

# Inexorable march toward utter climate disaster?

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In no affairs of mere prejudice, *pro* or *con*, do we deduce inferences with entire certainty, even from the most simple data.

E. A. Poe, *The Narrative of Arthur Gordon Pym of Nantucket*

In an International Conference on Climate Change, Ban Ki-moon, Secretary-General of the United Nations, said that our foot is stuck on the accelerator and we are heading towards an abyss. But it was almost ten years ago, in September 2009, when he said that. Now, is there any reason to think the advance toward disaster has slowed down, or maybe we have reversed course and we are getting away from the abyss? Apparently that is the case, according to no less famous personality than ex-President Obama and no less scientific source of information than the journal *Science*. It was that journal that in the final weeks of the Obama Presidency published the paper “The irreversible momentum of clean energy” in which Obama claimed that in the United States, as a consequence of policies put in place during his Presidency, there has been a “decoupling” of emissions and economic growth, so that market forces are leading toward increasingly clean energy. The evidence he showed, Obama said, “should put to rest the argument that combatting climate change requires accepting lower growth or a lower standard of living.” Indeed, Obama asserted that “although this decoupling is most pronounced in the United States, evidence that economies can grow while emissions do not is emerging around the world.”

## Obama’s demonstration of decoupling

Obama rested his “demonstration” of the decoupling between economic growth and growth of greenhouse gases emissions in the fact that between 2008 and 2015 the US gross domestic product (GDP) had increased by more than 10% while CO<sub>2</sub> emissions had decreased by 9.5%. His use of statistics was faulty, inferring major conclusions from just a comparison of two points in time. Yes, indeed, between 2008 and 2015 GDP increased while CO<sub>2</sub> emissions decreased in the United States, but that does not mean that both variables are decoupled. It means that in

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that period, US emissions of CO<sub>2</sub> were decreasing by the combined effect of two things: first, deindustrialization processes that started decades ago; and second, the low-growth, stagnant economy that followed the deep downturn of 2008-2009. If rather than comparing two points in time we examine year-to-year changes in the period 2008-2015, emissions and economic growth appear clearly “coupled,” as the annual rate of change of GDP and the annual rate of change of CO<sub>2</sub> emissions have a correlation of 0.67 which indicates that, to a large extent, both variables move together: that is, high or low rates of change in one variable occur associated with respectively high, or low rates of change in the other. Thus, the greater is the rate of growth of the economy, i.e., the stronger is an economic expansion, the greater will be the increase in CO<sub>2</sub> emissions, and conversely, the greater is an economic contraction, that is, a recession, the greater will be the reduction of emissions.<sup>2</sup>

To my knowledge, since the Obama paper was published in *Science*, nobody has criticized Obama’s reasoning supporting the idea of decoupling. We are now two years later, with a president and an administration who are doing all things possible to increase the extraction of coal, natural gas, shallow oil, and all types of conventional and nonconventional fossil fuels, as well as to favor the construction of pipelines and facilities to make easier and cheaper—often at the expense of taxpayers—the use of energy and in this way to stimulate business activity. Of course, at the same time news about climate disasters come from each region of the world, but political forces worldwide seem oblivious.

### **Half a century of economic growth and CO<sub>2</sub> emissions**

The evolution of CO<sub>2</sub> emissions and the economy in the past half century leaves no room to doubt that emissions are directly connected with economic growth. The link between the two variables is particularly obvious when annual changes in each of them are plotted, as in Figure 1, in which changes in GDP are measured in US dollars at 2010 prices. For the world at large, the greatest variations in GDP have been those associated with the Great Recession, as the world GDP, which is just the sum of the GDP of all countries, grew by 2.7 trillion in 2010 after dropping by 1.1 trillion in 2009. These two years were also the years in which CO<sub>2</sub> emissions respectively increased and decreased the most in the period 1960-2015, as emissions decreased by 325 megatons in 2009 and increased by 1795 megatons in 2010 (a megaton is a million tons). Years in which CO<sub>2</sub> emissions in the US have decreased have been relatively common in the past four decades, as the bottom panel of Figure 1 shows, but the biggest drop was also the one

