Chapter 4 – Models and Responses to Climate Catastrophe

We will mainly introduce in this chapter, and chapters 5 and 6, the work of Guy McPherson (Google ref. "Nature bats last" http://guymcpherson.com/climate-chaos). David Wasdell has worked on nonlinear feedback models of climate, which predict climate catastrophe, and references can be found on the Apollo-Gaia website (www.apollo-gaia.org).

Climate catastrophe.

The zero response of politicians, heads of non-governmental organizations, and corporate leaders remains the same, highly relevant when thinking about their pursuit of a buck at the expense of life on Earth.

As Hallor Thorgeirsson, a senior director with the United Nations Framework Convention on Climate Change, said on 17 September 2013: "We are failing as an international community. We are not on track." These are the people who know about, and presumably could do something about, our continuing race to disaster.

Worse are the media. Fully caught by companies and the corporate institutions, the media continue to dance around the issue of climate change. Sometimes a forthright piece is written, but it generally points in the wrong direction, such as suggesting climate scientists and activists be killed (e.g., James Delingpole's 7 April article in the *Telegraph*). Leading sources of information routinely lie to the public.

According to a report written on 11 January 2014, "the BBC has spent tens of thousands of pounds over six years trying to keep secret an extraordinary 'eco' conference which has shaped its coverage of global warming." At the 2006 event, green activists and scientists — one of whom thinks climate change is a bigger danger than global nuclear war — lectured 28 of the BBC's most senior executives.

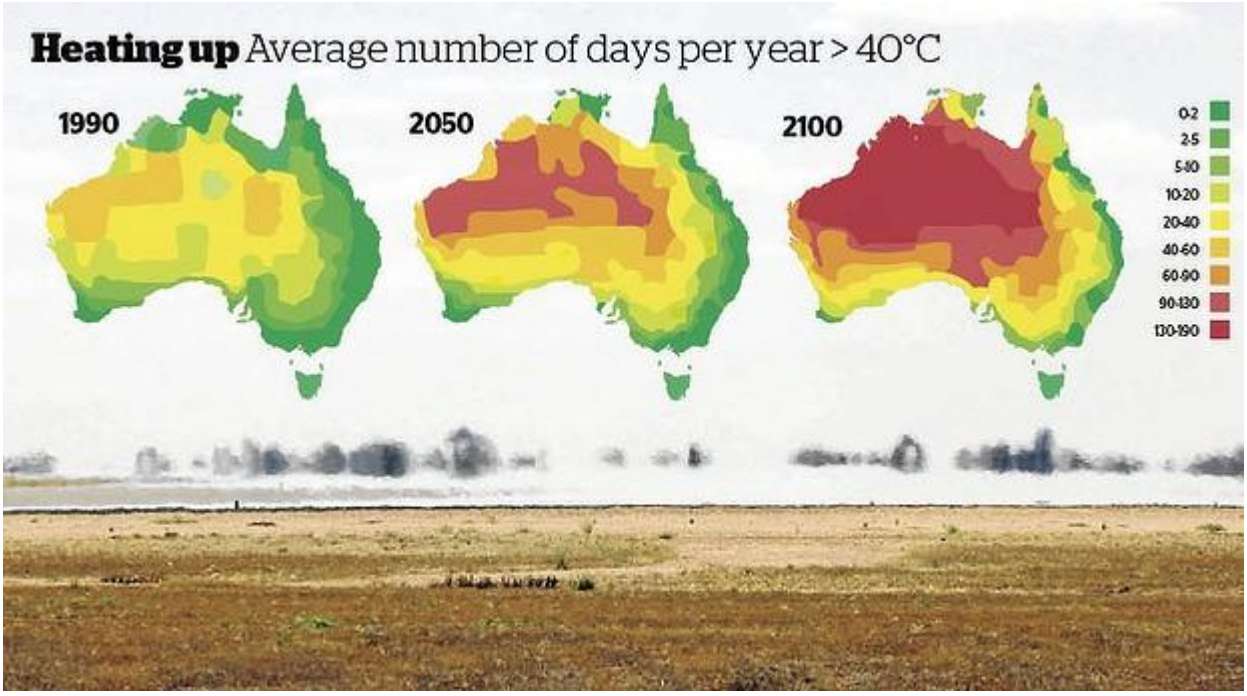
Most scientists minimize the message at every turn. As we've known for years, scientists almost invariably play down climate impacts. And in some cases, scientists are aggressively muzzled by their governments. I'm not suggesting conspiracy among scientists. Science chooses opposition to change. Academics choose extreme conservatism. These folks dislike the risk of drawing undue attention to themselves by pointing out there might be a threat to civilization. Never mind the near-term threat to our entire species (they couldn't care less about other species). If the truth is adverse, they can find another, not-so-dire version. The concept is supported by an article in the February 2013 issue of *Global Environmental Change* pointing out that climate-change scientists regularly underestimate impacts "by erring on the side of least drama." Almost everybody reading these words has a vested interest in not wanting to think about climate change, which helps explain why the climate-change deniers have won.

