

Climate, Energy and Community: Vermont 2018

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This is a compilation of my 2018 columns from the Sunday Rutland Herald and Barre/Montpelier Time Argus. This is the eleventh year of a series that started in January 2008; and a 2012 overview paper is available¹. These columns go through the seasons, dealing with weather, climate, climate change, energy and policy issues. They blend science and opinion with a systems perspective, and encourage the reader to explore alternative and hopeful paths for 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. The politically motivated attacks on climate science by the current president have sharpened my political commentary; since climate change denial may bring immense suffering to our children and all life on Earth.

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 build 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) Intelligence and Resilience

(February 10, 2018)

<https://www.rutlandherald.com/articles/Intelligence-and-Resilience/>

I have been reflecting this winter on environmental intelligence, defined as that blend of natural science, social science and indigenous knowledge that helps us humans understand how to interact constructively and creatively with the living natural world. Our limited environmental intelligence has been apparent for years. Now we have a central government that is so deficient that its primary interest is exploiting the natural world to increase the profits of its corporate sponsors. The tacit assumption is that both current and future costs can be dumped on the poor, the indigenous, our children, and of course the Earth itself. In sharp contrast, the well-being of the planet, and our democracy, depend on how soon we the people recognize that we are all an integral part of this one Earth; and that we are being exploited by rich demagogues.

It won't take much to bring our proud society to its knees. Everything changed overnight on Puerto Rico when Hurricane Maria destroyed the power grid last September. Nearly five months have passed, and in the regions still without power, it is still day-to-day basic survival with little or no potable water, no refrigeration, no schools and no industry. Infrastructure including key bridges have not been rebuilt because the economy is bankrupt. Our financial system that exploited and pushed the country into bankruptcy, accepts no liability. Our government treats Puerto Rico as a now-worthless colony of foreigners that can be ignored, because they don't make large donations, and they certainly don't have a vote. This neglect of its own citizens is a measure of how far this once proud nation has sunk.

But desperate circumstances force us to return to community values: human disasters we can all understand. The community support here for my daughter's family who came to Vermont as refugees from Puerto Rico has been amazing and joyful to watch. Instinctively we remember that we cannot survive disasters as isolated individuals, only as a caring community.

Yet underneath, the creeping disaster to the planet threatens all our treasured values. Perhaps some of you made New Year resolutions to speak out for reality and the truth, which are now precariously intertwined, and essential for our survival. This year we need a conscious and determined effort to strengthen our communities and democratic values, and resist an economic and political system that would rather manipulate us as lonely individual consumers in the thrall of advertising and the media.

On a national level, the executive is trying to suppress the freedom of the press, as it struggles with pathetic desperation to create the first American dictatorship. The truth is rebranded as fake news, and puppet news media spread fabrications. Science and evidence are suppressed as dangerous, while the EPA dismantles environmental regulations related to clean air, clean water and mitigating climate change. Fortunately the Climate Advisory Panel that was dissolved last August was recreated in January by the Earth Institute of Columbia University and the State

of New York. Cities, States and businesses want access to reliable information to adapt to our changing climate, as they intend to keep our commitments to the Paris climate agreement.

This is a good time to reflect on Franklin Roosevelt's State of the Union address in January 1941, before the US entered World War II. He described how the US stood for four essential human freedoms: freedom of speech, freedom of worship, freedom from want and freedom from fear - everywhere in the world. We must stand up for these American values in the face of efforts by the current administration to bury them all.

Our communities are our strength and our resilience. I have been reflecting on how the towns of Rutland County came together in the days after Tropical Storm Irene isolated many of them. Some towns had no power or cell service, so the local community simply met every morning to help those in need; while those with equipment started rebuilding washed-out roads. Some had to climb mountains to find cell service, but soon the flow of information across social networks reconnected us all, so we could collect and move food, water and resources across rough terrain. We rush to do this in crises: now we face ongoing crises which need the same courageous determination.

b) Lessons from winter

(April 7, 2017)

<https://www.rutlandherald.com/articles/lessons-from-winter/>

It has been a chilly and snowy winter in the northeast, while temperatures in the western US and Alaska have been high. Temperatures in the Arctic have been very high and the sea-ice cover has reached record low values. As the Arctic warms, the cold polar vortex weakens, and it has become more unstable. There have been large exchanges of warm air flowing into the Arctic and cold polar air sinking into eastern North America and then into Europe in March. These air-mass exchanges produced both our cooler winter and the warmer Arctic.

Snow cover locks in cold temperatures, because it reflects so much of the sun's energy that little snow can melt, until the sun is higher in the sky. But the winter has had some extreme transitions. When warm air come in from the south on January 11-12, temperatures which had been below zero soared to 60 degrees. The snow all melted, and to my surprise, the soil was unfrozen and I could dig under some of my cover crop.

By late March, we are eating spinach again that overwintered in a glass cold frame, buried under snow until last week. Our spring lettuce will soon be ready. The Rutland farmers' market has had mixed salad greens, grown in unheated greenhouses, since mid-February.