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<sup>2</sup> For those interested in the statistical technicalities there is an appendix at the end, where the sources and references are also stated.

caused by the Great Recession, when CO<sub>2</sub> emissions decreased by 403 megatons in 2009. Emissions increased by a large amount, 228 megatons, the following year, 2010, but this was still less than the increase in 1970, when emissions increased by 306 megatons. All this means that economic growth is strongly connected with CO<sub>2</sub> emissions, indeed the absolute growth of GDP is the best predictor of the change in emissions. The only periods in which the greenhouse emissions that are destroying the stability of the Earth climate have declined have been the years in which the world economy has ceased growing and has contracted, i.e., during economic crises. From the point of view of climate change, economic crises are a blessing, while economic prosperity is a scourge. That is the paradoxical reality that is either ignored or actively denied by most economists, politicians and intellectuals of different kinds and disciplines. For full disclosure, I must say it took years for me to fully understand it, in spite that it was close to my nose.

The fact that climate change is driven by economic growth and “sustainable growth” is no less an oxymoron than “healthy smoking” is a key element of the dire situation in which we are. The 20<sup>th</sup> century was the century of the fossil fuels. Feeding internal combustion engines, fossil fuels allowed for unprecedented increases in our ability to move around things and people. They also allowed us to generate artificially cold or warm environments, and to multiple food production by increasing the productivity of land and human labor. Fossil fuels played a key role in the two world wars in which all kinds of machines equipped with internal combustion engines fulfilled a key role in transporting, killing and destroying. Indeed, it is undeniable that an important factor in the defeat of the Axis Powers in World War II was their lack of access to oil fields that led to major shortages of fuel for the war machines of both Japan and Germany. By enabling cheap transportation, fossil fuels have been the base of the humungous expansion of world commerce and world tourism that have skyrocketed in recent decades.

Many think all this that has increased human ability to modify the environment in our short-term benefit has been a blessing, a triumph of civilization that made us healthier, richer, happier and wiser. Certainly, longevity and literacy have increased in all countries and plenty of desirable things are now available for consumption for large fractions of the population of the world. Many of those reading this paper probably consume every day products coming from all the continents. We enjoy lettuce from Chile, drink wine from Argentina or Spain, eat sardines fished on Moroccan waters, watch plasma TVs from Taiwan, drive cars from Korea or Japan or wear shoes or clothes manufactured in China, Vietnam, or the Dominican Republic. Furthermore, we often visit these or other countries. However, climate change science shows that, as readers of this paper probably suspect, all that is a poisoned gift. By consuming these

goods or services we are stimulating the production of large quantities of greenhouse gases that are raising global temperatures and making the Earth less habitable for both us humans and the non-human species we would like to preserve.

### **A diffuse, protracted and global causal process**

A critical and damning aspect of the problem is that emissions of greenhouse gases modify the Earth climate through a mechanism which is diffuse, accumulative, protracted and global. Heat waves, hurricanes, droughts and wildfires that we are suffering today at higher frequencies than would be expected if CO<sub>2</sub> atmospheric concentrations were at preindustrial levels are the climate change effects of the emissions that occurred since the industrial revolution started about a quarter of a millennium ago. Furthermore, given the way our society is organized, emissions are closely linked to activities that involve jobs and create commercial profits. For these reasons, powerful conceptual and social mechanisms are in place to avoid placing blame for the alteration of the Earth climate on either the producers of greenhouse gases or the consumers who purchase the commodities that generated greenhouse gases when they were produced. Individual responsibility of people or businesses gets diluted. Indeed, the sad reality is that besides bombastic and grandiloquent words, nothing has been done to stop the worsening of climate change since the process was discovered several decades ago. Since CO<sub>2</sub> concentrations in the atmosphere started to be systematically measured in the atmosphere in the 1950s, they have been increasing almost 1 part per million (ppm) per year and now they are over 400 ppm. They were below 250 ppm in preindustrial times and it was estimated time ago that only levels around 350 ppm or less would be compatible with a stable climate.

