

Climate, Energy and Community: Vermont 2017

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This is a compilation of my 2017 columns from the Sunday Rutland Herald and Barre/Montpelier Time Argus. This series started nine years ago in January 2008; and an overview paper is available¹. These columns go through the seasons, dealing with weather, climate, climate change, energy and policy issues. They blend science with a systems perspective, and encourage the reader to explore alternative and hopeful paths for themselves, their families and society. They are written so that a scientist will perceive them as accurate (although simplified); while the public can relate their tangible experience of weather and climate to the much less tangible issues of climate change, energy policy and strategies for living sustainably with the earth system. Other occasional opinion pieces are included.

I believe that earth scientists have a responsibility to communicate clearly and directly to the public² –as we all share responsibility for the future of the Earth. We must deepen our collective understanding, so we can make a collective decision to create a resilient future. *All my articles are available from my web-site, and can be freely reused under a Creative Commons license.*

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¹ **Betts, A.K. and E. Gibson (2012)**, Environmental journalism revisited. *Environmental Leadership: a Reference Handbook*. Deborah R. Gallagher, Editor, SAGE publications Inc., Sept. 2012, ISBN: 9781412981507. Available at <http://alanbetts.com/research/paper/environmental-journalism-revisited/#abstract>

² **Betts, A. K. (2011)**, Communicating Climate Science. *EOS Transactions*, 92, No. 24, 14 June 2011. Available at <http://alanbetts.com/research/paper/communicating-climate-science/#abstract>

a) Gulf between Science and Politics

(February 18, 2017)

<http://www.rutlandherald.com/articles/gulf-between-science-and-politics/>

It is time to look back on 2016 and ahead at 2017. Last year was again the warmest on record, well ahead of 2015, which itself set a new global temperature record. The sea-ice cover, which is shrinking as the planet warms, is near record lows at both poles for the first time. New research continues to point to accelerating climate change and increasing extreme weather. Last year, U.S. communities were faced with costs of \$53 billion from extreme weather and climate disasters.

Here in Vermont we have had more snow than last year, but so far the winter has been relatively warm. The downside has been more freezing rain and ice-storms. In our garden, a new crop of spinach is growing under glass, as the sun gets higher in the sky, and we will soon be making salads again.

A recent Yale Climate Communication national survey in November after the election shows that 70% of Americans think global warming is happening, 61% are worried about it, 65 % see it as a threat to developing countries and 71% as a threat to future generations. Yet the new administration is pretending climate change is a hoax, because it is a threat to the fossil fuel industry and to libertarian economics.

So let us contrast these two worlds; the scientific world with its roots in reality, and the new political world, which is built on power fantasies that change daily, glued together by egoism - and the determination to continue the exploitation of fossil fuels and the Earth.

In Washington, making America 'great', 'draining the swamp', and destroying the US government and its global reputation, are all pathetically jostling for attention. Indeed the swamp has been filled with alligators, and the new administration is a chaotic mess, as it struggles to assert the absolute power of the president. When false information is being rebranded as 'alternative facts'; all that is really clear is that our government is on sinking sands.

In my local store after the election, someone said: "You must be shattered to see everything you have worked for destroyed". I grinned, because narcissistic tweets don't affect the climate; even though they are a tragic threat to American values, international cooperation and world peace.

I heard that the US military has developed contingency plans to deal with 'illegal' executive orders. I am glad to see that Vermont is also working to counter illegal or immoral federal policies. Our Governor has reiterated that Vermont will not enforce federal laws that discriminate against non-citizens working on our farms.

Two difficult issues need to be faced. The states must prevent the takeover of their National Guard by a ruthless federal government. In addition, when they are blackmailed with "obey or lose your federal funds", extraordinary measures may be needed to cut funds to the central tax system. Recall that the real Tea Party started in New England centuries ago. Ultimately though, if the government in Washington becomes truly dysfunctional, the New England states can unite and act alone.

In December I was in San Francisco with 23000 earth scientists from around the globe for the annual meeting of the American Geophysical Union. What a delight to be in a global community of men and women searching to understand the real world, and eager to network and share all they have learnt.

The younger generation knows the challenges that lie ahead, but their deep shared integrity will carry them forward. Those from overseas paid rather little attention to US politics. The fact that the US is surrendering global leadership to China and Europe is a reality, but this does not affect all the scientific and engineering work that needs to be done to build a resilient world.

Clearly we cannot expect guidance or funding from Washington. It is time to expand our efforts to build energy efficient and resilient communities here in Vermont, so we can face the future together with moral clarity.

b) Getting there more efficiently

(April 22, 2017)

<http://www.rutlandherald.com/articles/getting-there-more-efficiently/>

It has been a generally warm winter in New England. Burlington had no nights in January below 0 degrees, and the temperature reached a remarkable 70 degrees on February 26th. The biggest snowstorm came in mid-March with 2 feet of snow in many places, but the snow quickly melted with sunny skies and the approach of the spring equinox. Another coastal snowstorm followed at the beginning of April.

