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Community Health Impacts from Oil and Gas Development in Texas: The Perspective of Sharon Wilson

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Abstract

Sharon Wilson is a community organizer for the nonprofit organization Earthworks. After leaving her office job managing data for the oil and gas industry, she started organizing in response to negative impacts from unconventional oil and gas extraction methods near her Texas home and throughout the state. She describes the environmental health impacts of oil and gas development aided by new technologies and regulatory exemptions set forth by the 2005 Energy Policy Act. Production has spread to previously unexplored regions over the last decade, including her property on the Barnett Shale in North Texas, where she has interacted with energy corporations and observed the intensification of residents' health issues. I structured the questions in this interview to highlight her unique perspective on organizing in relation to current regulatory loopholes, health impacts of oil and gas development, and the experiences individuals have had with representatives from the industry.

Keywords

Community organizing; shale gas development; extractive industries; Energy Policy Act; mineral rights

Introduction

Sharon Wilson is an organizer for the environmental nonprofit organization Earthworks.^a We met through my work as a graduate research assistant with Sara Wylie, assistant professor in the Department of Sociology and Anthropology and Bouve College of Health Sciences, and core faculty in the Social Science Environmental Health Research Institute at Northeastern University. We conducted a field study in Karnes County, TX, during the summer of 2015 with Deb Thomas of the nonprofit organization ShaleTest to measure air pollutants emitted from processes associated with unconventional oil and gas production. Shortly after meeting Wilson, the first conversation we had during our drive into Karnes had to do with her approach toward community organizing. One critical perspective she expressed was that each community has a different culture, personal dynamics, and needs—especially in terms

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^aEarthworks is a nonprofit organization based in Washington, DC, that works with grassroots groups impacted by mineral and energy development nationwide. Their Oil and Gas Accountability Project serves communities near drilling sites. <https://www.earthworksaction.org/>

of how they address oil and gas development. She stressed that an activist or community organizer should not push a predetermined agenda but instead work *with* residents to achieve *their* goals. This outlook toward community empowerment certainly resonated with me since it denoted an extraordinary degree of respect and care for the individuals she works with every day.

Throughout the last decade in the United States, technological developments have led to increased extraction of shale oil and natural gas from new areas that have not seen this type of production, such as within city limits or near schools.^{1,2} Oil and gas production frequently involves the emission of hazardous air pollutants that affect the health of nearby residents such as the toxic gas hydrogen sulfide (H₂S), volatile organic compounds, nitrogen oxides, and particulate matter.³ Additionally, the noise, light, and vibrations from production serve as physical and emotional stressors.⁴ Wilson has worked with communities and individuals who have experienced negative health outcomes such as dizziness, respiratory and neurological problems, and persistent nosebleeds after oil and gas development began near their homes.

In 2013, Wilson, environmental consultant Lisa Sumi, and scientist Wilma Subra completed a report through the nonprofit organization Earthworks entitled Reckless Endangerment While Fracking the Eagle Ford that outlines the growth in industry throughout Karnes County, TX, and the experiences of two families. After this report was published, Wylie as the principal investigator, Wilson, Thomas, and I implemented a testing plan to collect measurements of volatile organic compounds and H₂S near production sites that these families identified to be problematic sources of hazardous emissions. Community members more commonly experience chronic, low dose exposure to pollutants as opposed to the acute, high dose exposure that can occur accidentally or in an industrial setting. As a JPB Foundation Environmental Health Fellow, Wylie is developing a tool made from photopaper, which has a layer of silver gelatin that darkens when it reacts to H₂S over the course of one to three weeks. This method provides a visual representation of aggregate exposure over a given length of time, more accurately depicting communities' experience exposure to H₂S. The materials, procedures, and experiences implementing this tool are then posted on the website for the nonprofit organization and Do-it -Yourself environmental science community Public Lab, www.publiclab.org.

Community organizers, activists, and residents surrounding oil and gas sites inform the design of the H₂S-sensing tool, experiment, and study site. Through this form of community-based participatory research, Thomas' and Wilson's positions on the research team as community organizers and civic scientists were essential. Wilson connected us with families in the area and used the forward looking infrared camera, a particular type of infrared camera, to view leaks and regular volatile organic compound emissions from storage tanks. She contextualized our measurements, describing the pollutants emitted from each step in the production process and provided community anecdotes for the sites we visited.