### **Technology and profits**

Technology is often presented as the solution to the problem of global warming, but for now it has proved to be helpful in a very minor extent, if any. Denmark is a leader in technological innovation and wind power. A large fraction of the total energy consumed in that country is now produced by zero-emissions renewable sources. However, the CO<sub>2</sub> emissions implied by what is consumed in Denmark have not declined. The numbers show it. Total energy consumption in Denmark in kilowatts-hour (kWh) slightly decreased from 228 billion kWh in 1990 to 210 billion kWh in 2014, while total production of renewable energy more than quadrupled from 13.3 to 54.5 billion kWh. But emissions of CO<sub>2</sub> implied by total consumption in Denmark were 58 megatons in 1990, 55 megatons in 2014, and 54 megatons in 2015. Basically, there was no change. In 2014 Denmark remained among the top 50 countries of the world ranked by CO<sub>2</sub>

emissions linked to internal consumption, 9.8 tons per person, compared with 0.5 tons per person in Nigeria, 1.9 in Bolivia, 9.4 in the United Kingdom, 17 in Australia and Canada, and 19 in USA.

Versus the platitudes of most economists and almost all politicians who either deny the problem (like Trump) or tell us it is not that difficult to solve it with some technical innovations and policies (like Obama, Gore, and the heads behind the European Emission Trading System), only policies affecting the way things are produced and consumed at large, in the whole world economy, would be able to cut greenhouse gas emissions to a degree that could be effective to prevent catastrophic climate change. But if these policies were put in place, they should largely affect the consumption of individuals. It is inconceivable to prevent catastrophic climate change if airplanes, cars, international commerce, meat production and deforestation continue throwing hundreds million tons of CO<sub>2</sub> and methane, CH<sub>4</sub>, the two most important greenhouse gases, to the atmosphere.

Now, readers of this paper may think their individual decisions to consume this or that are irrelevant, because each individual decision is diluted in a sea of million decisions of people who decide about these issues just by using their tastes and their ability to pay. Why should I care about my emissions of greenhouse gases when they are an infinitesimal part of all emissions? An even more powerful reason for inaction is to ask why should I care about greenhouse gas emissions connected with my behavior and my consumption, when the important responsibility is that of fossil fuel companies and the governments that serve the interests of BP, Gazprom, ExxonMobil or Statoil? The problem is that this is a fallacious reasoning, because actually, many hundred million of, say, residents in African countries, neither use cars, nor travel by plane, nor consume goods imported from overseas, all of which are the commodities which are produced “at the cost” of million tons of greenhouse gases thrown to the atmosphere. The hundred million of non-consumers in the Global South who participate very little in the “party” of the global economy have a quite small level of responsibility in climate change compared for instance with the author of this paper or its potential readers, who probably every year if not every month or every day use AC or cars, fly in airplanes, consume imported articles, and eat meat. But we are the ones making this destructive way of life both *acceptable* and *attractive* for the rest of the humanity.

Producers of fossil fuels, automobile manufactures and organizations like the US Chamber of Commerce or the National Association of Manufacturers defending business interest knew about the harmful consequences of CO<sub>2</sub> emissions long ago. They invested billion dollars in disinformation to prevent policies cutting emissions, because these policies would also cut the

profits of the business interests they represent. Decades ago stupid economists developed the theory of the so-called environmental Kuznets curve, which asserted that with economic growth and increasing affluence, environmental problems first get worse, but then improve. Applied to climate change the environmental Kuznets curve for greenhouse gasses (EKC for GHG in the jargon of the discipline) states that continuous economic growth will eventually reduce emissions of CO<sub>2</sub> so that eventually, just leaving the market economy to develop itself, climate change will cease to be a problem. The reality was however that worldwide emissions continued to grow and the faster the world economy expanded, the faster they grew.

### **Socialism**

Some people say that the real cause of climate change is capitalism, because it is the whole organization of the economy which leads inexorably toward expansions of production and with it, increasing GHG emissions. If you are a socialist who thinks capitalism should end, perhaps this linkage between global warming and capitalism gives you an extra reason to fight for a post-capitalist society. Now, it is a clear reality that for many people socialism is not an attractive option. Given this, getting rid of capitalism does not appear to be a likely option to prevent catastrophic climate change. Socialists disagree on whether societies like those that existed in the USSR or China can be defended to some degree as alternatives to Western capitalism or even whether they can be properly called “socialist.” Furthermore, whatever be the answer to this question, “Soviet” socialism followed to a large extent the same industrializing path that was followed by the capitalist economies of the Western world, producing ever increasing quantities of greenhouse gases. And China, whether capitalist or socialist, by having since the 1980s astronomic rates of economic growth beyond 10% has reached the dubious honor of becoming in the past ten years the first producer of CO<sub>2</sub>.

