

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 is the tenth 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 incoming president have focused and sharpened my political commentary this year; since climate change denial may bring immense suffering to our children and 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.*

List of topics in 2017 [*Index is live*]

a) Gulf between Science and Politics	(February 18, 2017).....	2
b) Getting there more efficiently	(April 22, 2017).....	3
c) Needed: Clarity and Courage	(June 10, 2017).....	4
d) Be grateful for global society	(July 29, 2017).....	6
e) Biblical floods and storms	(September 16, 2017).....	7
f) From the Eye of the Storm (Hurricane Irma)	(September 16, 2017).....	9
g) Surviving Maria in Puerto Rico	(October 7, 2017).....	11
h) Robbing our children's future	(November 4, 2017).....	13
i) The weather listens to no man	(December 23, 2017).....	14

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.

e) Biblical floods and storms (September 16, 2017)

<http://www.rutlandherald.com/articles/biblical-floods-and-storms/>

As individuals we are all very concerned about our children's future. In contrast, our society ignores the misery that climate change will bring to the future of all children, as well as much of the life on Earth. This odd disconnect, which so many can rationalize away, reflects a clash of values that we avoid discussing. Society runs on an economic system where money and profit rule, and the future is discounted. With this strange logic, the future rapidly becomes devalued and worthless compared to our greed for present wealth. Life on Earth in the future, including our children's lives, are treated as worthless.

We love our children and are proud of our individual freedom, but we have been fooled to tolerate an immoral economic system, where the rich and powerful can exploit the Earth, the poor, and our children. Yet still we chant its mantra of endless material growth.

The truth is just the reverse. *Climate change exposes our current economic system, based on exploitation and profit, as both valueless and almost useless for dealing with the future.* This is hard for us to grasp. Yet we must because the Earth does not discount the future. It just stores the energy from the sun that cannot escape to space as we burn more fossil fuel, and add greenhouse gases to the atmosphere. It takes time for the oceans to warm and the ice-sheets to melt, but they are warming and melting, and sea-level will rise for centuries. Inexorably climate change will accelerate on our present path. The warmer ocean drives stronger storms.

The flood of biblical proportions that Hurricane Harvey brought to Houston is a bitter reminder in the present. Some will claim it is just another five hundred year flood (the third in three years). Politicians still pretend that climate change and the warming of the oceans is a myth. But the Earth cannot forget, and fittingly this flood struck the coastal oil industry of Texas. But tragically the poor suffered the most. Perhaps a few brave biblical scholars will look back at

Genesis and realize that we have not kept the covenant between Heaven and Earth that was the promise of protection against another great flood.

We can retreat from the coasts, and the damage to our fossil fuel industries benefits the Earth for a brief moment; although the conscious choice of an escalating carbon tax would be much better. However the damage to our forests and food supply, and the increase in extreme weather, floods and droughts from a changing climate will bring much hardship. This will expose the brutal cruelty of our present administration, whose primary goal seems to be to protect the value of fossil fuel assets, regardless of the hundreds of millions of people and species that will die later this century.

Hurricanes again came sharply in focus for me last week as hurricane Irma strengthened to a category 5 storm over the warmer ocean. It became the strongest storm ever recorded in the Atlantic. It was approaching St Thomas where my daughter and grandchildren live. With maximum winds nearing 180 mph, I helped them move to a safer location, where they huddled terrified. I spent hours glued to the Puerto Rico radar, watching as the eyewall grazed the northern shore, doing immense damage. After five days, they were evacuated safely to Puerto Rico by a catamaran bringing in emergency supplies, and crewed by my elder daughter's friends.

Climate science has been subject to extraordinary scrutiny, because so much is at stake. Dealing with climate change requires fundamental changes in our political, economic and financial system, and society doesn't want to face this. Protecting wealth and profits now is more important than the future of our children and of life of Earth. Denial is the only way that those in power can try to hide from the savagery of this strategy.

