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The U.S. is expanding CO2 pipelines. One poisoned town wants you to know its story

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By Julia Simon

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Deemmeris Debra'e Burns shows the spot on a rural road in Satartia, Miss., where he lost consciousness when a carbon dioxide pipeline ruptured, an experience he thinks is a warning for America.

Julia Simon/NPR

SATARTIA, Miss. – On Feb. 22, 2020, a clear Saturday after weeks of rain, Deemmeris Debra'e Burns, his brother and cousin decided to go fishing. They were headed home in a red Cadillac when they heard a boom and saw a big white cloud shooting into the evening sky.

Burns' first thought was a pipeline explosion. He didn't know what was filling the air, but he called his mom, Thelma Brown, to warn her to get inside. He told her he was coming.

Brown gathered her young grandchild and great-grandchildren she was watching, took them into her back bedroom, and got under the quilt with them. And waited.

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"They didn't come," Brown says. "Ten minutes. I knew they would've been here in five

minutes, but they didn't come."

Little did she know, her sons and nephew were just down the road in the Cadillac, unconscious, victims of a mass poisoning from a carbon dioxide pipeline rupture. As the carbon dioxide moved through the rural community, more than 200 people evacuated and at least 45 people were hospitalized. Cars stopped working, hobbling emergency response. People lay on the ground, shaking and unable to breathe. First responders didn't know what was going on. "It looked like you were going through the zombie apocalypse," says Jack Willingham, emergency director for Yazoo County.

Now, three years after the CO₂ poisoning from the pipeline break, some in Satartia see the incident as a warning at a critical moment for U.S. climate policy. The country is looking at a dramatic expansion of its carbon dioxide pipeline network, thanks in part to billions of dollars of incentives in last year's climate legislation. Last week, the Biden administration announced \$251 million for a dozen climate projects that focus on CO₂ transport and storage.

The story of the pipeline rupture and its lasting effects was first reported in HuffPost in 2021 by the Climate Investigations Center. The Center obtained recordings of the 911 calls and shared them with NPR.

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There are now about 5,300 miles of CO₂ pipelines in the U.S., but in the next few decades, that number could grow to more than 65,000 miles, says Jesse Jenkins, professor of engineering at Princeton University who has researched scenarios to reduce U.S. emissions.

But the rupture in Satartia underscores growing concerns across communities that face the prospect of more CO₂ pipelines being built to address climate change. Safety advocates and community residents worry about pipeline safety and gaps in federal regulation, says Bill Caram, executive director of the nonprofit Pipeline Safety Trust. "We're looking at those pipelines being a lot closer to people and communities than they are right now," Caram says. "We are not yet ready."





Thelma Brown's sons and nephew were on their way to come get her from her Satartia home when they lost consciousness. Unsure where they were, she gathered her grandkid and great-grandkids — ages 9 years, 2 years, and 3 months — under the quilt in her bedroom, and waited.

Julia Simon/NPR

Carbon dioxide hampers emergency response

The expected growth in CO₂ pipelines is tied to a nationwide push for more carbon capture and storage. That's the idea of sucking up carbon dioxide generated by things like power plants, cement-makers and steel factories and storing it underground before it heats the planet. Fossil fuel companies such as ExxonMobil and Chevron and their congressional allies like Joe Manchin pushed for higher tax credits for carbon capture in last year's climate legislation.

Now the government is on the verge of pouring over \$10 billion into this technology through a combination of grants and loans, with billions more available through tax credits, according to analysis from the Bipartisan Policy Center. Pipelines are needed, because when companies suck up carbon dioxide, they often can't store it where they capture it. They use pipelines to send it to underground locations with the right geology for storage, which can be states away. "Do we want to capture carbon dioxide and store it? If you do, we're going to need pipelines," Jenkins says. "One follows from

the other."

But people in the South and Midwest who face the prospect of new pipelines in their communities see what happened in Satartia as a potential warning. The rupture occurred at 7:06 p.m. and spewed CO₂ for about four hours. The 911 center in Yazoo County, Miss., was flooded with emergency calls.

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In one 911 call, a mother pleaded for help because her daughter couldn't breathe, her hacking audible in the background. Another 911 caller stranded on the highway described what was happening to her friend: "She's laying on the ground and she's shaking. She's kind of drooling out of the mouth. I don't know if she's having a seizure or not. Can you send somebody quick!"

Humans always breathe some carbon dioxide, but too much causes a thirst for oxygen, disorientation and heart malfunction. Extreme exposures to carbon dioxide can lead to death by asphyxiation. The use of carbon dioxide to kill pigs in abattoirs is now under scrutiny over whether it complies with federal laws on humane slaughter.

Carbon dioxide in open air can disperse. But third-party air monitoring that night in Satartia showed that potent clouds of CO₂ can sometimes hang in the air for hours.

It quickly became clear that the cloud of carbon dioxide was hampering the emergency response. Combustion engines need oxygen to work, and as the carbon dioxide displaced oxygen in the air, many cars stopped running.

