

## **The Fight Against Global Warming: A Failure and A Fix**

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Global climate change and land degradation have to be put on a war footing internationally - meaning that all nations need to pull together and treat this threat as we would a war. . . . Only through uniting and diverting all the resources required to deal with climate change and land degradation can we avert unimaginable tragedy. We have all the money we need. *All we cannot buy is time.*

Allan Savory<sup>1</sup>

### **A Failure**

I've been a climate activist since the millennium turned, twelve long years ago. It's been an eternity of global-warming days since then. I've rallied, marched, petitioned, organized, lectured, blogged, fumed, despaired, studied, argued and hoped. I've met leading lights - scientists, writers, and activists - and took their inspiration into the world, signing onto the party line and fully committing to our collective, world-saving goal: reducing greenhouse gas emissions. And now I wonder if all of our work has made any difference at all.

Despite all of our passion and desperation, Copenhagen and "Inconvenient Truths," we've stood by helplessly as the rate of greenhouse gas emissions has steadily *increased*, as the climate has grown hotter and wilder by the year. It seems that so far we've been unable to come to terms with a painful reality:

*Our fight against global warming has not worked.*

What I mean by "work" is quite simple: the atmospheric concentration of greenhouse gases would start falling steadily and surely towards pre-industrial levels of around 280 parts per million (ppm), and wouldn't stop until we got there. That's a fight against global warming that works. If we settle for anything less we are just kidding ourselves straight into a hellfire, chaotic and deadly world.

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<sup>1</sup> Allan Savory, "A Global Strategy for Addressing Global Climate Change," 2008, [http://www.savoryinstitute.com/wp-content/uploads/2012/01/GlobalStrategyforAddressingClimateChange2\\_1.pdf](http://www.savoryinstitute.com/wp-content/uploads/2012/01/GlobalStrategyforAddressingClimateChange2_1.pdf), pp. 19-20.

And that's exactly where we've been heading ever since leading NASA climate scientist Jim Hansen stood up before Congress in 1988 and announced that we're in deep climate trouble - in retrospect, more and faster than even he and his colleagues had anticipated.

Since then - despite circuses ("conferences" or "summits" in more polite circles) in Rio, Bali, Copenhagen and elsewhere - and in defiance of reason or anything resembling a will to live - carbon pollution has continued apace, amidst the global waffling of world governments and contrary to the intensive, dedicated efforts of climate activists. And in defiance, too, of the increasingly desperate warnings from thousands of scientists studying climate every which way from Sunday, from ice cores to sea-surface temperatures to sediment samples and ancient layers of rock, to jet streams, gulf streams, to floral and faunal migrations, to ocean chemistry, and a universe of other specialties.

In fact, the urgent study of climate over the past thirty years has been the largest coordinated scientific investigation *ever*, worldwide, international, with experts from nations large and small, working both in the floodlit, brutal scrutiny of an oft-times myopic public eye, as well as in obscure yet rigorous climes and sometimes perilous efforts on distant and barren corners of the planet.

Climate activists and writers have worked 24 x 7 as well, aiming at raising public awareness, applying political thumbscrews, creating movements, locally, nationally, anywhere and everywhere. We've threatened, cajoled, manipulated (a.k.a. "social marketing"), called up all the shows of dogs and ponies, rallied, taught-in, partied, networked, and spelled out "350" in a thousand picturesque ways.

So far, not so good.

Here's a question: given that national governments have decisively failed to do their job in addressing climate, why do we advocates of a low-carbon future, we would-be movers and shakers, persist in beating our heads against the official walls in conventional ways? None of it has worked (keeping in mind my strict definition of "work"). Is it that we can't figure out what else to do, and that we can't bear to stand by, feeling powerless, as our life support system crumbles? For we are painfully aware that the climate we have known, the climate that has made all civilizations possible over the past ten thousand years is falling apart. And fast.<sup>2</sup>

With all due respect to climate scientists (and that's a mountain of respect they're due), their one key shortcoming is that they have been and continue to be blindsided by how exquisitely sensitive earth systems are to even slight changes in atmospheric greenhouse gas concentrations. Climate chaos is taking over at a rate dramatically in excess of expectations - today, not in some distant future. Furthermore, there is every reason to

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<sup>2</sup> Even the climate-timid mainstream media is starting to catch on. See, for example, Justin Gillis, "Not Even Close: 2012 Was Hottest Ever in U.S.," New York Times, January 9, 2013, <http://www.nytimes.com/2013/01/09/science/earth/2012-was-hottest-year-ever-in-us.html>

believe that not just the frequency but the *acceleration of the frequency* of droughts, floods and destructive weather is raging, full speed ahead.

Can we admit that we've not only lost the battle against the Inconvenient Truth, but that the war itself is hanging in the balance? When do we finally figure out that perhaps we are on the wrong path? Here's the problem:

*We're **obsessed** with greenhouse gas emissions.*

Yes, those greedy oil, gas and coal companies should be stopped. And let's take the cotton-mouthed corporate media to task while we're at it . . .<sup>3</sup> Unfortunately, right now we are hooked on hydrocarbons and there is no way we're going to kick the habit *in time* without wreaking incalculable suffering on millions if not billions of people. Suffering, as in no food, no water, no heat, no power, no transportation. Yes, it is coming to that anyway as the climate unravels (it already has in some places), but, heads in the sand, we're going to make it worse by putting off dealing with it as long as possible.