For 50 years I have studied weather and climate science. Long ago in what we call the Carboniferous period, lush vegetation in a tropical hot-house climate removed CO₂ from the atmosphere for millions of years, and laid it down in the oceans to produce the fossil fuels. As CO₂ in the air fell, the earth cooled and eventually the icecaps formed. If we burn all these fossil

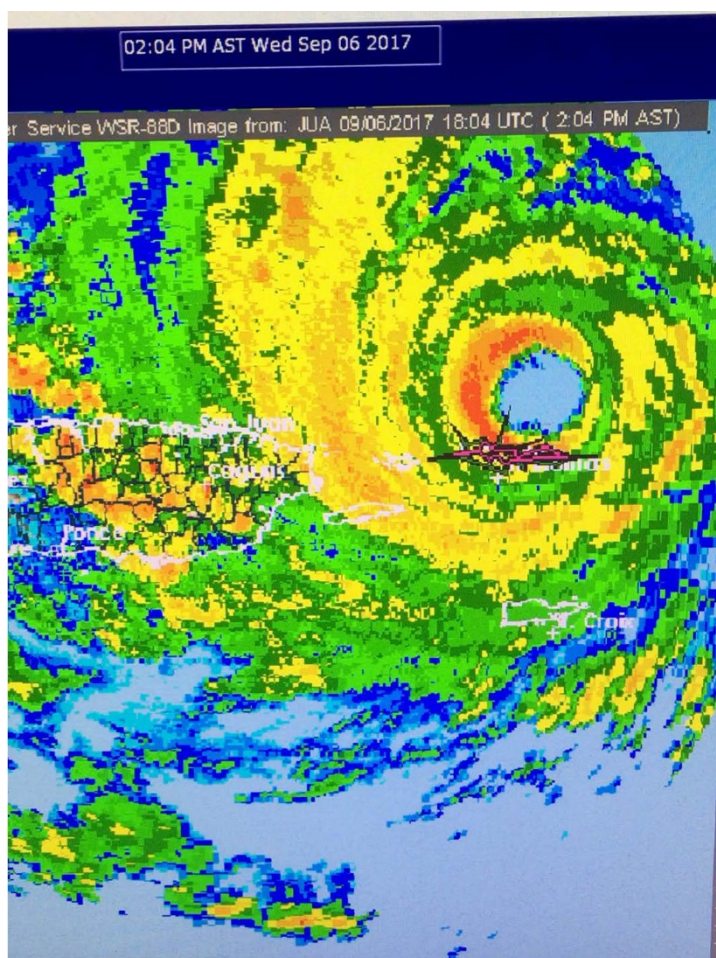


Figure 1 The eye of Hurricane Irma as it grazes the northern shore of St Thomas on September 6 as a strong category 5 storm. Red lines are warning boxes. Puerto Rico is to the left and St Croix to the south.

fuels this century, we will push the Earth once again back to a hothouse climate with disastrous consequences. Right now we are wasting our time and our resources. It is time we changed course, and made the rapid shift to an energy efficient society, powered by renewable energy.

f) From the Eye of the Storm (Hurricane Irma) (September 16, 2017)

with Heather Betts <http://www.rutlandherald.com/articles/irma/>

Alan Betts. My daughter Heather, her partner Peter and their two children have lived for years in Charlotte Amalie on the southern shore of St. Thomas in the US Virgin Islands. On Wednesday September 6, the eye-wall of Hurricane Irma, a category 5 storm, the strongest ever seen in the Atlantic with winds of 180mph, grazed the northern shore of the island. This narrative is a summary of hours of conversations with my daughter.