Wilson has worked with scientists, engineers, community members, policy makers, and environmental nonprofit organizations across the country. Her experiences as an activist

provide a critical and holistic way of viewing issues associated with oil and natural gas development that others outside her position would not be able to provide. Throughout her years of organizing and as someone personally affected by oil and gas extraction, she articulates the nuanced and complex issues that individuals face when development enters their communities. For these reasons, this interview is instrumental in understanding oil and gas development from the view of both an environmental activist and community member.

Interviewer How did you start community organizing and working for Earthworks' Oil and Gas Accountability Project?

SW After I left the oil and gas industry [working for an office that manages logistical and marketing data], I moved out to the country to Wise County and bought a 42-acre farm. I didn't know at the time that was the area [where] George Mitchell from George Mitchell Energy was experimenting with high volume slick water hydraulic fracturing and horizontal drilling in shale. A lot of people think that the new kind of fracking started in their area. It didn't. It started in Wise County. That's where Mitchell developed this new technology, and so I saw it happening around me, and I became very concerned about what I was seeing. I wrote letters to the paper, which got a lot of ridicule, so I started a blog (at <http://www.texassharon.com>). I would take pictures and video and put them on my blog. As I was trying to learn about this thing called fracking, the only place that I could find any information was on the Earthworks site because at that time in the early 2000s, 2002 to 2004, nobody else was working on this issue but Earthworks.⁴ As I would search for information, I would find some publications like *Oil and Gas at Your Door?* and *Your Drinking Water at Risk*. I read about Laura Amos, the woman whose water was polluted in Colorado, so I started learning about it and posting this information on my blog.⁵ Other people (I had no idea anybody would ever read this blog—it was just like a file cabinet) started contacting me saying, "This happened to me. Can you tell my story on your blog? Can you help me?" So I contacted Earthworks and I said, "I've got all these people contacting me for help. What do I tell them, and can you help me?" They started helping me learn how to document the impacts, how to report them to the state regulators, how to do open records requests to find what their investigations said, and I just started to be an organizer without knowing that I was being an organizer. Then I moved from Wise County; I sold my place to get away from the impacts. I moved to Denton and right as I was moving in, they decided to start fracking in the city limits of Denton, so eventually Earthworks hired me as an organizer.

Interviewer You mentioned George Mitchell—who is he?

SW He is the father of fracking. He experimented with fracking, oil, and gas (extraction) from the shale, until he was able to make it commercially viable. That is when the fracking boom started. The combination of the (2005) Energy Policy Act extension and then Mitchell experimenting and figuring out how to frack oil and gas from the shale in an economically viable way led to the fracking boom. But he was experimenting with his fracking all around Wise County before the (2005) Energy Policy Act.

Interviewer What did the Energy Policy Act do?

SW It exempted injections from regulation by the Environmental Protection Agency. It affects the exemptions from the Safe Drinking Water Act—the Cheney/Halliburton loophole. The oil and gas industry enjoys broad exemptions from seven of our bedrock environmental laws. People will say they’re exempt from these laws, but they are not exempt from the entire law s—they are just exempt from key portions of the laws. The Environmental Protection Agency prior to the 2005 Energy Policy Act regulated injections. That act exempted Environmental Protection Agency regulation on oil and gas injections; that exemption prevents the Environmental Protection Agency from regulating hydraulic fracturing. That’s why they don’t have to report what chemicals they have to use. The exemptions are super complicated. We have a two-pager and other publications about these exemptions.⁶ The way the communities find out about what’s being released—through the Community Right to Know Act—(unconventional oil and gas activities are) exempt from that. They’re exempt from the Clean Air Act, so there are a lot of exemptions they have.

Interviewer What does it mean to be a mineral owner in Texas and owning property on shale plays^b that can potentially be used for unconventional oil and gas extraction?

SW It depends on who the mineral owner is. I work with some mineral owners who are not happy about what’s happening, and I feel that it gives you a responsibility ... to advocate for better practices that protect people. Actually, I think that fracking has to stop. If you are a mineral owner, one thing I think mineral owners have done that is very, very foolish is they seem to feel so entitled to any kind of abuses that may happen to the surface owner. I just feel that is so morally reprehensible and I think that if you are a mineral owner, you are morally obligated to protect the surface owners. If you’ve joined a mineral owner forum, you know, where they talk among themselves, you won’t find that viewpoint anywhere.