Recently, our climate-wrecking potential has escalated: the United States of America has discovered that through destructive and toxic technology it can become the world's leading oil producer.<sup>4</sup> If history is any guide, there is little doubt that we will burn every last available drop.

Here's one piece of evidence among many that says we won't willingly change course: as a result of fossil-fuel induced climate destruction a great climate regulator, Arctic ice, has been melting at dizzying speed, creating a feedback loop that will accelerate the heating of the earth. Yet rather than learn the simplest of lessons and stop and think, nations and hydrocarbon vendors are drooling over the promise of ever more black gold from the polar ocean floor. We will likely pursue such folly with eager abandon, and accelerate the accelerations on the road to worst-case scenarios. While it's possible in theory that we do otherwise, there is to date no actual evidence whatsoever, beyond wishful thinking, to indicate that we ever would. If the catastrophe roars quickly, loudly and painfully enough, perhaps; otherwise, the best predictor of future behavior is still past behavior.

Human greenhouse gas emissions are much more than the gases from our tailpipes and power plants. They're also the gases from the melting permafrost and seabed floor, from the failing carbon sinks of dying forests, warming oceans and wilderness sacrificed to agriculture. In fact, the soils destroyed worldwide by humans since the advent of agriculture have added more than twice the greenhouse gases to the atmosphere than all

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<sup>3</sup> Wen Stephenson, "A Convenient Excuse," *The Phoenix*, November 2, 2012, <http://thephoenix.com/Boston/news/146647-convenient-excuse/>.

<sup>4</sup> Elisabeth Rosenthal, "U.S. to Be World's Top Oil Producer in 5 Years, Report Says," *New York Times*, November 13, 2012, <http://www.nytimes.com/2012/11/13/business/energy-environment/report-sees-us-as-top-oil-producer-in-5-years.html>.

emissions from fossil fuels (see sidebar at end of text, "The World's Soils: Lost and Found").

And there's more to come, in the form of self-sustaining positive feedback loops that will surge ahead with no further help from us. For example, melting permafrost contains twice as much carbon as the atmosphere, and as it emits carbon over the years it will warm the atmosphere further and continue to accelerate its own melting and emissions.<sup>5</sup>

The elephant has arrived in the room, special delivery. The elephant is *bigger* than the room. Despite all the efforts at cutting carbon emissions over the past thirty years, we are spewing out more carbon dioxide faster than ever before. Of course we *should* stop the carbon machine, marshal everything in our power to do so, but we'd better recognize that we're not doing it, and we've got to do something else as well. Something very big.

So far, in our attempts to repair the damage, we insist on doing the same things that haven't worked, reflexively thinking that if only we do more and more of what doesn't work, and do it better, it will somehow magically start working. But apparently reducing emissions *isn't* going to happen soon, therefore *it's time to leave emissions obsessions behind*.

In order to develop a workable climate strategy, we need some fundamental assumptions to build on, based on data as reliable as we can muster. Here's a new fundamental assumption numero uno, a *sine qua non* of climate assumptions:

*We can't stop, or even reduce, this global civilization's greenhouse gas emissions in time.*

That's not, "*Maybe* we won't stop this global civilization's greenhouse gas emissions *in time*." It's not "*We probably* won't stop this global civilization's greenhouse gas emissions *in time*." It's "*We can't* stop this global civilization's greenhouse gas emissions *in time*." We have proved this to ourselves beyond a shadow of a doubt: CANNOT.

The key concept here is "in time." Yes, if we had the luxury of a leisurely pace, we would eventually reduce emissions, but time is precisely what we don't have. How do we acknowledge the terrifying and depressing trap we're in, and figure out it's time to try something different?<sup>6</sup> And what might that something be?

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<sup>5</sup> Joe Romm, "IPCC's Planned Obsolescence: Fifth Assessment Report Will Ignore Crucial Permafrost Carbon Feedback!," Dec 2, 2012, <http://thinkprogress.org/climate/2012/12/02/1253931/ipccs-planned-obsolence-fifth-assessment-report-will-ignore-crucial-permafrost-carbon-feedback/>.

<sup>6</sup> For a thoughtful discussion of dealing with climate reality at a personal, emotional level, see Steve Wineman, "Crossing the Chasm: From Denial to Acceptance of Climate Catastrophe," [http://gis.net/~swineman/files/Crossing the Chasm.pdf](http://gis.net/~swineman/files/Crossing%20the%20Chasm.pdf). Also, see an article I wrote for Grist around three years ago, "Dispersion as the world ends: The absent heart of the great climate affair," October 15, 2009, <http://grist.org/article/2009-10-14-the-absent-heart-of-the-great-climate-affair/>.

## A Fix

It's all about dirt. And cows.

*Our first priority is to get greenhouse gases out of the atmosphere and back into the ground as rapidly as possible.*

This is not an original idea, but it's mostly lost in the activity around capturing solar energy directly. In general, to the extent we've considered carbon capture and storage, the focus has been on expensive high-tech engineering schemes which, like all high-tech schemes (some of which are downright loopy<sup>7</sup>), is fraught with potentially catastrophic unintended consequences. Global warming itself is an unintended consequence of technology, the Mother of Unintended Consequences, and like all of them was difficult unto impossible to anticipate.