Heather Betts. As Irma approached, we had bought a month's supply of dry food and bottled water, and cooked a week's supply of rice and beans, since it was too late to leave the island. We stored everything we could in plastic bags. But we started to panic as Irma intensified and the track moved closer and closer to St Thomas. I turned to my father for guidance as he is a meteorologist. We found a small hotel down the hill from our apartment that was more protected and had hurricane shutters. We rented a ground floor room on the eastern end, because my dad said the strongest winds would come from the west. The hotel filled up rapidly as everyone on the north shore was evacuated. We moved in on Tuesday the day before the storm: it was a sleepless night. On Wednesday morning, the wind and rain started. My father was tracking the storm on the Puerto Rico radar, and giving me updates of what to expect when; until we were cut off at 1pm, an hour before the eye-wall reached the island. It was the most terrifying experience of my life, listening to the wind pounding and shaking the walls. At times it sounded like gunshots. We couldn't stop the water from coming through the windows and doors. My 11-yr-old daughter hid in the closet and my 4-yr-old clung to me. Then at the peak of the storm there were screams for help from a room down the hall, but we could do nothing. We thought the hurricane had broken into her room and was carrying them all away, and that our room was next. We got up to move into the bathroom but as we did the bathroom ceiling fell into the tub and onto the toilet. I looked around hopelessly: how could I save my children?

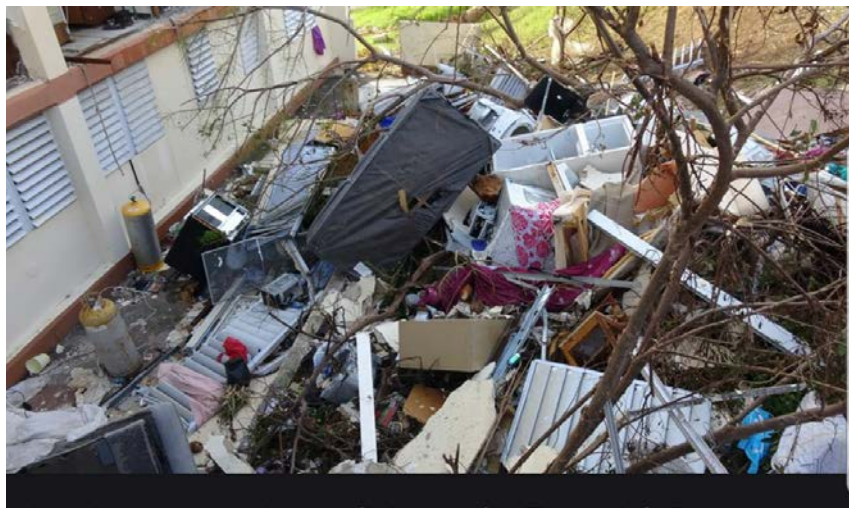
That evening after the storm everyone was in shock. The island lost all power, and may not have power for weeks or months, but the hotel had a generator. All rooms had some damage, and we spent hours and hours sweeping and scooping up water. We shared cell phones as some worked and others didn't. By the morning I got messages to my father and sister, and Facebook told everyone we were OK. There was a 48h curfew for cleanup and to prevent looting, so we could not go and see whether our apartment had survived. We stayed inside: many kids played together in one hotel room. We got news through a friend of mine who moved to St Thomas to run an ambulance service. She and her crew came to our room to

charge cellphones and store food in the fridge, working all day to help the injured. The dead they had to leave in their destroyed homes. Peter was scheduled for surgery on Friday, but part of the hospital roof came off, and the surgical wing and records were destroyed. All critical patients and the injured were being evacuated to other islands by helicopter as the airport was damaged.

My sister, who had lived in Puerto Rico and worked on an East Wind catamaran, found that they were running emergency supplies to the many devastated islands, and evacuating people. She wanted us to get out before Hurricane Jose arrived on Sunday, but when the curfew lifted at noon on Saturday for 6 hours, the roads were in chaos, and the seas were rising. The next day, we got to our apartment, which was OK except that the porch roof had blown away. We took what we could back to the hotel room, and I sorted till 2:30 in the morning. So much we could not take with us. Our landlord's family, from Palestine, had lost the roof of their house. They said they would move into our apartment, and give our possessions to others in need. They were grateful for our food supplies. Their little girl who played with ours will get the toys we left behind.