Last December the fuel efficiency of our Prius Prime plug-in hybrid dropped below 100mpg for the first time, as the battery is less efficient when cold, and 20% of its energy is used to heat the car. In contrast we average 160 mpg in summer with a mix of short and long-range trips. Our

average on the first 14000 miles is 134 mpg, which means we are burning only 90 gallons of gas per year. Plug-in hybrids reduce carbon emissions by 80% and are available now.

Global trade issues are in flux. The European Commission has backed a French call to make trade deals with Europe contingent on membership of the Paris climate agreement. This is a step forward towards global responsibility. And a small step towards holding the US government responsible for sacrificing the Earth's climate to protect the financial interests of its fossil carbon sponsors. However our president believes he can control trade using tariffs, so trade wars threaten.

The deeper economic issue is that climate change denial is driving a huge fossil carbon bubble. We face the collapse of the perceived value of fossil carbon assets and related industries, as well as the value of coastal property threatened by storm surges and sea level rise. Trillions of dollars of assets will lose their value as climate change accelerates. We would be wise to manage this transition using a little environmental intelligence.

At town meeting last month, 35 Vermont towns voted overwhelmingly in favor of resolutions seeking climate solutions. They urged the State of Vermont to meet its goals for 90% renewable energy, and called for a fair and equitable transition off fossil fuels. The majority of the resolutions also demanded a ban on any new fossil fuel infrastructure, such as natural gas pipelines. This is a stark but encouraging contrast with federal policy.

I am reminded how Vermont conservatives realized long ago that conserving the natural resources of the Earth was crucial for our society. I remember well Art Gibb, one of my neighbors in Weybridge, who led the Commission that drafted Act 250 in 1970. Yet strangely in our Nation's capital, many that claim to be conservatives do not see that conserving the climate of this planet is crucial for future life on Earth. Morally blind, they would sell our children's future to those who fund their election campaigns.

Yet spring is here again and very soon I will have the delight of planting frost-hardy seeds to rejoin the cycle of life.

c) Our responsibility to the Earth

(June 2, 2018)

<https://www.rutlandherald.com/articles/our-responsibility-to-the-Earth>

Spring came late in Vermont, as the daffodils did not start opening in Pittsford till April 18, and the forsythia were ten days later. Rain for days on end from slow moving weather systems led to substantial flooding. The grass grew profusely weeks before it was dry enough to mow. I planted cool weather crops, lettuce, kale and broccoli by the first of May, and by now even the summer squash and tomatoes are growing fast.

Earth Day was a Sunday this year. In the morning I spoke at the Dorset Church about our failing to accept our deep responsibilities to the Earth. In the afternoon, I spoke to a group called 'Earth Matters' on the green in Manchester. The challenge we face is the same whether framed in spiritual or secular language: time is running out for humanity if we continue down the path of mindlessly exploiting the Earth for short-term profit.

The glaring question facing us all is: who is responsible for solving this mess?

In early May I spent a week in the mountains of Alberta, Canada speaking to an international meeting of hundreds of scientists working on global water and energy issues. The title of this open science conference was "Extremes and Water on the Edge". Introducing the conference, the Deputy Minister of Environment and Climate Change Canada explained how fast the Canadian north is changing as ice, snow and permafrost melt. Planning for the future is well underway, but the adaptation costs are immense. Ironically Alaska has just the same changing climate, but planning is very difficult, because federal policy requires them to pretend it isn't happening!

As the climate changes, so the global water and energy cycles are changing. The long-frozen north is melting; and floods, droughts and heat waves are becoming more frequent across the globe. Disaster response and future planning for resilience were hot topics. Scientists are in no doubt about what needs to be done to move away from a fossil fuel economy to a renewable energy economy; but traditionally scientists have preserved the integrity and independence of science by leaving policy to others. My message to this scientific community was that we all have a moral obligation to the Earth, especially earth scientists who can see clearly the dire future that lies ahead under 'business as usual'.

This moral responsibility of course extends to all of us; and it is time for citizens and professionals to speak up for the interests of all our children and life on Earth. We can no longer leave issues of 'policy' to a federal government that is simply ignoring all that we know about the climate system in order to protect the massive investments of the fossil fuel industry (who are bribing them).

Across the US and on a global scale, the renewable energy transition is going nowhere near fast enough to stave off disaster. The Earth's energy imbalance is about 1.3 watts per square meter and 93% of this extra energy is being stored in the oceans for the decades and centuries to come.

This may seem small, comparable to a night-light, but it is about 250 times as large in total as the entire global electrical energy production. Rising sea level comes from this heating of the oceans, along with the melting of glaciers, which puts all our coastal development at risk. The flooding of New York by hurricane Sandy illustrates what happens when warmer seas give stronger storms with powerful storm surges along with higher sea-levels.

So redouble your efforts for the renewable energy transition. Work together to build creative synergistic solutions that will work for everyone, because so much is at stake, and discuss openly the moral issues we face with your colleagues and neighbors.