Yet today, in our very hands, we hold the single most promising of climate cures: eco-restoration that has the potential to pull all of the legacy carbon out of the atmosphere and back into the ground where it belongs. It is a most convenient truth.

We have good evidence to indicate that, in four decades or less, it is possible to return greenhouse gases to the climate-stable pre-industrial levels of 280 ppm (see sidebar at end of text, "Soil-Based Carbon Capture and Storage: The Numbers"). It requires no unknown or complicated technology - in fact, no technology at all. It is based on *nature's* brilliant soil-based carbon capture and storage, also called Holistic Management of grasslands. It has so many benefits - including an eventual net cost of zero or less - that even if climate weren't an issue we should be doing it anyway.

All we need to proceed are what is readily at hand: billions of acres of plains and savannas - mostly damaged by improper human use - and billions of grazing animals, managed the way nature has successfully done it for millions of years in the co-evolutionary grazer/grassland habitat. People have been doing it all wrong.

Holistic Management of grasslands was pioneered by an ingenious and innovative biologist and rangeland manager in Zimbabwe named Allan Savory. Thanks to Savory and others, for decades we've been learning how to restore desertified grasslands. It involves reinstating the evolutionary relationship between grazing animals and their habitats. Because we've so mismanaged our raising of cattle and other grazers, we don't generally understand how essential they are to a healthy grassland, and how, when ungulates are constantly on the move in response to predators, they aerate and fertilize the soils. This is the opposite of what they do when randomly trampling grasses, which is

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<sup>7</sup> Margaret Munro, "Geoengineering experiment off B.C. coast called 'blatant violation' of UN rules," Postmedia News, October 16, 2012, <http://www.globaltvbc.com/geoengineering+experiment+off+bc+coast+called+blatant+violation+of+un+rules/6442734635/story.html>

what happens under conventional rangeland management where cattle overgraze and destroy soils.

Confusion over the categorical differences between the two approaches has resulted in misleading assessments that lead us in precisely the wrong direction. By now we in the global warming biz, panicky and desperate as we are, can and should know better - but apparently because we are stuck on emissions reductions we haven't yet connected the dots, or even noticed some of the dots we need to connect.

In fact, there is extraordinary resistance to soil-based carbon capture and storage among global warming warriors. In part this is because the supporting evidence is in a form unfamiliar to climate activists and scientists, who are accustomed to direct measurement of atmospheric carbon, and who therefore have trouble grasping how effective soil carbon sequestration can be. Therefore we feel the need for "hard" numbers and a definitive answer to just how much carbon sequestration we can expect these herds to accomplish. An understandable though misdirected conventional prejudice against grazing animals doesn't help.

One reason that such carbon soil measurements in holistically managed grasslands are limited at the moment is that climate activists and ranchers view soil very differently. What's important to animal and land managers is the visible and functional health of the soil that they're bringing back to life. In other words, direct measurement of carbon in a handful of healthy dirt - brimming with microbial, fungal, green plant, insect and animal life - is, in practical terms, far less important to ranchers than it is to those of us immersed in issues of climate. Here are some of the questions ranchers ask (all of which are eventually answered in the affirmative with properly managed grasslands, and are directly related to the quantities of carbon captured in the soil):

- Is the plant life vigorous and diverse, and are perennial grasses reappearing with roots that penetrate up to 15 feet into the ground?
- Is there good soil moisture content, are streams and ponds full of water even during a drought?
- Are the dung beetles, earthworms and other soil organisms abundant?
- Is the diversity of wildlife returning?
- Is the soil turning black (the color of carbon), soft and sweet from all the biotic activity?
- Is there less need for winter hay because the land provides?
- Are the animals healthy?
- And of key importance to people who make their living on the land, are we more productive with less work, are our lives happier and more secure?

The bottom line for climate folk, on the other hand, is that there's less carbon dioxide in the atmosphere. Period. Although we are certainly concerned with many other related issues, the only thing that really matters is the looming 450 or 550 or greater parts per

million of carbon dioxide in the atmosphere. After all, if we don't fix that our entire world will fall apart and everything else becomes academic. How are we expected to believe that a traditional climate enemy, cows, are now our friends?

I understand that it will be a serious challenge for climate scientists and activists to get our arms around soil-based carbon capture and storage. We're going to have to give up a couple of cherished preconceptions, assumptions that we hold as self-evident. Paradigm shifts like these are never easy:

1. *Grazing animals, including cattle, are **essential** to healthy grasslands and climate restoration.* They are part of the solution when raised in accordance with nature's rules, not part of the problem the way they are when raised on factory farms or grazed helter-skelter on huge tracts of land.<sup>8</sup>
2. We have to make the right decisions *without regard to profits or expense* (although profits are still possible), as profit-driven decisions continue to create a global wasteland where crisp, freshly minted \$1,000 bills won't be worth a cup of water. The ecosphere exists for reasons other than providing humans with "services," and money is no substitute for a healthy life-support system (just ask King Midas).
3. *In nature, everything is connected to everything else.* We have to begin to understand that global warming is not a carbon problem, it is a problem of how humans are living on earth - and that we can learn to do it differently. There are no simplistic, linear, reductionist solutions, only complex dynamic systems seeking equilibrium. Only by understanding wholes can we address a fractured global biosphere.