We made plans to evacuate on Monday. As we left the National Guard were moving emergency food rations into a hotel room; and we heard cruise ships would come in to rescue tourists, and anyone who wanted to go to the US mainland. The curfew was still in effect, but our friend's ambulance took us and others to the marina for evacuation on the catamaran. The damage to the west end of the south shore was much worse. Everything got wet on the boat from the waves, but they fed us - we were so hungry. Friends met us on Puerto Rico, and took us to a place to stay in Luquillo, near where I had lived years ago. Gratefully, we all walked to the shore to swim in the ocean. Power returned the day there we arrived, so we then started washing and drying clothes. It will take us long to recover, but there is a lot to do.

Relief funds for East Wind rescue work: www.gofundme.com/virgin-islands-relief-from-Irma



Wrecked buildings after Irma, five miles east in Tutu, St. Thomas.

g) Surviving Maria in Puerto Rico (October 7, 2017)

<http://www.rutlandherald.com/articles/surviving-maria-in-puerto-rico/>

Three weeks ago, my daughter Heather's eye-witness account of surviving hurricane Irma on St Thomas was published. She and her family were evacuated by catamaran to Puerto Rico. These small boats delivered emergency supplies, and rescued a thousand people in a few days from the US Virgin Islands.

My daughter and her partner Peter have lived on Puerto Rico and St Thomas for twenty years. Peter's family is Puerto Rican and Heather moved there with her mother as a teenager. But a few days after they arrived in Luquillo on the northeast shore of Puerto Rico, the next storm Maria strengthened to another category 5 hurricane, destroying more islands in its path and targeting Puerto Rico directly. Day after day, I followed the hurricane track forecast, which remained straight across the island from southeast to northwest. Now I had the impossible task of weighing the risks of 140 mph winds, a 6 ft storm surge (their apartment was on the coast) and severe flash flooding (20 inches of rain fell on the mountains).

Traumatized by Irma, they looked at the situation, spoke to relatives on the island and borrowed a car. They drove to safety on the far southwest coast the day before Maria hit. Having survived Irma, they stocked up on food and water. Realizing that the island would lose power, water and communications, they took \$500 from our joint bank account, because they had seen after Irma that everything collapsed to a cash economy.

As Maria approached, I was once again watching the Puerto Rican weather radar: this time the radar was destroyed the moment the storm hit the southeast coast around sunrise. The devastation was staggering. Puerto Rico lost all power and communications: and most of the island is still without them. It was 6 days before I had got a static-garbled message: just enough to tell me they were alive. The storm stripped leaves from a 50-mile swath across the island, and destroyed 95% of the agriculture. The roads were blocked by debris and fallen trees. Most of the hospitals were damaged.

They had chosen a good place. The small hotel, that gave them a room even though it was closed, also had backup power that ran at night. This preserved their cooked food - and their candles! After a week as the roads were cleared and their food was running low, they set off. Heather later told me that without leaves, it was like driving through a brown desert. Imagine for a moment setting off to make a post-apocalyptic journey across a flattened island in ruins. They needed a miracle. First they found a small shop open that had been miraculously restocked, and were able to buy food and water: critical as their water was almost gone. They needed gas, and someone sold them enough to get back to Luquillo (for \$100). In the more populated areas of the island there were 5-hour lines to buy 2 gallons of gas at the few stations that had some.

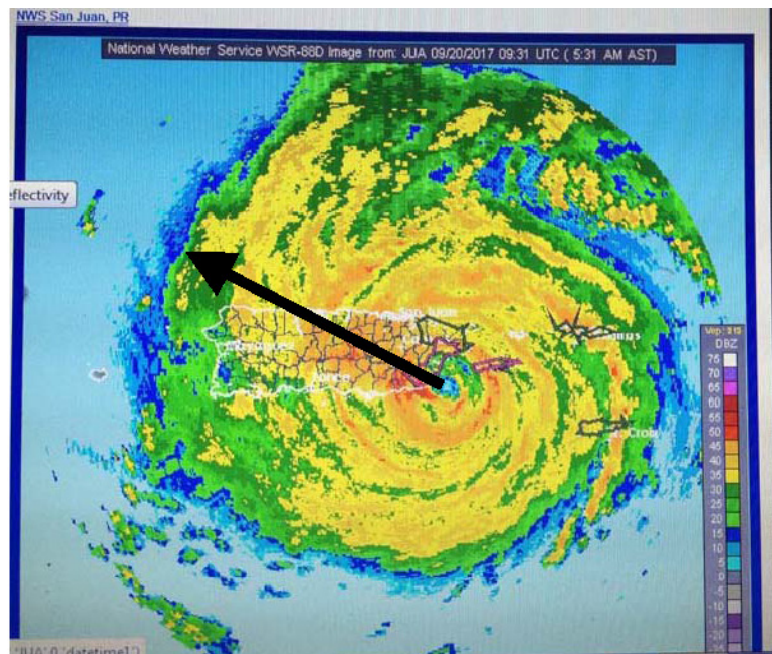
Then they saw a cell tower on the road that was working, and they stopped and called me. It was our first phone conversation 7 days after the storm. I could hear Heather's gratitude to make contact, and her joy of being able to meet the basic needs of life for her family for a few more days.