So, what is to be done? My short answer is I don't know. I am seriously confused. Things like opposing fracking or the construction of pipelines or calling for taxes or restrictions on extractions and use of fossil fuels are obvious, as it is also obvious for me the need to fight for a large social transformation. But should we also get involved in individual actions like avoiding the use of disposables or consuming meat? To what extent? Shall we consider people who travel in planes or commute daily in cars no less irresponsible and reckless than those who incite children to smoke? This can appear silly, but remember that just a few decades ago, ads claimed that Camel was the cigarette brand preferred by doctors. When I was a teenager I was given promotional cigarettes. Of course, I got addicted. Years later, when I was in the School of

Medicine, we smoked in class and also in the aisles of the clinical hospital. Customs and mores change quickly.

The climatologist Kevin Anderson rejected using planes and traveling by private cars many years ago. These are probably the two aspects of individual behavior that together with the use of electricity for AC purposes and consumption of meat have the greatest implications in terms of GHG emissions. Of course, if you live in a high or middle income country as you probably do if you are reading this paper, the more you avoid cars and airplanes, use only ships or trains for long distance travel, commute by riding a bike or using public transportation, or reject the use of disposables—all of which are “normal things” that the economic and social environment pushes on us all the time—the more you will appear to be a weirdo. In his stupendous book on socialism and workers, *The way to Wigan Pier*, George Orwell wrote in the 1930s on the extremely urgent need to face the danger of fascist domination in Europe. He thought that “unless Socialist doctrine, in an effective form, can be diffused widely and very quickly, there is no certainty that Fascism will ever be overthrown. For Socialism is the only real enemy that Fascism has to face.” He argued that socialists needed to join forces to face the beastly possibility of world domination by fascism. However, Orwell said,

The only thing for which we can combine is the underlying ideal of Socialism; justice and liberty. But it is hardly strong enough to call this ideal 'underlying'. It is almost completely forgotten. It has been buried beneath layer after layer of doctrinaire priggishness, party squabbles, and half-baked 'progressivism' until it is like a diamond hidden under a mountain of dung. The job of the Socialist is to get it out again. Justice and liberty! Those are the words that have got to ring like a bugle across the world. For a long time past, certainly for the last ten years, the devil has had all the best tunes. We have reached a stage when the very word 'Socialism' calls up, on the one hand, a picture of aeroplanes, tractors, and huge glittering factories of glass and concrete; on the other, a picture of vegetarians with wilting beards, of Bolshevik commissars (half gangster, half gramophone), of earnest ladies in sandals, shock-headed Marxists chewing polysyllables, escaped Quakers, birth-control fanatics, and Labour Party backstairs-crawlers. Socialism, at least in this island, does not smell any longer of revolution and the overthrow of tyrants; it smells of crankishness, machine-worship, and the stupid cult of Russia. Unless you can remove that smell, and very rapidly, Fascism may win.

Well, I am afraid we are in a similar situation now to avoid catastrophic climate change. Unfortunately, with respect to that, things look much worse than with respect to fascism in the 1930s. But perhaps I am wrong about that, I hope I am.

News in the past two years show that finally the stagnant economy following the Great Recession of 2008-2009 was overcome, unemployment has significantly decreased everywhere and the desired economic growth that supposedly will raise all boats is here. Of course, preliminary reports indicate that worldwide emissions of CO<sub>2</sub> have reached new historical

records in 2017. Everything suggests in 2018 they will increase even more. We are not going toward an abyss at a constant high speed, we are accelerating toward it.

Shall we do something about it, or shall we plan our next vacation? Flights are cheap now.

## ENDNOTES AND REFERENCES

The paper by Obama was published in *Science* in January 2017. It is available online at [science.sciencemag.org/content/early/2017/01/06/science.aam6284](http://science.sciencemag.org/content/early/2017/01/06/science.aam6284).

