 million years-well into the Jurassic-before anything like pre-extinction levels of biodiversity returned...*
the end-Permian greenhouse probably took at least 10,000 years to play out. We could achieve the same level of warming in a century, a hundred times quicker even than during the worst catastrophe the world has ever known. [Even 1000 years wouldn't give much time for adaptation, given that 10000 years was too fast.]...
Scientists have calculated that only a billion years remain before the bio sphere will go extinct for ever from overheating [by the sun] -the planet is already 4.6 billion years old...
It took 50 million years-well into the Jurassic-before anything like pre-extinction levels of biodiversity returned. Everything else wouldn't have that much time to recover from humanity if things got that bad.

From sitting on the fence in 2007: *To knowingly cut this flowering short is undoubtedly a crime, one more un- speakable even than the cruellest genocide or most destructive war. If each person is uniquely valuable, each species is surely more so. I can see no excuses for collaborating in such a crime. As the post-war Nuremberg trials established, ignorance is no defence;*
Lynas now appears more human-centred. For example he favours nuclear power. Which is a tricky issue and perhaps one on which no one can be right in my eyes. To those who are idealistically and firmly anti-nuclear, I tend to say that there's inevitably going to be *some* more of it as a backup to renewables because the alternatives aren't familiar and tested enough for politicians, and I wouldn't actively oppose it - but people who are firmly pro are the Other Side who evidently think it's fine for humans to keep knowingly on a path of destroying a great deal else to satisfy their short term interests, by creating nuclear waste that will hang around for a very long time.

Back in 2007, Lynas described climate change and ecosystem destruction as "a classic tragedy of the commons" and pointed out that economics and finance is wrongly configured, considering wild resources (whether obvious ones like fish, or the atmosphere and climate itself being in a state amenable to trade and business) as "free goods" missed out from accounting, and depletion of resources counts as an accumulation of wealth. (Depreciation ought to be built in, he doesn't quite say, as it is for large items of equipment infrequently purchased.) All of which shows again for what a short time civilisation has existed.

The principal solution offered here are things to which the world is really no closer than it was at the time the book was written - although the Paris accord and increased %s of renewable energy use are something (a little something).

Just as people were better off and healthier in Britain under food rationing during the Second World War, so most of us would see a dramatic improvement in our quality of life if 'carbon rationing' were introduced by the government.... Although carbon permits should be tradeable in the interests of flexibility, conspicuous carbon consumption by celebrities would be largely eliminated. Instead, social pressure would reverse, with people happy to make changes in the knowledge that everyone else is doing likewise.
This kind of collectivist solution is likely to be anathema to conservative Americans, who don't have the

idealisation of the make do and mend era not uncommon on both right and left in Britain. (Though perhaps the idea is that countries would start this unilaterally - scandinavians first, I guess? - and do what they could, ignoring the US.)

An entirely unprecendented solution, meanwhile, is *an across-the-board global agreement, given different levels of development? There is only one logical way out of the conundrum: rich countries must agree to trade their habituated inequity in return for poor countries' participation in an agreed climate regime, a compromise first proposed by the Global Commons Institute and known as 'Contraction and Convergence'. Under C&C, all countries would converge to equal per person emissions allocations by an agreed date, within the overall context of a contraction of global emissions to sustainable levels. It would be a historic bargain: the poor would get equality, whilst all (including the rich) would get survival.*
In the US, where per person emissions are higher than in the majority of the world, this convergence process would require much heftier cuts than the global average, perhaps as high as 85 per cent by 2030, depending on the nature of the C&C deal. In order to make the system flexible and efficient, however, it is crucial that an international market in emissions permits is established-allowing poor countries to sell unused allocations to the rich, generating significant revenue in the process. This earning from a global carbon trade could help tackle poverty as well as ensuring that poorer countries have the option of pursuing a low-carbon development path.

(Having until now considered political principles and potential public service provision in terms of what we could afford in this country, I am extremely curious about what we could afford in this hypothetical scenario - and it probably won't be pretty.)