For the second year in a row, spinach survived in the open protected only from deer. At the end of March as soon as the soil had thawed, I planted lettuce and more spinach, which sprouted as the temperature rose into the 70s in recent weeks. Remember not to plant anything that a frost will kill till the maples leaf out, unless you are prepared to cover them well. The clear nights of spring make frosts likely, because the earth can cool rapidly to space at night, until the deciduous forests leaf out and put more water vapor in the air.

Politically the last 2 months have had a certain fascination. After the inauguration, the fantasy of rescuing the coal industry replaced tackling climate change by phasing out fossil fuels. That same week, China canceled plans to build 100 new coal-fired power plants, and introduced a plan to install 130 GW of new solar power by 2020. To give you a sense of scale, this is a thousand times the large build-out of solar power in New England in the last year or two. As climate change leadership shifted to China, the US stacked the cabinet in Washington with fossil fuel advocates.

Our grandchildren will look back in horror and say “How could they sacrifice the Earth to protect the profits of the billionaires?” Well, our elected leaders pretend not to know that burning all our coal and oil reserves will melt the icecaps, flood the coastal plains and wipe out half of life on earth. As Pope Francis pointed out in 2015, our use of power and our respect for creation is a deeply spiritual issue. We cannot serve both the Earth and money.

Transportation in New England uses a lot of fossil fuel, so it is one of the big challenges we face to decarbonize our economy. A typical automobile getting 25 miles per gallon, so driving 12000 miles per year burns 480 gallons of gas and emits 4.3 tons of CO₂. A recent study showed that this melts an extra 140 sq.ft. of Arctic sea-ice every September. As the reflective sea ice shrinks, the warming of the Arctic accelerates, and we will soon face more amplifying factors like the release of methane, another stronger greenhouse gas.

I drive to meetings and to the grocery store, so how can I reduce the gasoline I use? Only by shifting to electricity coming from solar power. For me this has taken a couple of years. First I invested in solar panels from a community array, providing 5.7 kW of peak power. Over the year, eighty percent of this power provides the electricity that powers our house and heats our hot water. Twenty percent provides the power for a Prius Prime plug-in hybrid, which we purchased last year.

The all-electric range is only about 25 miles, but that is enough to drive to my neighboring towns and back. The combination of a very efficient hybrid car that gets 55 mpg, and this modest all-electric range has surprised and delighted me. Even in the winter months, we have averaged more than 120 miles on a gallon of gas. This means we only fill up the 10 gallon gas tank every 1200 miles. Yet using it will still emit almost a ton of fossil CO₂ every year, and inexorably contribute to the melting of Arctic sea-ice.

The basic issue is that typical four-passenger cars weigh about 3500 pounds. Where I grew up in England, there were networks of public paths connecting towns that had been used for centuries – on foot or on horseback. For the future, New England needs a new network of small paved roads for lightweight electric cargo bicycles and tricycles. Even tricycles that are fully enclosed with a shell to keep out the weather, are less than a tenth of the weight of a car; so they are far easier and cheaper to power with solar electricity. But for safety reasons they need to be separated from heavy trucks and speeding cars. And yes, they will only go half the speed of cars – about 25 mph. They could use heated seats for our winters, and there will be some snow-days.

But there are two fringe benefits that would benefit our health in the long term: some exercise commuting to work, and a closer connection to the landscape as we travel. This is of immense importance as our society must turn to the Earth for guidance.

c) Needed: Clarity and Courage

(June 10, 2017)

<http://www.rutlandherald.com/articles/needed-clarity-and-courage/>

After a cool March, the daffodils and forsythia bloomed relatively late in Pittsford around April 17. But the maple trees bloomed early and leaf-out started April 28, as if they were unaware of the cool temperatures in March. A long period of unusually cool, cloudy, wet weather with slowly moving jet stream patterns followed in May and early June. Potatoes, broccoli, peas and lettuce are flourishing in the garden.

The most exciting aspect of giving talks on climate change this year is that a public awakening is underway. I have seen capacity audiences with a new intent enthusiasm. This took quite a shock, but now more people realize they must stand up and they must act. For the faint-hearted it helps that this is the final decade to drop our global emissions of fossil carbon, and still have an even chance of just squeaking below critical earth system thresholds.

The March for Science on Earth day exemplified this. Scientists never thought they had to stand up and be counted. They were a rather comfortable part of the establishment; perhaps too comfortable in their academic worlds. Now they realize that they bear some real responsibility for the truth, not just in science, but a social responsibility for the truth in society. They must protect the integrity of science

against a corrupt political system; and make a lot more effort to reach out since we need a knowledgeable public. Otherwise the democratic enterprise collapses.

It has been a slow awakening. Too many scientists tolerated, for example, the substitution of profit for truth by the pharmaceutical industry. But now they watched in horror as the legal protections for clean air and clean water were denounced, simply because they interfere with the profits of those exploiting the Earth. It is deeply ironic that the Environmental Protection Agency itself is now threatened, as it was set up and strengthened by Republican presidents, who understood the need to protect and conserve our natural resources.