The correlation of the annual rate of change of US GDP and the annual rate of change of US CO<sub>2</sub> emissions, 0.67, in terms of statistical significance is marginally significant, as the *P*-value is 0.07 meaning that if the two variables changed independently without any link, the probability of finding such high correlation or a higher correlation would be 0.07, that is about 1 in 17. Of course, this is a small probability, but not a very small one. This is due to the fact that the sample is quite small, we are considering only 8 years in the computation. If we use the observations for the years 1991-2015 so that now we have 25-year sample, the correlation between the annual rates of growth of GDP and energy-related CO<sub>2</sub> emissions is almost the same as in the period 2008-2015, 0.70, but the *P*-value is now much smaller, it is indeed below 0.0001, i.e., less than 1 in 10,000. This is strong statistical evidence.

For the critique of the EKG for CO<sub>2</sub> see my chapter with Oscar Carpintero, “Dynamics and economic aspects of climate change”, in *Combating Climate Change: An Agricultural Perspective*, edited by M. S. Kang and S. S. Banga (Boca Raton, CRC Press, 2013, pp. 29-58). An updated version of this chapter appeared under the title “Economic Aspects of Climate Change” in *Journal of Crop Improvement*, Vol. 27, No. 6, 2013.

The correlations between the two variables in the two panels of Figure 1 is 0.76 for the world and 0.57 for the USA; for both,  $P < 0.001$ .

Energy production in Denmark from [en.wikipedia.org/wiki/Renewable\\_energy\\_in\\_Denmark](http://en.wikipedia.org/wiki/Renewable_energy_in_Denmark).

National emissions of CO<sub>2</sub> implied by total consumption according to estimates reported by [globalcarbonatlas.org](http://globalcarbonatlas.org).

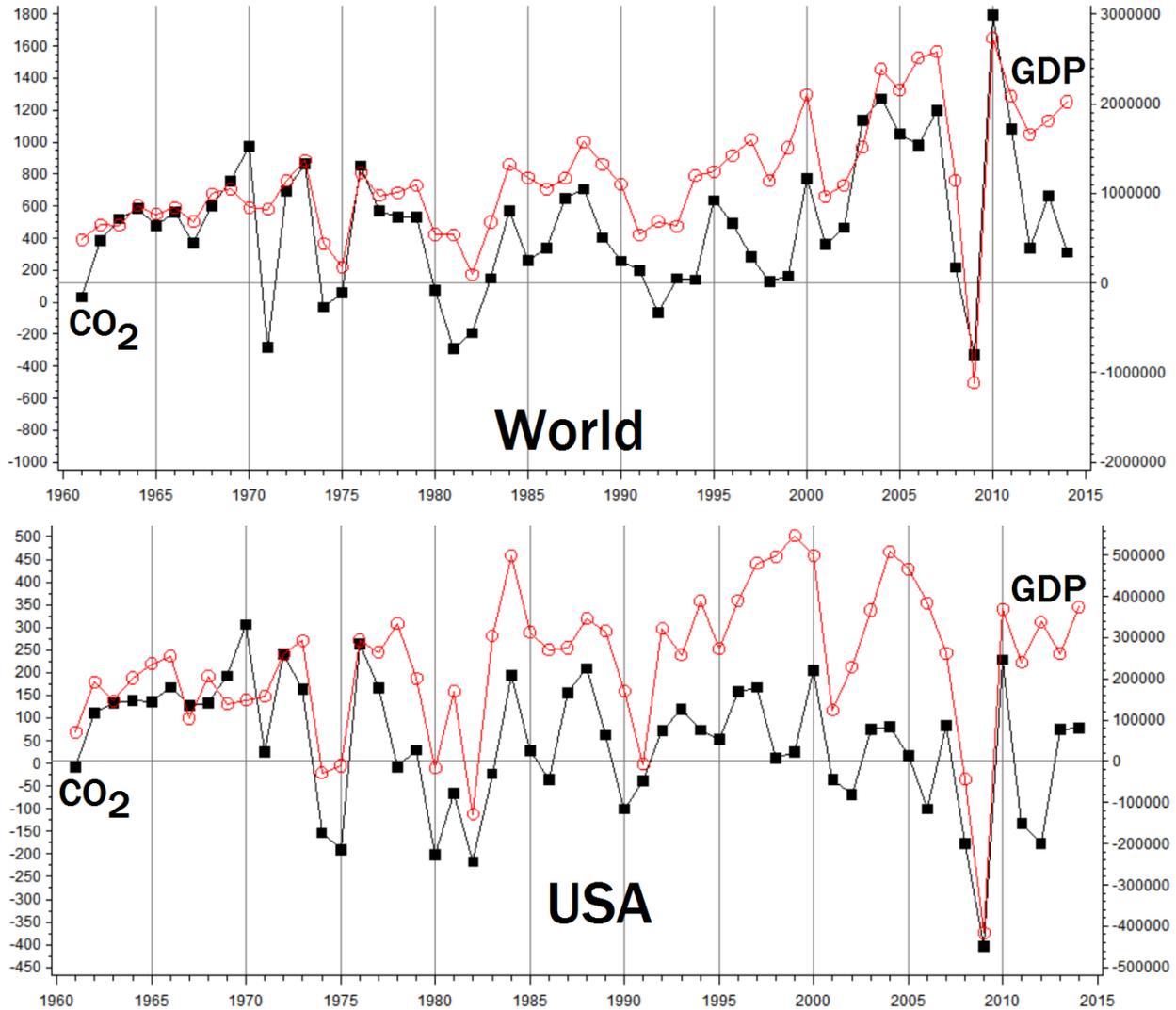
On doctors smoking Camel more than any other cigarette, see [www.youtube.com/watch?v=gCMzjJjuxQI](http://www.youtube.com/watch?v=gCMzjJjuxQI).