"I don't know what's going on," said the caller on the highway. "My car stopped, it won't move, and we just got outta the car and started walking."

Jerry Briggs, a fire coordinator from Warren County, was searching the area in a utility terrain vehicle when he and his team found a red Cadillac with what looked like three men passed out inside. At first Briggs wasn't sure if they were alive. When they broke open the car windows, they found Burns, his brother and cousin, all unconscious.

Because the UTV was so cramped, they considered taking the men to safety one by one, but Briggs' colleague worried that the men wouldn't make it if they left any of them behind in the car.





Jerry Briggs, fire coordinator for Warren County, thinks people need to understand the potential for CO2 pipeline ruptures. "It happened. I mean, I am living proof to tell you it happened."

Julia Simon/NPR

Three years on, the community still suffers health impacts

Briggs' team helped get Burns, his brother and cousin to the hospital. The medical team at the hospital sent them home after a few hours. But the following day, struggling to breathe, Burns came back to the hospital. He, his brother and cousin ended up taking oxygen tanks around with them for several months.

They aren't the only ones in the community with ongoing respiratory issues, says Markus Stanley, chief of staff and medical director of the emergency department at Merit Health River Region, a hospital in nearby Vicksburg, Miss.

Stanley treats patients who were in the area the night of the pipeline rupture,

including residents and first responders. "I've had several patients say, 'My lung problems have gotten a lot worse since I was exposed to that,'" Stanley says. His patients with asthma "do show some increased frequency and severity of their asthmatic exacerbations."

Carbon dioxide poisoning can also affect the brain, says Steven Vercammen, an emergency room physician in Belgium who has studied carbon dioxide intoxication. "The brains are the most vulnerable for the decrease in oxygen," Vercammen says. "If your brain [does] not have enough oxygen, it will start to die. Depending on which parts of the brain are affected, you will see different symptoms. Most often you see that there are effects on cognitive function."

Burns says that after spending more than an hour unconscious in a car filled with CO₂, he still has headaches, difficulty concentrating and muscle tremors. He gestures to his shaking hand. "I'm an outside worker, you know what I'm saying?" Burns says. "No inside building job. Never had that. I've always did construction or lumber mill work and, you know, I can't do that now."

Burns also saw a psychiatrist for the anxiety attacks he had after that night. "They gave me some pills for it, but I'd rather not take those 'cause they had you sleeping most of the time," he says.





Markus Stanley, chief of staff and medical director of the emergency department at a hospital in nearby Vicksburg, Miss., says his patients who experienced the pipeline rupture have seen an increase in the frequency and severity of their asthma attacks and chronic lung issues.

Julia Simon/NPR

Satartia opens up questions over pipeline regulatory gaps

Federal regulators who investigated found that the pipeline operator, Denbury Inc., violated several regulations that night, including in its emergency response. When the pipeline ruptured in Satartia, Denbury knew there was an issue almost immediately, according to the government's report.

In an earnings call a few days after the event, David Sheppard, Denbury's then-senior

vice president for operations, said the company's CO2 operations center "detected a pressure loss ... immediately triggering our emergency response protocol." Sheppard also said on the call that "no injuries to local residents, our employees, our contractors were reported in association with the leak."

But emergency responders in Satartia say that after the pipeline rupture, Denbury didn't alert them. "I never heard from 'em," county emergency director Willingham says. "It just didn't happen. Nobody contacted us to let us know."

Only after a local emergency responder called Denbury did the company confirm what had happened, according to the government report. That was at 7:48 p.m., more than 40 minutes after the rupture. "We may have — could have — had a better response had we known what was going on," says Willingham.

Regulators also found that the company failed to recognize the risks that the weather and soil posed to the pipeline. Unlike the Mississippi Delta, which is famously flat — "an area you can watch your dog run away for three days," Willingham says — nearby Satartia is hilly. Federal regulators determined that all the rain in the weeks and months beforehand caused the uneven ground to shift, and the pipeline to rupture.

Denbury recently "agree[d] to the findings of violation" — though it said it did "not admit to any of the alleged violations or risks identified" by the government — and paid the government a \$2.8 million penalty. Burns, his brother, cousin and others in the community are suing the company. Denbury did not reply to NPR's request for comment about the lawsuit.

In an emailed statement to NPR, a Denbury spokesperson says they fully cooperated with regulators to investigate what happened and worked with local officials to address the impacts. "Denbury is an industry leader in carbon dioxide transportation and we remain committed to continually improving pipeline safety," the statement said.

John Satterfield, the director of regulatory affairs for Summit Carbon Solutions, a company that's constructing CO2 pipelines across the Midwest, says the incident in Satartia speaks to problems with the pipeline operator, Denbury, and not problems regulating the wider industry.