They got back to Luquillo, which still does not have power and cell service. But two new miracles: they have potable water, and they found their rental apartment has a barbeque grill with a full tank of propane. They will soon be able to cook. Their food is running low and they are sharing some with neighbors who have none. But stores are reopening and in a day or two they may be able to buy food, as they still have a little cash left. At the moment, the big stores are only letting in a few people at a time, so the lines are impossibly long. She believes this is to prevent theft – but many have no cash and are starving.

This is life for the three million US citizens on Puerto Rico, in a new deep survival sharing mode, as our government drifts. Today my daughter says she saw Trump drive past, thirteen days after Maria hit. Perhaps his generals can explain how bad the situation on the ground really is?

The first week of October, Central and Southern Vermont Hurricane Relief in partnership with JetBlue and CapeAir transported 3750 lbs of supplies from Rutland airport through Boston to Puerto Rico; as well as on to the US Virgin islands. If air service improves enough, JetBlue will evacuate my daughter's family to Vermont on Oct 18.

Hurricane Maria as it hits Puerto Rico at 5:30 am on September 20, heading west-north-west (National Weather Service radar).



h) Robbing our children's future

(November 4, 2017)

<http://www.rutlandherald.com/articles/robbing-our-childrens-future/>

The weather this summer has been a wake-up call. It was exceptionally warm across the western United States, and there was little rainfall across the north-west. The result was widespread forest fires, which filled the cities with smoky polluted air. In the south, Hurricane Harvey gave near-record summer precipitation and extreme flooding. Across the warm waters of the Caribbean and Puerto Rico, two powerful hurricanes, Irma and Maria, did immense damage to a dozen islands. Their recovery will be very long. Some islands like Barbuda have simply been evacuated. Much of Puerto Rico still has no power. Without power, modern society crumbles, and basic survival depends on cooperation and the sharing of resources.

Our society has not put aside the money to rebuild after these disasters, which will only increase as the Earth gets warmer and extreme weather increases. The increase in the greenhouse gases, triggered by the burning of the fossil fuels, reduces the cooling of the Earth to space. So vast amounts of heat are now being stored in the oceans, and inevitably stronger storms develop when conditions are favorable, as they were this summer.

In September I discussed the paradox that although we as individuals are deeply concerned for the lives of our children and grand-children, we support an economic system that places little value on their lives, since it discounts the future. Investments in an energy efficient society powered by renewable energy are often rejected as 'not cost-effective'. A closer look shows that this means not cost-effective for the present bottom line. If we ask whether this energy transition is cost-effective for the future of our children, the answer is absolutely yes. Staying with an inefficient fossil fuel energy system is a catastrophe for both our children and the Earth.

Economists estimate that spending a billion dollars now on this transition will save 50 billion dollars in damages later this century. Since national governments have conflicting interests, it has been proposed recently that the global insurance industry could manage a global levy on carbon emissions to fund adaptation costs and the low-carbon transition. This would lower their insurance risks.

Yet many articles are still published claiming that renewable energy is a bad investment: that we are wasting money on the transition away from fossil fuels. This is phony economics where we ignore the present and future costs of accelerating climate change. What we need is an economics where we really value the future of the Earth, and our children and our grand-children.