In the latest release from the Intergovernmental Panel on Climate Change (IPCC) on climate change and global heating, the authors describe the current impact of planetary warming, where we humans are vulnerable in the near future, and how we will have to adapt. With its opening statement, "Human interference with the climate system is occurring," the report no longer hedges on probability. However, the IPCC's forecasts have been revealed as too conservative time after time, including low-balling the impact of emissions, as pointed out in the 9 March 2014 issue of *Nature Climate Change*. What is the IPCC big picture?

- We are seeing and will see more changes to the state of water on this planet from altered rainfall patterns, melting alpine glaciers and polar sea ice, thawing permafrost, shrinking sources of water, acidifying oceans and sea levels rising.

- We are seeing land based, freshwater and marine life all undergoing stresses from changes to habitat, migration patterns, and food sources.
- We are seeing lower crop yields.
- We are seeing human health changes due to climate factors, although this is not as well documented as of yet.
- We are seeing those in the Developing World already vulnerable, becoming even more so as the above reasons impact their societies.
- We are seeing more extremes in weather with heat waves, droughts, floods, wildfires, and cyclonic storms causing damage to our economies at increasing costs.

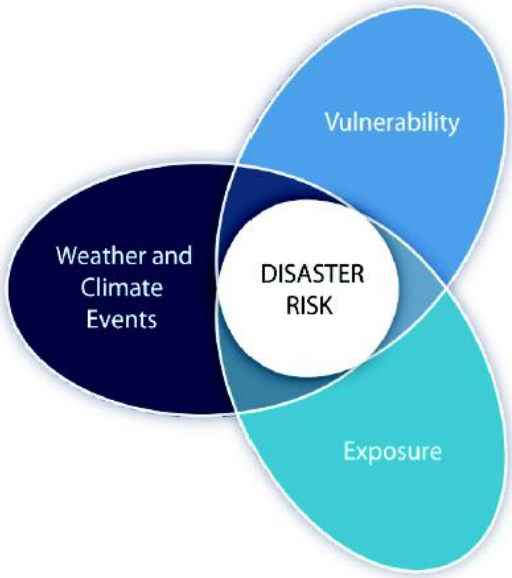
So far what does the report say about how we are adapting to all of the above?



- Governments are putting adaptation plans in place, but very slowly with Australia and the island nations of the Pacific and Indian Ocean leading the way. You can see why just by looking at the temperature forecasts in the image above. Australia, more than any continent will feel the impact.
- The weakest response so far at the national level seems to be coming from the nations of North America where most of the planning is happening in municipalities in terms of hardening of infrastructure, but very little at the state, provincial and federal level.
- In the Arctic, where the climate change impact will be seen the soonest, some work is being done on adaptive strategies with the nations and communities of the North meeting often. But it would seem far too little has been accomplished and without significant investment in adaptation strategies it is already probably too late.
- For the oceans there is the beginning of international cooperation and planning to deal with climate change challenges including coastline submergence, the bleaching of coral reefs, acidification, and declining biodiversity.

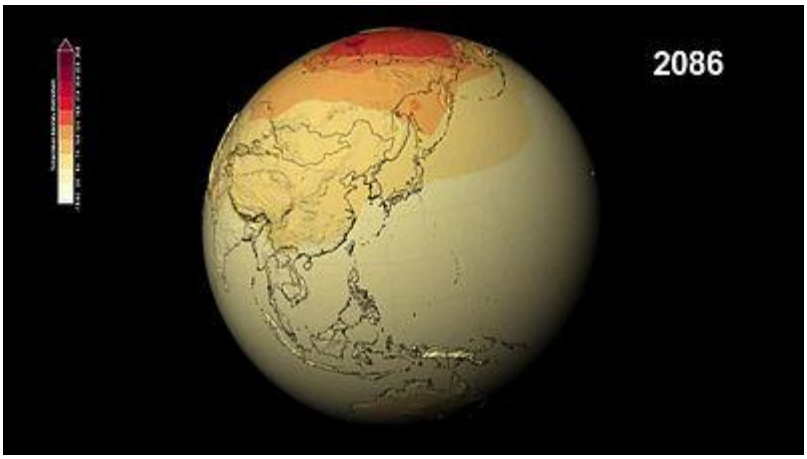
For the first time the IPCC report openly states the key risks from the changing climate, everything from food insecurity, extinction of animal and plant species on land and sea, submerging of coastlines and coastal communities, disappearance of island nations and

weather event risks to human health, infrastructure, jobs, and income. The study report even measures the war probability brought on by nations fighting over declining resources.