Now our phony conservative leaders would like to sweep it all away in their rush to the dark side. On June 1, they had a moment of triumph with the announcement that the US will withdraw from the 2015 Paris climate change agreement. In reality, their ignorance of the global issues we all face just confirms the irrelevance of our national leaders. It is another call for states and citizens to wake up and act.

The wider conflict going on both in our society and around the world needs explicit discussion, because it must be faced consciously. It is a broad struggle for the soul of humanity that has been ongoing but continually changing since the catastrophe of World War One a century ago. One aspect in recent decades is the consolidation of political, economic and financial power in the hands of elites. Underlying it are deeper, ego-based power struggles. These cannot be resolved without a change of mindset, because no amount of power and wealth will console and satisfy fearful egos.

What is happening is that many of the traditional patriarchal, libertarian, religious, racial, economic and financial frameworks are crumbling. Fear and desperation has been rising as groups fight for the survival of their threatened mindsets. Finally we have in Washington a pathetic but desperate parody of the patriarchal system, which is willing to jettison everything rather than face themselves and their responsibilities to either the people or to the Earth. Their moral and intellectual collapse is illustrated by the fact that democracy, science and ethics were valued only as long as they served the interests of the powerful.

So it is not surprising that opposition is on the rise. Many are justifiably fearful of what they may lose. What is needed however is a conscious opposition that is rooted in a compassionate awareness that we must stand up for an inclusive view, where all people and all life on Earth matter, because we are all deeply connected.

Certainly, rooted awareness is a real threat to the fearful, egotistical plutocrats in power; but this should not be seen as yet another battle where the powerful could simply crush us. The moral and practical choices are so clear that if we stand up in our communities and align ourselves with the Earth, their foolishness will likely crumble. But first we must confront the threat to the soul of democracy from thirty years of corruption by dark money. Next year will be the test to see whether democracy still stands across America.

But summer is coming, so don't stop planting because we need to feed each other. Let us cultivate the strength and vision of our communities.

d) Be grateful for global society**(July 29, 2017)**<http://www.rutlandherald.com/articles/be-grateful-for-global-society/>

The garden has grown well in June and July with plenty of rain. By the summer solstice, the last of the head lettuce that had wintered over was gone, but many more rows planted this spring headed up as the weather warmed. By late June we were eating broccoli every night and then peas; delicious with chard and shiitake mushrooms from the Rutland farmers market. It has been very satisfying to localize our food supply in the past ten years, and to share some of what we grow with others.

This past week I have been at the European Weather Centre in England, discussing the improvements they have made with their global forecast model, and strategizing on the next developments. I have been working with them for thirty years, and it is always a delight to come to an international institution with clear goals that is run by scientists without political interference. Not surprisingly their forecasts have been the best in the world for decades.

Here in the US, NOAA struggles with political interference, which has often squeezed budgets and personnel. A few weeks ago I read about a threat to cut funding for hurricane forecasting. Perhaps the supreme leader is dreaming of building a Great Wall to keep hurricanes out? Our current administration is of course annoyed that NOAA's climate simulations don't support their alternative facts. The new EPA administrator Scott Pruitt, living in a dream world, says that he "does not agree that carbon dioxide is the primary driver of global warming". I doubt he has looked at the science that shows that if you remove all that pesky carbon dioxide from climate models, the Earth quickly freezes over!

Of course, this administration came in with the confused notion of demolishing as much of the federal government as possible, and they are succeeding by making it simply dysfunctional. This a pathetic reminder of how doctrinal interference with science weakened the Soviet Union fifty years ago. There is nothing here that will make America great again: it will simply speed up the coming implosion, unless we the people wake up and act soon.

Fortunately this is happening across America as cities and states are taking responsibility for climate change and the transformation of our energy system. Fourteen states including Vermont have joined the US Climate Alliance, to uphold the commitments of the 2015 Paris agreement. In Vermont we have a good chance to address together the issues of sustainability and social justice, and implement useful long-term strategies. But it will require a lot of effort.

The people will have to lead because the national republican and democratic parties are too mired in past doctrine and indebted to wealthy interests. Pay attention to the radical change that just happened in France. There a democratic revolution replaced the old left and right political parties in a single year with a new visionary political party and President. If climate scientists are fired in the United States, France has offered them jobs!

We live in a global world where we can be grateful that others take their responsibilities seriously. The new global analysis from the European Centre, which goes back forty years, will be freely available to scientists in Vermont to help us understand our changing climate. We need to understand how and why heavy rain, flash flooding and more severe storms are becoming more frequent as the climate changes. On July 1st Vermont had major flooding once again, while Maine experienced five tornados. The good local news was that the recently finished flood diversion culvert under route 7, built to protect Brandon after Irene, saved the town from another disastrous flood. Across the US however, extreme weather and climate disasters caused \$53 billion in economic damage in 2016.

But despite all our rain this summer, my year's supply of garlic is harvested and dry. When I get home, there are potatoes to be dug, and no doubt prolific squash and tomatoes.