Interviewer What was it like owning property and minerals on the Barnett Shale, interacting with “landmen?”^c

SW I found the landmen to be dishonest. What a landman does is they try to negotiate with a mineral owner to lease your mineral rights. Basically, saying that they “lease” them is kind of misleading because what you are doing is you are turning over those mineral rights to whoever leases them. It could be [that], depending on the agreement you have, you may never get out of that lease. The landowner, if they own the land on top of the minerals and [the company] own[s] the minerals, then [the landowner] basically [is] turning over all of [their] property to this company to do whatever they want.^d Unless you have it specified in your lease, you will most likely have to get an attorney to enforce what’s in the lease, and most landowners do not have deep pockets—but the industry does. So, basically you’re just

^bThe U.S. Department of Energy defines shale plays as “a set of discovered, undiscovered or possible natural gas accumulations that exhibit similar geological characteristics. Shale plays are located within basins, which are largescalegeologic depressions, often hundreds of miles across, which also may contain other oil and natural gas resources.”⁸

^cAccording to the American Association of Professional Landmen, a landman is “the public facing (business) side of the oil, gas and mineral exploration and production team. They interact and negotiate directly with landowners to acquire oil and gas drilling leases on the behalf of oil and gas companies.” <http://www.americalandman.com/aboutlandmen>

^dEarthworks details this “split estate” situation in which the surface or property owner of a parcel of land might not own rights to the minerals underneath their home. The mineral rights owner can be a separate individual or institution that legally decides whether natural gas or oil is extracted from the property and is able to profit from production. https://www.earthworksaction.org/issues/detail/split_estate#.V14cQeYrI_U

turning your property over to the industry. And you don't have much recourse to what happens.

But I found that the landmen would be very manipulative in our area. They would go to and approach [uneducated] landowners (good people, but people who were unsophisticated) and they would tell them: I'm going to make an offer for your minerals, but what I am going to offer you is way better than what any of your neighbors have gotten, so you need to keep this strictly between us. If you tell anybody, that automatically voids this offer.

So, you see how this sets up a way that you can't go in as a block and negotiate a better deal for everyone. It's to pit neighbors against neighbors, and [landmen] will go into a community, find someone who is friendly, and then [the landman] will make a deal with that person to pay them either a percentage of [their neighbor's] minerals, or a finder's fee for however many people that they get to lease. So they either find (a resident) who is well respected in the community or neighborhood and then that person talks [their] neighbors into leasing. I've actually seen it happen at neighborhood meetings. It's very high pressure.

I've had the landmen who were trying to lease my minerals—they weren't really that interested in me because I just had a small 42 acres—but my neighbors had 250 acres. So [the landmen] tried to make a deal with me where I talked [my neighbor] into leasing with them, and they would give me 2% of [profits from] his minerals which, the way I phrased it to them was, "That's actually stealing from my neighbor because they're his minerals, not mine." That's the way that I felt about it.

Interviewer Can you describe some of the oil and gas related environmental and health effects that you've witnessed?

SW The negative effects can be anything from [truck] traffic, which a lot of people when [truck] traffic comes to your area unless you are pretty good at navigating the internet or pretty informed, people don't know what this means. They don't know what fracking means, they don't know what oil and gas development in their neighborhood or area means, and the landmen come in very early and make a lot of promises ... they told me I would make \$5,000 a month, which I knew is not true, but they make a lot of promises. They get people really excited about this free money—they call it "free money"... [but] they don't give people the full disclosure about what's going to happen.

They'll show a little brochure, and there'll be a tank sitting in a field of flowers or butterflies, and the deer, and now it's not at all reality. It doesn't go into all of the infrastructure and many things. But the first thing the communities usually get upset about is the traffic, and so the traffic is just [an] overwhelming, life altering amount of traffic. And then as the process starts there's always concern about the water, but the most immediate impact on the community ... is the air because that happens immediately with the traffic. With clearing the land, the dust, and then the drilling phase, a lot of methane and chemicals [are released] into the air, and you have the fracking. Then there [are] the constant leaks and emission events and all this. So those are some of the concerns.

Interviewer Which communities have you worked with so far in responding to the negative effects of oil and gas development?