The 2015 Encyclical by Pope Frances mapped out the corruption and immorality of our present economic system, where the exploitation of the Earth and the poor have become inseparable. The Catholic Church, and some Protestant churches, are now giving this more careful attention. Not surprisingly, our economic system is still avoiding this issue, so it is up to us all to speak up!

I am indebted to Joanna Macy for another insight. We are encouraged to become happy isolated individuals addicted to consumerism, escapism and the media. As isolated individuals, the media will not show us that runaway corporate capitalism is on a path to destroy much of life on Earth. But as communities with courage, determination, caring and creativity, whether secular or communities of faith, we can face this reality, and together search for a sustainable alternative. I know this will not be easy, but there is almost no limit to what we can do for the sake of each other and the Earth.

i) The weather listens to no man

(December 23, 2017)

<http://www.rutlandherald.com/articles/the-weather-listens-to-no-man/>

The impact of accelerating climate change this year has been sobering. High temperatures and drought produced record fires in the western US, and the 2017 Atlantic hurricane season was devastating. Preliminary damage estimates are approaching \$400 billion, twice as much as the 2005 hurricane season.

Yet, ten days before Hurricane Harvey hit Texas, wreaking havoc and causing widespread flooding, the President signed an executive order revoking a set of regulations that would have made federally funded infrastructure less vulnerable to flooding. As a result much of the federal money sent to Texas to rebuild may be wasted on construction that will not protect against rising sea level and the increasing severity of storms.

Washington is facing many irreconcilable conflicts. This is not surprising because the weather doesn't listen to political denial. Just paying for these weather disasters is getting harder, as Congress tries to cut corporate taxes, rather than introduce an escalating fossil carbon tax to pay for the immense damage that lies ahead.

Ironically the background work of the federal government continues. The first volume of the Fourth National Climate Assessment was released on schedule in November (science2017.globalchange.gov/), as mandated by Congress 20 years ago. This excellent report is an authoritative assessment of the science of climate change, dealing with all aspects that affect the United States. It is a joint effort of all the government agencies along with university researchers, and it is lengthy and very thorough (470 pages). It is an essential document for regional planning. Everything it says flatly contradicts the climate change denial of the executive branch, which was powerless to prevent its publication. Our dysfunctional administration in Washington will now try to figure out how to obstruct the publication of the second volume of this report. Scott Pruitt, EPA administrator, has suggested a red team/blue team debate as a review mechanism for the science, with a hostile red team of climate science critics, selected mainly by the fossil fuel industry and the Heritage Institute. The clear intent is to turn a critical issue for the future of the US and the planet into political theater to spread doubt and confusion. This in turn will lead to more tragedies in the future.

At the November climate change talks in Bonn (COP 23), the official US delegation looked pathetic as it tried to promote the coal industry. The US is now the only country in the world trying to withdraw from the 2015 Paris agreement, which we helped draft. Meanwhile Bloomberg, the former Mayor of New York City, and California Gov. Jerry Brown presented the opposite message under the banner of America's Pledge, an initiative to mobilize states, cities, and companies to comply with the US commitment to cut carbon dioxide emissions in the Paris agreement. So far 20 states and more than 50 cities and 1,400 businesses have signed.

Unfortunately it is already clear that the Paris agreement needs to be strengthened, if the world is to meet its climate goal of limiting the rise of global mean temperature to less than 2C (3.8F). After a plateau that lasted three years, the global emissions of CO2 appear to be rising again, when we actually need a 3% fall each year for many decades.

At home here in Pittsford Vermont, we are enjoying the last of the Brussel sprouts and kale, which I harvested before the first big snowstorm. My winter spinach is doing well under glass, and the rye cover crop is now covered with snow. There is much we can do to store more carbon in the soil. This benefits the climate, and at the same time the organic matter stores more water in the soil, which in turn reduces runoff, and gives crops greater resilience against drought. We need to understand what is happening on a global scale, but it is critical for our children to develop the resilience of our local agriculture.