As have Savory and others, in my own very modest way I have presented soil-based carbon capture and storage and its climate implications to numerous global warming protagonists, and offered extensive evidence based on our collective years of experience with bringing millions of acres of desertified lands across the globe back to life. No one has refuted it. In fact, as far as I know no one in the climate community has even seriously tried. And we can't continue to ignore that this is the one thing, so far *the only thing*, that shows any promise at all of reversing the damage from our fossil follies. Yet we fight the very idea.

We may have been right to pursue the obvious - reducing emissions - and for a while it even seemed that it might work. If we weren't the complex socio-political creatures that we are, emissions reductions should have been easy, little more than rational decision-making and substituting technologies. Unfortunately, our primitive reptilian brainstem

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<sup>8</sup> "Livestock's Long Shadow: environmental issues and options," United Nations Food and Agricultural Organization, Rome, 2006, <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

often wins over the elegant cerebral cortex, and in this instance the irrational victory appears to have been decisive. On top of that it's hard to get around our fallacious but well-established antipathy to what raising cattle does to the atmosphere.

As I said in my January 2010 article "Got Cows?," with respect to my surprising experience with climate activists: "They can't hear it. The obsession with chasing green and profitable technofixes and/or reducing emissions drowns out other thinking – they smile, say it sounds interesting, look quizzical and change the subject."<sup>9</sup> Three years later, no perceptible shifts yet. Here's just one example from my many exchanges with climate heroes to illustrate how difficult it is to change perspective and direction:

During winter 2010, a restoration ecologist, a rangelands activist and I drove from Boston up to Middlebury College in snowy Vermont to visit Bill McKibben. We spent two hours urging him to investigate grassland restoration. He was convinced enough to research and write an article about it - and a pretty good one at that:

Done right, some studies suggest, this method of raising cattle could put much of the atmosphere's oversupply of greenhouse gases back in the soil inside half a century. That means shifting from feedlot farming to rotational grazing is one of the few changes we could make that's on the same scale as the problem of global warming.<sup>10</sup>

He even spoke at a conference held by the Quivira Coalition, an organization dedicated to eco-restoration in the American west.<sup>11</sup> But since then, even though he appears to be in agreement . . . silence.

Why only one mention of soil-based carbon capture and storage, a minimal aside, on 350.org?<sup>12</sup> McKibben has been waging a noble battle against fossil fuels and writing about the associated politics and economics for decades, yet our predicament is more dire than ever. At this point perhaps it is time for him and the rest of us to stop, catch our breaths (and lick our wounds), regroup and rethink.

On the plus side, in 2010 the Savory Institute's sister organization in Zimbabwe, the Africa Centre for Holistic Management, won the \$100,000 Buckminster Fuller Award for its "proposal that has significant potential to solve humanity's most pressing problems."<sup>13</sup>

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<sup>9</sup> See my online article, "Got Cows?", *Grist*, January 31, 2010, <http://grist.org/article/the-climate-solution-got-cows/>.

<sup>10</sup> Bill McKibben, "The Only Way to Have a Cow," *Orion* magazine, March/April 2010, <http://www.orionmagazine.org/index.php/articles/article/5339/>. See also Seth Itzkan's brief presentation on YouTube that McKibben twittered about, <http://twitter.com/billmckibben/status/209342014234431488>.

<sup>11</sup> <http://quiviracoalition.org/index.html>

<sup>12</sup> <http://world.350.org/africa/2011/09/24/moving-planet-is-underway-and-zimbabwe-kicks-off-africa/>, accessed on November 25, 2012.

<sup>13</sup> <http://achmonline.squarespace.com/awards-and-recognitions/>, <http://challenge.bfi.org/Winners>



At the time of this writing, in December 2012, the Savory Institute is one of eleven finalists out of 2,600 applicants in business magnate Richard Branson's \$25 million Virgin Earth Challenge.<sup>14</sup> The Challenge's goal is to advance "the successful commercialisation of ways of taking greenhouse gases out of the atmosphere and keeping them out with no countervailing impacts." Branson's concept is flawed: What if saving the climate is *not* commercially viable? Does that mean we *shouldn't* do it? How commercially viable is a dead civilization? But \$25 million would help eco-restoration along, and despite a faulty premise it is still possible to do the right thing.

More on the plus side: along with massive carbon sequestration, also called "carbon farming," global-scale restoration of grasslands re-establishes a balanced hydrological cycle, soil integrity and biodiversity; helps stabilize local and, eventually, global weather patterns; provides positive stable work opportunities, particularly in third-world countries; produces high-quality animal protein without synthetic soil supplements and destructive factory farming; and supports local communities worldwide in sustainable living. And word is even starting to trickle into the mainstream press.<sup>15</sup>

What's the icing on the eco-cake? We would need far less along the lines of slow and barely more than symbolic international agreements, endless contorted and protracted government approvals, complex machines, dangerous geo-engineering experiments, or prohibitive sums of taxpayer money thrown at desperate and wacky technologies. What we would need are the already abundant lands that have been abused unto uselessness, some eager and dedicated ranchers and herders, and some ruminating animals. These are readily available, and, as far as rescuing life on earth for future millennia goes, pretty cheap - far less than the cost of recovering from just one super-hurricane like Sandy.