SW I'm supposed to be an organizer for the Texas Gulf Coast region, but most of my work is in Texas. It's from Panola County in East Texas to El Paso in West Texas and from Lubbock to Laredo. There are so many communities and individuals who have contacted me, and there are different amounts of help to each area. Some areas need a lot of help, and I've spent a lot of time in Denton—just an incredible amount of time there. Flower Mound, South Lake, other communities or individuals, they just need a little bit of help so it just depends, but I am contacted by people all over the United States and even people in other countries looking for help. The need for help is tremendous because there are 11 million Americans who live within one mile of fracking now. Right now, the crisis has slowed some things down. What happens to me is that people get on the Internet and then Google fracking. If you Google fracking or drilling, then you're going to end up on my blog. And then I have a contact form and they contact me about what they can do. So very early on they started doing this in Pennsylvania. People in the Marcellus shale would find my blog and they would ask me for help and to blog about their issues. So then all these people in the Marcellus shale were ending up on my blog and asking for more help and saying, "Can you add this?" to my blog, and I had to just say, "Look you're going to have to start your own blogs, your own websites," and so I helped a lot of people get their websites started. When you Google for fracking, you want to end up with something that's in your area specifically. So that did take some pressure off of me as other groups started forming and getting a web presence.

Interviewer How do you approach organizing, educating, and empowerment for communities?

SW Well, every community is different. They have their own character, their own culture, so what happens in their community in Laredo is very different from what happens in a community in Denton or in Dallas. Dallas you know is very liberal. Denton is pretty conservative, and Laredo, they're pretty liberal. There are a lot of Spanish speakers there, and so it's a different culture. I don't think it's my job to go in and tell the community what they need to do in their community. [If] the goal is just, "I want to write a strong ordinance to help us keep this in bounds," I don't go in and tell them, "No you need to ban it." Of course you can't do any of that in Texas anymore because of the HB 40 legislation, but I wouldn't go in and tell a community that this can be properly regulated, but you can make it better.^e I work with them, whatever their goal is, as long as it's something that we can ethically support and is part of our mission, then we meet the community wherever they are and try to work with them. They know their politics better than anybody else, and they know their people, and they know their messaging. So we might help them with their messaging, but we're not going to tell them, "You need to use this message." Texas is a huge state and it's way too diverse to have everyone come under one umbrella.

^eHB 40 is a bill passed by the state of Texas that limits the jurisdiction of local governments and municipalities over oil and gas drilling. This bill was enacted in response to a fracking ban that citizens established in the city of Denton, Texas. <http://www.capitol.state.tx.us/tlodocs/84R/billtext/pdf/HB00040I.pdf> <http://www.texassharon.com/2015/07/29/whatisthetrueintentofhb40/>

Interviewer What are some accomplishments that you and the communities you have worked with have made?

SW The biggest accomplishment that we've made was with the Denton fracking ban. One thing, I think, has helped the Cernys in the Eagle Ford Shale. The Cernys don't feel like they've made much progress, and things keep expanding around them, and things in their lives, but some things definitely are better, like the Marathon Sugarhorn facility has had vents sticking up from the tanks, and those vents were always venting hydrocarbons—a lot of hydro carbons. Now they have plumbed [them] so they're at least capturing some of those emissions. So those are some things early on we advocated for [and] a better response time from the TCEQ (Texas Commission for Environmental Quality). We did get an eight hour response time; now they've stepped back from that.

Interviewer Can you tell us a little bit more about the Cernys and other families who are experiencing health effects around oil and gas sites?

SW The Cernys are a family in Karnes County, and they moved there for a quiet country life. It was very peaceful when they moved there, then the Eagle Ford Shale [development] started happening, and Mike worked for the industry as a water hauler. He hauled different kinds of waste. Some was solid waste, and some was liquid waste. He started having a lot of health effects from it; some very serious health effects where he one time was exposed to H₂S gas and did what they call “went down,” which means he was unconscious. They had to drag him off the site and he spent (I don't know if he's ever fully recovered from that) several days to more than a week babbling incoherently. But as activity started getting closer to his home, his family has suffered from [negative health effects] and these impacts are universal to every area where they have shale plays. To families it can be anything from eye irritation, respiratory irritation, and skin rashes. The Cernys have known this in their neuropathies. Deep bone pain is another complaint that we hear so often, even in very young children. Nosebleeds, a lot of eye irritation, people who have never had breathing problems have breathing problems. Asthma, there's a lot of depression, which tracks with the health impacts from the chemicals. There are lots of complaints of mental confusion, dizziness, and general lethargy.

