

## Ruth Hardinger

### My talk for loving underground

My art is this: its title is **Earth and My New York Rocks**.

This is made with milk cartons, dirt/earth, graphite and the shale rocks from Delaware County that were used in the 1800's for fences in their lands. My art here is about the underground

My talk for is about loving the underground.

The planet we live in began 4.5 billion years ago, and maybe even 6 billion years. The planet gave earth, rocks, water, oxygen, fish, reptiles, insects, mammals, dinosaurs, forests, conifers, plants and over enormous times.

After millions of years all humans, early and modern alike, had to find their own food. They spent a large part of each day gathering plants and hunting for scavenging animals. Then, within just the past 12,000 years, our species, Homo sapiens, (the so-called modern humans) made the transition to producing food and changing our surroundings. We have been so successful that we have inadvertently created a turning point in the history of life on Earth.

Most cultures we live in now have lost much of humanity's relationship of nature and underground delivered by the planet. It was not until the 1990's that scientists began to understand the underground's diverse microbial and biological communities existing in the deep subsurface. In other words, the underground had and has been alive with vitality.

Now we have concrete all over the earth with buildings and streets covering so much of our earth.

In 2008 Damascus Citizens for Sustainability was able to have Hazen and Sawyer working with NYC Department of Environmental Protection, an Impact Assessment of Natural Gas Production in the New York City Water Supply Watershed. The kind of fracking was the extraction of natural gas from the Marcellus shale rock horizontal drilling which could damage the aquifers. Their work has highly helped the ban of HVHF in New York State in 2009.

Other states in the US, have had much more gas extraction, particularly Pennsylvania, Texas, Arkansas, Oklahoma, Ohio, California, New York, and more. Scientists recently has told that young children have died when they live in the area of fracking. Our planet's underground has lots of aquifers - water that runs horizontally. Water runs in rivers from the underground. **There's a problem now from some Pennsylvanians** trying to get fracking in the Delaware River which is water including NY, PA, New Jersey, and Delaware. Organizations are now working hard to stop this fracking in the river. If you want to sign a petition to stop it the website is on this paper.

High volume hydro fracking was banned in NYS in 2009. Yet companies changed the name to conventional wells. Frankly fracking continues to be used in the West Side of NY State. Its not clean.

I've had conversations with two scientists about the underground. Ron Bishop, PhD, a biologist and professor, has written about chemical and biological risks of gas extraction and the issue of many abandoned gas wells in NYS. Since drilling started in NYS in the 1859 - wells were left when they stopped drilling and some still are continuing leaking. Bryce Payne, PhD, a soil scientist, who also has also been working on gas leakage in NYC, PA, and other areas. In 2012 Rebecca Smith and I, working with DCS, received funds from friends to have Bryce Payne and Bob Ackley Gas Safe measure leakage of

gas in 160 miles in NYC. At least science of 6% of gas (mostly methane) is leaking and probably it has been much higher.

Water is one of the most incompressible substances. It's a liquid yet is more incompressible than most of rocks. Rocks are fractured by water pressure. Water will squeeze rock till it breaks. Water can deliver more energy than rocks. So, injecting mostly water into all these fractures and fissures of cracks and spaces, and then pumping it sets up a bed of pressure- cracked rocks that has its mechanical stability compromised. Water with toxins or pollutions is rising to higher layers over time, another problem. The title "natural gas" is not at all a natural. That gas contains Methane, CH<sub>4</sub> is 94 to 98 percent of this gas. The other elements of gas are serious pollutions such as benzene, toluene, ethyl benzene, and xylenes, brought from the underground.

When methane rises from the underground during 8 to 12 years the Global Warming Potential of methane is compared to CO<sub>2</sub>: 86 to 105 times CH<sub>4</sub> is more powerful than carbon dioxide, its likely disrupting the climate over a 100 year time though EPA says 20 year period.

Because of the pipeline information, we know that in Manhattan we have a cloud of methane from leaky infrastructure, we can't see it and it does not smell. They leak more than the industry is willing to admit. Besides, many of the stripped-out hydrocarbons are simply vented into the atmosphere.

7 Billion People, One Planet, --I found this on Feb 14th at NY Times

Can we provide good lives for the seven billion people on Earth without wrecking the planet?

The United States, on the other hand, provides a relatively high quality of life but fails on every measure of sustainability in the study. For example, it emits 21.2 metric tons of carbon dioxide per person per year, while the study's sustainability threshold is 1.6 metric tons.

We walk on the underground, construct our shelters and factories on it, obtain our food and fuel from it, feed our animals on it, and derive our medicines from it. The underground cleans our air and water. The underground did all very nicely until we grew greedy and smart enough to brutalize it and interfere with the natural balance between the underground and the upper- world. Probably the worst is our greedy, reckless extraction of the carbon energy stored under our feet. It all goes together – poetic and scientific harmony.

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There has been lots of (so called) natural gas in New York City because Mayor Michael Bloomberg supported it's development and in 2017 his book finished "Climate of Hope", His words are: "Natural gas, when safely and responsibly extracted, has been a godsend for the environment and public health." I do NOT agree with that.

Mayor Bill de Blasio, Comptroller Scott M. Stringer and other trustees of the City's \$189 Billion pension funds today announced a goal to divest City funds from fossil fuel reserve owners within five years, which would make New York City the first major US pension plan to do so. In a first-in-the-nation step towards the goal of divestment, the Mayor and Comptroller will submit a joint resolution to pension fund trustees to begin analyzing ways to divest from fossil fuel owners in a responsible way that is fully consistent with fiduciary obligations. In total, the City's five pension funds hold roughly \$5 billion in the securities of over 190 fossil fuel companies. The City's move is among the most significant divestment efforts in the world to date.

An underappreciated and understudied problem is when the ground is cracked, methane gets into a water well. The methane can stir up dirt and silt with its bubbling that muddies the water and makes the

well water non-potable. Methane is soluble in cold water and out-gases from hot water quickly. Although there is not much documented health impact evidence, people who take warm showers when methane has migrated to their wells, have complained of nose bleeds, headaches, nausea, and other symptoms of negative health impacts.

Do you remember in the City that we had a march about climate change in 2014. The Saturday before, Bryce Payne, me, Samara Swanston, Legislative Counsel for Environmental Protection Committee of NYC Council,

He said that we are at the over tipping point because the EPA had not included methane in their GWP. I decided to let you know some bad information, but I want to share the information I've received through science.

Neil DeGrasse Tyson - a 4 minute video on science. Its on his FB page and I copied it to be on my FB page.