Recently, the Savory Institute has established its program of community hubs to offer "consulting and training services, state-of-the-art content and tools, as well as access to the land, networks and funding resources necessary to expand Holistic Management practices across entire regions." Furthermore, to "ensure a worldwide shift towards a holistic approach to agriculture, Savory Institute has set a goal for 2025 of establishing 100 Hubs, influencing 1 billion hectares [2.5 billion acres] of grasslands across the continents."<sup>16</sup>

My concern is that the climate is changing too quickly, and that destructive feedbacks are difficult to detect until they're unstoppable; indeed, there is ample evidence that they're

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<sup>14</sup> Helen Craig, "Virgin Earth Challenge announces leading organisations," Nov 2, 2011, <http://www.virgin.com/people-and-planet/blog/virgin-earth-challenge-announces-leading-organisations>.

<sup>15</sup> Terry Waghorn, "Holistic Land Management: Key to Global Stability," *Forbes*, December 20, 2012, <http://www.forbes.com/sites/terrywaghorn/2012/12/20/holistic-land-management-key-to-global-stability/>.

<sup>16</sup> <http://www.savoryinstitute.com/what-we-do/empowering-others/>

already underway.<sup>17</sup> Since everything is happening faster than anyone expected and only promises to accelerate, I fear that the 2025 target date is too late, and 1 billion hectares is too few. We need a jumpstart, big-time.

### *The New Focus*

What this all adds up to is a change in focus, from the frustrated endeavor of reducing emissions, to an attainable one, putting carbon back into the ground. The new undertaking must be even more passionate than the old one, because we have twenty fewer years in our race against time and geophysics.

Yes, we need focus: *Put carbon back into the ground. Now.*

Suppose, for a moment, that just *some* of the efforts currently dedicated to emissions reduction were shifted to eco-restoration and biologically-based carbon sequestration in soils. Instead of endlessly pleading with government and industry, suffocating in bureaucracy and political quagmires, arguing about profits and tax breaks, we just hit the ground - grazing. Imagine if 350.org dedicated some of its global efforts to turn communities to carbon farming. Or if officials or commercial operations started setting aside currently useless rangelands for restoration of grasses, water cycles, soils, employment, and production of high-quality protein. And while worldwide public agreement would be a wonderful thing, we can proceed without it - even a relatively small group of people could do the job, and it would be hard to mount objections to restoring ruined land that is currently bereft of healthy biodiversity, barely useful for anything else.

*You don't even have to believe that global warming exists, only that healthy soils are beneficial.*

Who knows, maybe it's even possible to unite climate skeptics with firebrands, profiteers with non-profteers, corporations with real, live people. I would venture that not many folks prefer parched, cracked, lifeless earth to fields of waving grasses, full of creatures great and small.

We *can* get together on this one.

We need funds to catapult major restoration efforts to the fore. It would make sense for governments to step forward, since public coffers already supply a lion's share of the cash to *undo* what carbon economies have wrought: Hurricane Katrina cost the U.S. taxpayers

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<sup>17</sup> See, for example, John Carey, "Is Global Warming Happening Faster Than Expected?," *Scientific American*, November 2012.

around \$110 billion, Hurricane Sandy likely upwards of \$50 billion.<sup>18</sup> And that's just the tip of the iceberg (if we can find one).

There's plenty of money out there to redirect towards saving life on earth. What about the \$1 trillion in annual worldwide subsidies to the fossil fuel industries?<sup>19</sup> Or the \$396 billion price tag on America's F-35 jet (with a projected long-term cost of \$1.1 trillion), a single over-budget weapons system,<sup>20</sup> designed to fight threats not a fraction as threatening as our current path to a climate-ravaged planet (while the plane faces cuts in these tight fiscal times, that we would even contemplate throwing \$1,000,000,000,000 at it must give us pause).

An ounce of prevention never went farther than it would with today's world-melt, a trifle compared to the damage heading our way. Unfortunately, governments seem much happier mopping up storm-surge spills than indulging in foresight (I don't categorize multi-billion dollar high-tech flood barriers as "foresight," necessary stopgaps though they may be). OK, I realize I've been saying that governments are the jellyfish of intelligent climate action - I'm just hoping that ultimately economically beneficial restoration of living systems that make it possible for humans to continue to live on earth will be within the grasp of a jellyfish.

While we should at least make an effort to aim national treasuries at survival strategies, here's another idea as well, albeit perhaps unpalatable at first glance: *big bucks from the coal, oil and gas industry*.

Whether it's a good idea or not is something we should consider and debate. Would supporting soil sequestration just wind up as an excuse to keep pumping out carbon, or creating bogus "carbon credits"? Maybe. But, since no excuses have been needed yet, why would fossil mongers need one now? In any case, given the current accelerating climate death spiral, desperate measures are in order.

Here's my immodest proposal, and if you have others, the more the merrier. But there is a positive role here for an obsolete breed of capitalists, and they may have reasons of their own to agree:

- First, they are aiders- and abettors-in-chief of climate implosions, and they know it, public-relations-machine denials notwithstanding.

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<sup>18</sup> Editorial, "Hurricane Sandy's Rising Costs," New York Times, November 27, 2012, <http://www.nytimes.com/2012/11/28/opinion/hurricane-sandys-rising-costs.html>

<sup>19</sup> The World Bank, "The Real Cost of Fossil Fuel Subsidies," May 9, 2012, <http://go.worldbank.org/EBQRS9K7H0>.