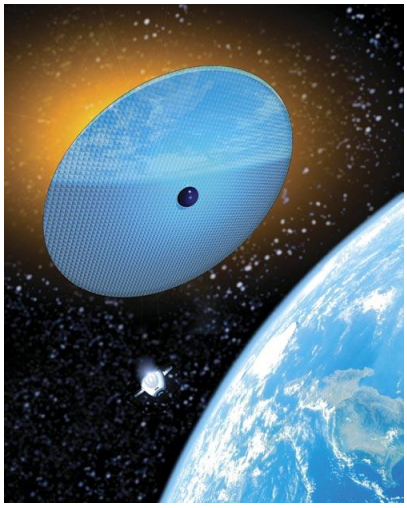


The IPCC states that we will certainly see global warming with mean global temperature rising an average of 0.2 Celsius per decade based on current rates of carbon emissions. Should emissions, however, continue to rise the rate of heating could be as high as 4 Celsius by the century's end. At the extreme end of this heating projection the IPCC report points out that the warmer the atmosphere the less land and ocean is capable of absorbing carbon feeding the cycle of heating even faster.

For policy makers the latest report lays out a roadmap for sustainable development, hardening of infrastructure, and adaptation. Failure-to-act is not considered a good option.



Ever late, the IPCC admits global warming is irreversible without geoengineering in a report out on 27 September 2013. As pointed out in the 5 December 2013 issue of *Earth System Dynamics*, known strategies for geoengineering are unlikely to succeed ("climate geo-engineering cannot simply be used to undo global warming"). "Attempts to reverse the impacts of global warming by injecting reflective particles into the stratosphere could make matters worse," according to research in the 8 January 2014 issue of *Environmental Research Letters*.



In addition, the December 2013 issue of *Journal of Geophysical Research: Atmospheres* says that geoengineering may succeed in cooling the Earth, but it would also disrupt rainfall patterns around the world. Furthermore, "risk of abrupt and dangerous warming is inherent to the large-scale implementation of SRM" (solar radiation management), as pointed out in the 17 February 2014 issue of *Environmental Research Letters*. Finally, "schemes to minimize the havoc caused by global warming by purposefully manipulating Earth's climate are likely to either be relatively useless or actually make things worse," judging from research in the 25 February 2014 issue of *Nature Communications*. As it turns out, the public isn't impressed, either: Research in the 12 January 2014 issue of *Nature Climate Change* "reveals that the overall public evaluation of climate engineering is negative."

Gradual change is not certain, as pointed out by the U.S. National Academy of Sciences in December 2013: "The history of climate on the planet — as read in archives such as tree rings, ocean sediments, and ice cores — is punctuated with large changes that occurred rapidly, over the course of decades to as little as a few years." The December 2013 report echoes one from Wood Hole Oceanographic Institution more than a decade earlier.

In the evidence presented below, here's the bottom line: On a planet 4 °C hotter than baseline, all we can prepare for is human extinction (from Oliver Tickell's 2008 synthesis in the *Guardian*). Tickell is taking a conservative approach, considering humans have not been present at 3.5 °C above the baseline of the beginning of the Industrial Revolution, commonly accepted as 1750. According to the World Bank's 2012 report, "Turn down the heat: why a 4 °C warmer world must be avoided" and an informed assessment of "BP Energy Outlook 2030" put together by Barry Saxifrage for the *Vancouver Observer*, our path leads directly to the 4°C mark.

The 19th Conference of the Parties of the UN Framework Convention on Climate Change (COP 19), held in November 2013 in Warsaw, Poland, was warned by professor of climatology Mark Maslin: "We are already planning for a 4 °C world because that is where we are heading. I do not know of any scientists who do not believe that." Adding to planetary misery is a paper in the 16 December 2013 issue of the *Proceedings of the National Academy of Sciences* showing that 4 °C ends the ability of Earth's vegetation to absorb atmospheric carbon dioxide.