Interviewer How have the residents been realizing these health effects, and what have the responses been from doctors in the area?

SW A lot of doctors in Texas don't want to get involved. Because if you do, it opens them up to intimidation by the industry. So a lot of doctors just won't get involved in it. They treat the symptoms and a lot of times they'll send their patients to an environmental specialist, but there are very few doctors who want to get involved. Some doctors have done some research on it. In Texas, there's Dr. Anne Epstein (MD, internal medicine), there are some people who have done some research and papers on health impacts. But, in Texas, not a lot want to get involved. In Pennsylvania and New York, that's a different story. You've got Dr. Dave Brown who is a toxicologist and has done some tremendous great work.^f

Interviewer What have the outcomes been of any lawsuits that have been filed?

SW Some of the people I've worked with (and that's one thing I try to help people do if they're in harm's way is collect documentation to document their impacts) have sued and gotten settlements. Most of the time they sued and they've moved on and they're not allowed to talk about what happened. Most of the time they end up being gagged, and so all of that data that they had to prove that they were contaminated is no longer available for the public—not doctors, lawmakers, or journalists.^g Nobody. It is forever sealed and secret. That's a really horrible thing that's happening—that's enabling more people to be harmed. The Parrs family did not sign any kind of a settlement, they didn't take a settlement, they went all the way to the jury trial and the jury awarded them \$2.9 million, which the industry is trying to get appealed, so we'll see where that goes.^h But, I think if a jury of your peers sees the evidence, they're going to condemn fracking because the evidence is very compelling. Sometimes people will turn their evidence over to me as they go along, and I can keep that evidence, and it's a record where I can prove that there was harm. The problem is that a lot of journalists are stuck on stupid. They have this formula for reporting, and they have to have a person who's been impacted in their story, but the fact that there are no people who can talk to you is the story. [I'm] telling journalists that is the story, and "here is the evidence, they gave it all to me, and I can give you this evidence." But I don't know why they are stuck on stupid.

Interviewer: Going back to your point on industry pressures, can you comment on any run-ins with the industry or any controversies you've received about your work?

SW In the beginning, you know when I was writing letters to the editor of the Wise County Messenger, [the] industry had people they paid to monitor the comments online. They would come after me in a very vicious way [with] ad hominem attacks. Painting me as a "left wing lunatic with a socialist agenda," (that's what they'd call me), and they'd leave comments on my blog to harm me. I was run off the road numerous times by trucks, but I guess the thing that happened that was the most intimidating was the two times that I've been sued. Range resources didn't sue me, but they're a multibillion dollar company, or they were at that time, and they subpoenaed my record and tried to wrap me into the lawsuit with Steve Lipsky.ⁱ But they couldn't find any evidence so instead they just harassed me. I had to go to a hearing, and then I had to go sit through a six-hour deposition. Even though they had my records that proved I had no connection with what they were accusing me of, they still demanded that I sit through a sixhour deposition. It was very abusive. Since then, just a year ago, this guy who called himself the "frackmaster" sued me for defamation and torturous interference. And it was just a "SLAPP" suit, but you know you have to find an attorney, so I did find an attorney.^j After the thing was raised, I got a [homeowner's] insurance policy to take care of that, and I was able to find an attorney, but you know it's really hard and very

^fDr. David Brown is a Toxicologist and Environmental Public Health Scientist who is part of the Southwest Pennsylvania Environmental Health Project, a nonprofit organization that assists residents in Southwestern Pennsylvania who are affected by oil and gas development. <http://www.environmentalhealthproject.org/about>

^gOften in court, individuals who sue the industry are required to sign a nondisclosure agreement stating that they cannot discuss details of the case and/or acknowledging a lack of medical evidence connecting their health symptoms to drilling. <http://www.bloomberg.com/news/articles/20130606/drillerssilencefrackingclaimswithsealedsettlements>

^hIn 2014, the Parr family from Decatur, Texas, sued Aruba Petroleum, Inc. for \$2.9 million after experiencing health problems from oil and gas production.

ⁱSteve Lipsky, who was able to light his tap water on fire after Range Resources Corporation started fracking near his home in 2009, sued for \$3 million.

stressful because you pay for this insurance, but they don't want to take care of you, they want to not have to take care of you. It was horrible, it was very stressful, because I knew there was no basis to this lawsuit, but you have to have an attorney and participate in the court process in order to prove that. I did end up with a really good attorney, who did make a beautiful case, and the judge dismissed the lawsuit, and he tried to appeal, and they threw the appeal out and upheld for revision. She said that he had [owed] my attorney fees and \$10k of damages, but I'll never see that money. There's no way to make him pay that. There are constant calling of names; they try to take something you said out of context and make a big deal out of it.