<sup>20</sup> Christopher Drew, "Costliest Jet, Years in Making, Sees the Enemy: Budget Cuts," New York Times, November 29, 2012, <http://www.nytimes.com/2012/11/29/us/in-federal-budget-cutting-f-35-fighter-jet-is-at-risk.html>.

- Second, they have money in the gazillions. And without an overwhelming catastrophe-in-progress, our corporate-owned governments aren't going to fix that any time soon.
- Third, all signs indicate that they are going to get us to burn every last profitable molecule they can get their oily hands on, whether we want to or not. They rely on the fact that the economy and infrastructure we've built and are currently stuck with leave us with little choice, at least in the short time we have to save the show. Solar, etc. may have their day in the sun, so to speak, but not in the tight timeframe handed to us.
- Fourth, as droughts and storm surges gut the world economy, even their copious profits would suffer. Maybe that's the wrong motivation for doing the right thing but getting the right thing done comes first, no matter whether it's done by a genius or an idiot.
- Finally, they look bad, and for reasons that are probably silly and don't matter much, they nonetheless would rather look good (check out their slimy greenish ads if you don't believe that).

Of course we should do everything we can to keep carbonaceous fuels deep in the ground. Given our dismal track record, however, and the pressing state of emergency, let's move ahead on eco-restoration with all due dispatch, and let the corporate purveyors of pollution help pay for it. For sadly and ironically for life on earth, even with all the advantages of soil-based carbon capture and storage, we do need money to get started: to gain access to twelve billion acres of land across the planet, to educate people on how to manage it effectively and support them in the process, and to populate it with cattle, goats and sheep - grazing the way nature has done it successfully for eons, long before humans arrived on the scene. The fossil fiends have the money, and it's in their interest to spend what to them would be a pittance on everyone's survival, including their own. No, they don't deserve their wealth, and yes, they've effectively stolen non-renewable resources and ruined many lives and livelihoods along the way, but that's history.

So let's pursue a new focus with a vengeance:

***Pull out all the stops and put carbon back into the ground - the way nature does it.***

Let governments go on notice: it's their job to prevent the devastation of the human race and the natural world. To make sure it's paid for by whatever means necessary, and to help ensure that the fossil mongers spend lots of money on it. Outright. No payback from the people of the world. No carbon credits or tax breaks. The corporate world - not just the coal/oil/gas companies - owes us. If we don't stop climate chaos there will ultimately be no profits to be had by anybody, so all mega-corporate coffers have their own best interests to consider as well.

Will soil sequestration of carbon do everything to save us? In and of itself, frankly no. We need to restore forest and other ecosystems as well, expand our understanding of how nature cycles carbon, and apply it.<sup>21</sup> Furthermore, we're still confronted by a growing and hungry population, depleted resources, species extinctions, inequity and many other afflictions of civilization. But if we don't solve global warming all of our other problems will be moot.

Savory was absolutely correct: the only thing we cannot buy is time. Never was there a more urgent need to prepare for war. Never was there to be a war which would build, not destroy, and which would save so many lives. And to that point restoration of grassland soils is so far ahead of anything else on the table, in a wealth of ways, that a failure to embrace it - with all due dispatch, with all necessary resources - would be tragic.

### **Annotated References**

*All links current as of December 4, 2012*

The Soil Age google group is for anyone interested in holistic management/carbon farming solutions. All are welcome to join: <http://groups.google.com/group/soil-age>.

**Videos Online** - excellent discussions on restoring a livable world:

Savory Institute, "Holistic Planned Grazing," December 18, 2011, <http://youtu.be/5LHoh-OKUfU>, 3 minutes.

Allan Savory, Savory Institute, "Changing Our Future," from "TED's Ads Worth Spreading," February 7, 2011, <http://www.youtube.com/watch?v=ZOmlw2eiWII>, 4 minutes.

Seth Itzkan, "Reversing global warming with livestock?," May 24, 2012, <http://www.youtube.com/watch?v=lOpoRdpvIh0>, 8 minutes.

Tony Lovell, "Soil Carbon: Putting Carbon Back Where It Belongs," September 9, 2011, <http://www.youtube.com/watch?v=wgmsrVInP0>, 21 minutes.

Allan Savory, Savory Institute, "Keeping Cattle: Cause or Cure for Climate Crisis?," 2009, <http://vimeo.com/8239427>, 59 minutes.

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<sup>21</sup> For a holistic approach to wetlands restoration, see Dan Barber, "How I fell in love with a fish," TED Talk, February 2010, [http://www.ted.com/talks/dan\\_barber\\_how\\_i\\_fell\\_in\\_love\\_with\\_a\\_fish.html](http://www.ted.com/talks/dan_barber_how_i_fell_in_love_with_a_fish.html).

Greg Judy, "Holistic Management for Profitable and Sustainable Production of Crops and Livestock," February 20, 2011, <http://www.youtube.com/watch?v=W6HGKSvjk5Q>, 1hour 15 minutes.

## Books and Articles

An excellent place to start is Allan Savory's 2008 paper, "A Global Strategy for Addressing Global Climate Change," [http://www.savoryinstitute.com/wp-content/uploads/2012/01/GlobalStrategyforAddressingClimateChange2\\_1.pdf](http://www.savoryinstitute.com/wp-content/uploads/2012/01/GlobalStrategyforAddressingClimateChange2_1.pdf). Savory is a pioneer in the management of grasslands, and has decades of experience as a research biologist, game manager, rancher, and farmer in Africa the United States. His organization, the Savory Institute, maintains a website at <http://www.savoryinstitute.com/>. Holistic Management International (HMI), also founded by Savory, is at <http://www.holisticmanagement.org/>. These sites have a wealth of downloadable articles, including archives of HMI's journal for farmers and ranchers, "In Practice," <http://holisticmanagement.org/in-practice-journal/>. PBS has also produced a video, "The First Millimeter: Healing the Earth," available at <http://holisticmanagement.org/store/multimedia/>.