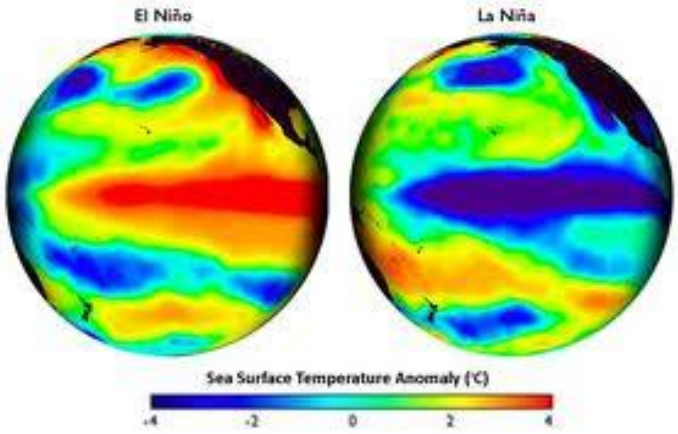
I'm not sure what it means to plan for 4 °C (extinction). I'm not impressed that civilized scientists claim to be planning for it, either.

According to Colin Goldblatt, author of an online paper in the 28 July 2013 issue of *Nature Geoscience*, "The runaway greenhouse may be much easier to initiate than previously thought." Furthermore, as pointed out in the 1 August 2013 issue of *Science*, in the near term Earth's climate will change orders of magnitude faster than at any time during the last 65 million years. Tack on, without the large and growing number of self-reinforcing feedback loops we've triggered recently, the 5 °C rise in global-average temperature 55 million years ago during a span of 13 years, and it looks like trouble ahead for the wise ape.

This conclusion ignores the long-lasting, incredibly powerful greenhouse gas discovered on 9 December 2013 by University of Toronto researchers: Perfluorotributylamine (PFTBA) is 7,100 times more powerful than carbon dioxide as a greenhouse gas in the atmosphere, and it stays hundreds of years in the atmosphere.

It also ignores the irreversible nature of climate change: Earth's atmosphere will harbour, at minimum, the current level of atmospheric carbon dioxide concentration for at least the next 1,000 years, as indicated in the 28 January 2009 issue of the *Proceedings of the National Academy of Sciences*.

Finally, the *New Yorker* asks a relevant question on 5 November 2013: Is It Too Late to Prepare for Climate Change? Joining the too-little, too-late gang, the Geological Society of London points out on 10 December 2013 that Earth's climate could be twice as sensitive to atmospheric carbon as previously believed. *New Scientist* piles on in March 2014, pointing out that planetary heating is far more sensitive to atmospheric carbon dioxide concentration than indicated by past reports. As usual and expected, carbon dioxide emissions set a record again in 2013, the fifth-warming year on record and the second-warmest year without an El Nino.

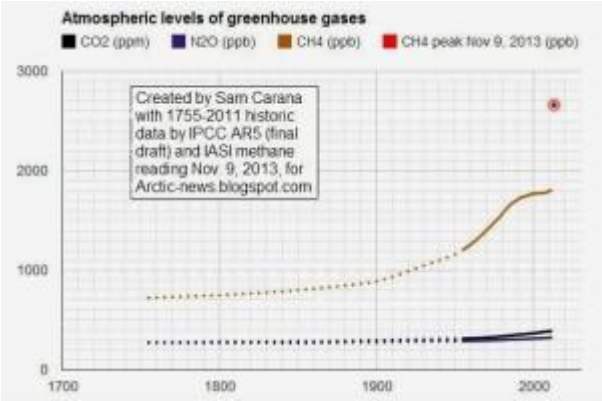


Another El Niño is on the way, as pointed out by Robert Scribbler on 6 March 2014: "Should the predicted El Nino emerge and be as strong as average model values indicate, global surface temperatures could rise by between .05 and .15 °C …. This would be a substantial jump for a single year, giving yet one more large shift toward an ever more extreme climate." Indeed, the upper end of the forecast range takes us to 1 °C warmer than baseline.

All of the above information fails to include the excellent work by Tim Garrett, which points out that only complete collapse avoids a runaway greenhouse event. Garrett reached the conclusion in a paper submitted in 2007 (personal communication) and published online by *Climatic Change* in November 2009 (outcry from civilized scientists delayed formal publication until February 2011). The paper was largely ignored by the scientific community, having been cited fewer than ten times since its publication.

According to Yvo de Boer, who was executive secretary of the United Nations Framework Convention on Climate Change in 2009, when attempts to reach a deal at a summit in Copenhagen crumbled with a rift between industrialized and developing nations, "the only way that a 2015 agreement can achieve a 2-degree goal is to shut down the whole global economy." Politicians finally have caught up with Tim Garrett's excellent paper in *Climatic Change*.