On organized activities to promote climate change denial see Riley E. Dunlap & Aaron M. McCright, “Organized climate change denial,” Chapter 10 in *Oxford Handbook of Climate Change & Society*, ed. by J. S. Dryzek et al. Oxford University Press 2011. A recent paper on climate change lobbying is the one authored by Robert J. Brulle, “The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016”, *Climatic Change* published online 19 July 2018.

For a report of the recent rise in emissions which is very likely linked with the recovery of the world economy, see in the Reuters website the piece by Nina Chestney “Global carbon emissions hit record high in 2017”, [www.reuters.com/article/us-energy-carbon-iea/global-carbon-emissions-hit-record-high-in-2017-idUSKBN1GYoRB](http://www.reuters.com/article/us-energy-carbon-iea/global-carbon-emissions-hit-record-high-in-2017-idUSKBN1GYoRB).

Mainstream economists have insisted in market-friendly approaches to climate change that have not had any discernible effect in reducing emissions where they have been applied, for instance in Europe or California. Part of these market-friendly approaches to reduce emissions are the so called offsets offered to individuals. Thus a website linked to the United Nations Framework Convention on Climate Change offers to tourists and travelers means to compensate the carbon emissions of their trips by purchasing UN-certified offsets provided through the UN, see [unfccc.int/news/greening-tourism-for-a-healthy-planet](http://unfccc.int/news/greening-tourism-for-a-healthy-planet). Kevin Anderson is Deputy Director of the Tyndall Center for Climate Change Research and holds faculty positions at the universities of Manchester and East Anglia. His blog in [KevinAnderson.info](http://KevinAnderson.info) contains very interesting materials on climate change and connected issues. His commentary on “The inconvenient truth of carbon offsets,” (*Nature*, 4 April 2012), available at [www.nature.com/news/the-inconvenient-truth-of-carbon-offsets-1.10373](http://www.nature.com/news/the-inconvenient-truth-of-carbon-offsets-1.10373), is a caustic critique of these offsets.

**Figure 1.** Annual change in CO<sub>2</sub> emissions (megatonnes, black squares, l.h.s.) and GDP (million US 2010 dollars, red circles, r.h.s.) for the world economy (upper panel) and the USA (lower panel)



Author's elaboration on the basis of data from the CAIT database of the World Resources Institute, [cait.wri.org](http://cait.wri.org).