Dan Dagget, *Gardeners of Eden: Rediscovering Our Importance To Nature*, Thatcher Charitable Trust/EcoResults! Press, Santa Barbara, 2005. This excellent and well-illustrated book tells the stories of Tony and Jerrie Tipton and others who have brought all but dead soils miraculously back to life. It offers many insightful discussions of the relationships in the natural world and the obstacles created by cultural assumptions and dogmatic environmentalism.

Christine Jones is an internationally known Australian groundcover and soils ecologist. Her website is Amazing Carbon, <http://www.amazingcarbon.com>. Several informative papers are available on the site.

The Soil Carbon Coalition is a nonprofit organization dedicated to turning atmospheric carbon into soil organic matter. Its Soil Carbon Challenge is "an international prize competition to see how fast land managers can turn atmospheric carbon into water-holding, fertility-enhancing soil organic matter." <http://soilcarboncoalition.org/about>.

The Rodale Institute has been conducting scientific soils and farming research for almost thirty years, the longest running trial comparing organic and conventional farming methods, and have documented agricultural solutions to climate change and the developing "green revolution" collapse in food production, [http://rodaleinstitute.org/global\\_warming](http://rodaleinstitute.org/global_warming).

A couple of articles from non-profit organizations addressing soil sequestration of carbon: Sara J. Scherr and Sajal Sthapit, "Mitigating Climate Change through Food and Land Use," *Worldwatch*, 2008, <http://www.worldwatch.org/node/6126>; and Ronnie Cummins, "The Organic Revolution: How We Can Stop Global Warming," *Organic*

Consumers Association, October 19, 2009,  
[http://www.organicconsumers.org/articles/article\\_19404.cfm](http://www.organicconsumers.org/articles/article_19404.cfm).

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## SIDEBAR 1

### Soil-Based Carbon Capture and Storage: The Numbers

Here's some basic carbon arithmetic. It can be confusing, so I've outlined for reference.

The *absolute amount* of either carbon dioxide (CO<sub>2</sub>) or carbon (C) in the atmosphere is measured in billions of tons, or gigatons (Gt). The *proportion* of C in the atmosphere (as part of the CO<sub>2</sub> gas molecule) is measured in parts per million (ppm) relative to all the other gases in the atmosphere:

1 ppm is the equivalent of 2 Gt C in the atmosphere or in the soil

Since the beginning of the industrial revolution, humans have added roughly 112 ppm to the atmosphere, that is, 224 Gt C.

Note that not all the CO<sub>2</sub> emitted goes into the atmosphere. Much is sequestered in terrestrial carbon sinks, most notably the oceans (which are becoming dangerously acid as a result). For example, in 2011 we emitted 8.6 Gt C from fossil fuel combustion and many more from soil loss, but only around 5 Gt C (2.5 ppm) made it into the atmosphere; the sinks absorbed the rest.<sup>22</sup>

The bottom line is that *for every 2 Gt of C captured from the atmosphere and absorbed into the soils, there is 1 ppm less in the atmosphere*. Therefore, if we were to capture 1 ton of carbon per acre per year on the roughly 12 billion acres of degraded grasslands worldwide, we would remove 12 Gt of C from the atmosphere per year, that is, 6 ppm annually. If we are crazy enough to keep pumping carbon into the atmosphere at current rates, roughly 2.5 ppm per year, planned grazing would remove 3.5 ppm of legacy industrial carbon per year. In theory, this could return us to pre-industrial atmospheric CO<sub>2</sub> levels in under four decades, even with ongoing fossil fuel emissions - but certainly faster without them.

The 1 ton of carbon capture per acre per year is a conservative estimate and has been demonstrated in a variety of studies, which *did not* include the essential benefits of the grassland/grazer co-evolutionary relationship. In fact we are only beginning to study and improve on the effectiveness of soil-based carbon capture and storage.

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<sup>22</sup> International Energy Agency, "Global carbon-dioxide emissions increase by 1.0 Gt in 2011 to record high," May 24, 2012, <http://www.iaa.org/newsroomandevents/news/2012/may/name.27216.en.html>

When pressed and undaunted, human beings have been known to perform remarkable feats. A Manhattan Project for soils, instead of blowing the world to bits, might just be able to put the pieces back together again.