Writing for the Arctic Methane Emergency Group, John Davies concludes: "The world is probably at the start of a runaway Greenhouse Event which will end most human life on Earth before 2040." He considers only atmospheric carbon dioxide concentration, not the many self-reinforcing feedback loops described below. Tacking on only one feedback loop, and writing on 28 November 2013 — methane release from the Arctic Ocean — Sam Carana expects global temperature anomalies up to 20 °C by 2050 (an anomaly is a deviation from long-term average). Small wonder atmospheric methane can cause such global catastrophe considering its dramatic rise during the last few years, as is made clear by Carana on 5 December 2013 in the figure below.



On the topic of tipping points, we crossed the Rubicon in 2007 at about 0.76 °C warming. At this point, according to David Spratt's excellent September 2013 report, "Is Climate Already Dangerous?", not only had Arctic sea-ice passed its tipping point, but the Greenland Ice Sheet was not far behind, as the Arctic moves to sea-ice-free conditions in summer (the U.S. Navy predicts an ice-free Arctic by summer 2016, a year later than expected by the United Kingdom Parliament, which points out that the six lowest September ice extents were in the last six years). Glaciologist Jason Box, an expert on Greenland ice, agrees.

Box was quoted in a 5 December 2012 article in the *Guardian*: "In 2012 Greenland crossed a threshold where for the first time we saw complete surface melting at the highest elevations in what we used to call the dry snow zone. … As Greenland crosses the threshold and starts really melting in the upper elevations it really won't recover from that unless the climate cools significantly for an extended period of time which doesn't seem very likely." Indeed, as stated that same year in the September issue of *Global Policy*, "because of increasing temperatures due to GHG emissions a suite of amplifying feedback mechanisms, such as massive methane leaks from the sub-sea Arctic Ocean, have engaged and are probably unstoppable." By December 2013, the disappearance of Greenland's ice had accelerated to five times the pace of a few years previously, and IPCC was admitting they'd been far too conservative with past estimates. Continued conservatism is buttressed by research in the 16 March 2014 issue of *Nature Climate Change* showing melting of Greenland ice accounts for about one-sixth of recent sea-level rise.

If you think we'll adapt, think again. The rate of evolution trails the rate of climate change by a factor of 10,000, according to a paper in the August 2013 issue of *Ecology Letters*. And it's not as if extinction events haven't happened on this planet, as explained in the BBC program, *The Day the Earth Nearly Died*.

The rate of climate change clearly has gone beyond linear, as indicated by the presence of the myriad self-reinforcing feedback loops described in chapter 5, and now threatens our species with extinction in the near term. As Australian biologist Frank Fenner said in June 2010: "We're going to become extinct," the eminent scientist says. "Whatever we do now is too late." Anthropologist Louise Leakey ponders our near-term demise in her 5 July 2013 assessment at *Huffington Post* and her father Richard joins the fray in a video from December 2013 (see particularly 1:02:18 – 1:02:56). Canadian wildlife biologist Neil Dawe joins the party of near-term extinction in an interview 29 August 2013 and musician-turned-activist Sir Bob Geldof joins the club in a Daily Star article from 6 October 2013. In the face of near-term human extinction, most Americans view the threat as distant and irrelevant, as illustrated by a 22 April 2013 article in the *Washington Post* based on poll results that echo the long-held sentiment that elected officials should be focused on the industrial economy, not far-away minor nuisances such as climate change.

Supporters of carbon farming — the nonsensical notion that industrial civilization can be used to overcome a predicament created by industrial civilization — claim all we need to do is fill the desert with nonnative plants to the tune of an area three-quarters the size of the United States. And, they say, we'll be able to lower atmospheric carbon dioxide by a whopping 17.5 ppm in only two decades. Well, how exciting. At that blistering pace, atmospheric carbon dioxide will be all the way back down to the reasonably safe level of 280 ppm in only 140 years, more than a century after humans are likely to become extinct from climate change.

According to the plan presented in the 23 August 2013 issue of *Scientific American*, and described in chapter 10, the nonnative plants, irrigated with increasingly rare fresh water pumped by increasingly rare fossil-fuel energy, will capture carbon sufficient to overcome contemporary emissions. Never mind the emissions resulting from pumping the water, or the desirability of converting thriving deserts into monocultures, or the notion of maintaining industrial civilization at the expense of non-civilized humans and non-human species. Instead, think about one simple thing: When the nonnative plants die, they will emit back into the atmosphere essentially all the carbon they absorbed. A tiny bit of the carbon will be stored in the soil. The rest goes into the atmosphere as a result of decomposition.