I don't know if you know about the psy-ops thing? I went to one of these conferences where they talked about deploying ex-military operatives in our neighborhoods. I went to a conference of industry communications professionals, and I used my name and Earthworks, but because they charged so much, they didn't even know I was there at first. I recorded them saying that—one executive of Anadarko said, (and this is all on my blog, I've got the tapes and everything) that everyone in the room (his peers) should download the U.S. Army—Marine Corps Counter-Insurgency Manual because what they were dealing with is an insurgency. [He meant] you and me, your grandmother, any body who doesn't want to be impacted by fracking, is an “insurgent” to be treated as an insurgent the way the military treats insurgents in Iraq and Afghanistan.⁷ And then another guy got up, not to be outdone, and admitted that they hired ex-military psy-operatives to help people in neighborhoods. If the neighborhood is working on trying to regulate industry, they will get in there and dilute that process. They also have a database of people they call the stake holders database so they can click on “Sharon Wilson,” they have a map, and everybody is on this map. They zoom in and can click on “Sharon Wilson,” and they know everybody, all my contacts in the United States, so the spoke goes out that shows all of the people they know of that I have communicated with any where. So if they want to go to a community in California, and they click on Sharon Wilson, and I know some people in that community, they know to target those people to marginalize them before they go in and try to comb out that community with fracking.

Interviewer Can anybody have access to this database or is it just for people in the industry?

SW It was created for industry, and they have it. I saw a presentation of how it works. All of that is on my website.

Interviewer We have been talking about your work on the ground, but I also want to touch on the relationship between government and the oil and gas industry. Which government organizations and agencies have played a role in your organizing?

SW The city councils are, or were, a very important way that local people could get protected if the city passed a strong drilling ordinance and there's more accountability at that very local level. So, still you have a lot of industry influence and you have the council members that get elected because they're big landowners and or big real estate owners; they

⁷A SLAPP (strategic lawsuits against public participation) suit, although illegal in Texas, is designed to burden opponents with legal fees in an attempt to have them abandon their voiced criticisms.

want to make sure they have taxation [on] different things in the city to help make [conditions] favorable to their business. But, they're more accountable because at a local level if they have a weak drilling ordinance, then the next election they're probably going to be gone. Then the state government is much less accountable because the state may be a bigger area that's representative, and maybe there's only fracking in part of their area, so people who don't have fracking may not care about that issue. Then of course, there's the federal at all levels.

Interviewer Recently, your work took you to the UN Conference on Climate Change in Paris. Can you talk a little about your experience there and what it meant for oil and gas organizing?

SW I couldn't present anything because we weren't accredited. What I was hoping to do was to show some of the forward looking infrared [camera] footage that I've gotten, and I was hoping to find an area where I could project it onto a building so a lot of people would be able to see it, but because of the terrorist attacks, those kinds of activities were much harder to do. We're hoping that [with the] next one in Morocco, we'll be accredited so we can actually present in some of the panels.

Interviewer What is a forward looking infrared (FLIR) camera and how do you use it?

SW That is a game changer. Until we were able to show communities, give them that evidence that proves they are being exposed, before that, industry could just say, "Oh, that's not us, that's the chemicals you're using to clean your windows" or, "You can't prove that is coming from our facility." But now we can prove it. It's a very powerful image that we can give the community so that they can advocate to get those pollutions stopped for better controls on the industry. It's also been very powerful for global warming and climate change because methane reacts strongly with the climate. You can show people, "This is what's going on in the air everywhere, all over where they do this because they are not really capable of keeping those emissions in."

Interviewer How does the forward looking infrared work specifically?

SW The camera makes visible the invisible emissions. It's finely calibrated to show gases in the hydrocarbon range, which is a very narrow range. Hydrocarbons store infrared so the camera is able to make that visible.

Author Biography

Lourdes Vera is a PhD student in the Department of Sociology and member of the Social Science Environmental Health Research Institute at Northeastern University. As a former science teacher, she is interested in how D.I.Y. science tools can educate and empower communities in environmental health and justice advocacy.

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