## END SIDEBAR 1

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## SIDEBAR 2

### The World's Soils: Lost and Found

#### *Soils Lost*<sup>23</sup>

Measured in gigatons, the amount of organic carbon in soils, - that is, carbon in complex molecules formed by living things - is approximately 1477 Gt (numbers will vary somewhat depending on the source). This is roughly 537 Gt less than total organic carbon in soils in prehistoric times, "or 27 per cent of the amount present prior to the spread of civilization. . . ."<sup>24</sup> That 537 Gt is the equivalent of 218 ppm that was once safely stored in the ground instead of in the atmosphere:

Soil carbon stocks decline after land use changes from pasture to plantation (-10%), native forest to plantation (-13%), native forest to crop (-42%), and pasture to crop (-59%).<sup>25</sup>

The 218 ppm is roughly twice the excess carbon that we've injected into the atmosphere since 1750 (half of it was absorbed by the ocean and other carbon sinks). We only need to put 112 ppm back into the ground, even though a percentage of the excess didn't come from soils, it's from our burning of fossil fuels. To emphasize, *replacing just half of the soil carbon we have lost in the past ten thousand years has the realistic potential for reducing atmospheric carbon to a pre-industrial 280 ppm, and restoring a stable climate.* Note that in so doing we would also sequester *all* past and current emissions from fossil fuels.

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<sup>23</sup> "What If the World's Soil Runs Out?," *Time* World, December 4, 2012, <http://world.time.com/2012/12/14/what-if-the-worlds-soil-runs-out/>.

<sup>24</sup> P. Buringh, "Organic Carbon in Soils of the World," in *The Role of Terrestrial Vegetation in the Global Carbon Cycle: Measurement by Remote Sensing*, G. M. Woodwell, Ed., John Wiley & Sons Ltd, 1984, p. 91, [http://globalecology.stanford.edu/SCOPE/SCOPE\\_23/SCOPE\\_23\\_3.1\\_chapter3\\_91-109.pdf](http://globalecology.stanford.edu/SCOPE/SCOPE_23/SCOPE_23_3.1_chapter3_91-109.pdf)

<sup>25</sup> L. B. Guo, R. M. Gifford, "Soil carbon stocks and land use change: a meta analysis," *Global Change Biology* Volume 8, Issue 4, pages 345-360, April 2002, <http://onlinelibrary.wiley.com/doi/10.1046/j.1354-1013.2002.00486.x/abstract;jsessionid=60D26918F786756A58B3365D3DE18B3A.d03t03>



## ***Soils Found***

There are two ways soils are made: geological and biological. Geological soil generation, primarily the weathering of rock that removes carbon dioxide from the atmosphere to make calcium carbonate and other compounds, takes millennia. Biological soil generation, the combining of plant litter and animal dung and the action of myriad soil life forms can, under proper management, add an inch or more of soil per year, and turn a ton or more of atmospheric carbon into stable complex biological compounds per acre, compounds that stay in the ground for centuries or millennia. *We can make it happen.* In fact, it is already happening on 40 million acres;<sup>26</sup> now, to make a significant impact on atmospheric carbon dioxide, we have to scale up to 12 billion acres.

There is mainstream scientific research that supports restoring soils for carbon sequestration, even without restoring nature's grazer/grassland co-evolutionary relationship. For example, a five-year study of grasslands planted with switchgrass for use as biofuels demonstrated that soil carbon could increase by more than 1.7 tons per acre. This was on conventional farmlands *without* the added benefit of grazers and the diverse assortment of animals, insects and fungi that capture significant additional quantities of carbon dioxide.<sup>27</sup>

Another example: The Rodale Institute in Pennsylvania has conducted the longest running U.S. study comparing organic with conventional farming. Its results: "organic systems have shown an increase of almost 30 percent in soil carbon over 27 years." Furthermore, "During the 1990s, results from the Compost Utilization Trial (CUT) at Rodale Institute—a 10-year study comparing the use of composts, manures and synthetic chemical fertilizer—show that the use of composted manure with crop rotations in organic systems can result in carbon sequestration of up to 2,000 lbs/ac/year. By contrast, fields under standard tillage relying on chemical fertilizers lost almost 300 pounds of carbon per acre per year. Storing—or sequestering—up to 2,000 lbs/ac/year of carbon means that more than 7,000 pounds of carbon dioxide are taken from the air and trapped in that field soil."<sup>28</sup> The Rodale study shows sequestration of up to 1 ton of carbon per acre, again even without employing the essential evolutionary relationship between grazing animals and grasslands.

Anecdotal reports indicate that a good deal more carbon sequestration is possible when the grassland/grazer relationship is applied correctly, but formal study of carbon

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<sup>26</sup> "We Need a Brown Revolution: Interview with Allan Savory," United Nations Convention to Combat Desertification (UNCCD) News, May-June 2011, <http://newsbox.unccd.int/3.3/imgissue/UNCCDNews3.3.pdf>

<sup>27</sup> M. A. Liebig, et al., "Soil Carbon Storage by Switchgrass Grown for Bioenergy," *Bioenerg. Res.* (2008) 1:215–222, September 2008, <http://naldc.nal.usda.gov/download/28132/PDF>.

<sup>28</sup> Tim J. LaSalle, Paul Hepperly, "Regenerative Organic Farming: A Solution to Global Warming," Rodale Institute, Kutztown, PA, 2008. Slideshow of paper available at [http://www.princeton.edu/morefoodlesscarbon/speakers/timothy-lasalle/Timothy\\_LaSalle.pdf](http://www.princeton.edu/morefoodlesscarbon/speakers/timothy-lasalle/Timothy_LaSalle.pdf); full paper no longer available online.

sequestration in holistically managed soils is still in its very early stages. One such effort, advanced by Peter Donovan of the Soil Carbon Coalition, has only recently begun collecting soil carbon data from across the United States.<sup>29</sup>

**END SIDEBAR 2**

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<sup>29</sup> <http://soilcarboncoalition.org/>