"It's not as if there's some huge gap in the regulatory schema," says Satterfield, whose company is building new CO2 pipelines across North Dakota, South Dakota, Nebraska, Iowa and Minnesota. "The regulations have been in place for years. There are pipelines everywhere. It's the safest mode of transporting large volumes of products across our country, and the pipelines that we're talking about building today are brand new, and they're based on the latest technology."

Other pipeline industry executives point out that the accident rate of their network is low. But Briggs, the fireman who rescued the men from the Cadillac, says when people in the industry say pipelines are safe, he gets frustrated. He thinks people need to understand the risks of CO2 poisoning, and potential pipeline ruptures. "It happened. I mean, I am living proof to tell you it happened," Briggs says. "Maybe it hasn't happened before this event, but it did happen. People were hurt, people didn't know [the pipeline] was here. Something needs to change."





Jack Willingham, emergency director for Yazoo County, says that the night of the pipeline rupture, his team didn't know what was going on: "It looked like you were going through the zombie apocalypse."

Julia Simon/NPR

"What we learned here is that we need a stronger standard"

CO₂ can take different forms, like gas, liquid and dry ice. Jesse Arenivas is chief executive of EnLink, which is building a CO₂ pipeline network in Louisiana to support customers such as ExxonMobil. He says for the first project, the company plans to transmit about 70% of the CO₂ as a gas and transmit the rest as a liquid.

But while CO₂ in its "supercritical" liquid state is regulated by the federal government, the gaseous state and other states aren't currently regulated at all. Caram of the Pipeline Safety Trust says if there's a disaster while the CO₂ is a gas or other

unregulated state, "I worry about a good lawyer getting an operator out of any kind of liability."

There are other potential regulatory gaps. CO₂ itself is odorless. So is natural gas, but companies add an odorant to alert people to its presence. There is currently no such requirement for CO₂. There's also a limited understanding of how CO₂ can move through the air, says Caram. "As we're building these pipelines, we don't have a good sense of who's going to be in that potential impact area in the case of a failure," Caram says.

Tristan Brown is the deputy administrator of the Pipeline and Hazardous Materials Safety Administration (PHMSA), the federal agency that regulates CO₂ pipelines. He says in June 2022 his agency issued an advisory bulletin to make sure all pipeline operators looked out for geologic hazards, updating their guidance to include lessons from the Satartia pipeline rupture.

And he says the agency is making new rules around CO₂ pipelines, including looking into regulating more phases of CO₂, like the gaseous phase, and potentially requiring odorants. "I think what we learned here is that we need a stronger standard and so that's what we're working towards," Tristan Brown says. He also notes that the agency

is increasing the number of pipeline inspectors and engineers by 20%.

Still, Yazoo County emergency director Willingham worries that with tens of thousands of miles of new pipelines and lots of processes for self-reporting, the necessary enforcement might not happen. "I think they're dependent on the operators to make sure that they're going by code," he says, "and you can't police yourself."

Some pipeline executives are learning from Satartia. Others haven't heard of it

NPR spoke with leadership at four companies building thousands of miles of new carbon dioxide pipelines across the United States. Most had heard of what happened in Satartia.

"We take those learnings, and we study those cases and we implement safeguards so we don't repeat those incidents," says Arenivas of EnLink, who says they educate local communities about what will go through the pipe.

"We are very well aware of what happened in Satartia," says Elizabeth Burns-Thompson, vice president of government and public affairs for Navigator CO2, which is building carbon dioxide pipelines across Iowa, Nebraska, Illinois, South Dakota and

part of Minnesota. She says the company is holding meetings with first responders and communities even before breaking ground. And they're looking at new safety precautions, including contracting with a university research team about adding an odorant to their CO₂. "The odorant that we're looking at has a garlic aroma," she says.

Navigator and the company Summit tell NPR that in light of the updated regulatory advisory following Satartia, they are continuing to look at hazards from weather and soil along the entirety of their lines.

Mike Fernandez, a senior vice president at Enbridge, a pipeline company that is building carbon dioxide pipelines in Texas, said he had not heard about the Satartia incident. But he adds: "What you have to do is you have to let science and innovation kind of lead the way and you need to understand what are the risks. At the same time, what you want to do is try to diminish those risks so that they become smaller factors."

"We are pushing envelopes. We're trying to innovate. We're trying to do something different in the name of saving the planet," Fernandez says. "We all have to realize that there are pluses and minuses with every technology, and some are slightly riskier than others. And we just need to make sure if it is the right thing for us to do in order to reduce carbon dioxide then let's do it, but let's do it with caution."

But U.S. Rep. Jared Huffman, D-Calif., who serves on the House subcommittee covering pipeline safety, questions whether all these pipelines really will help save the planet. "We should be concerned about this from a safety standard. We really have to be concerned about this from a climate perspective as well," he says.

"This entire strategy is being represented as a climate solution, when most of the time it's really not. Most of the time it's really part of the climate problem."



A sign for a carbon dioxide pipeline in Satartia, Miss. There are now about 5,300 miles of CO2 pipelines in the U.S., but in the next few decades, that number could grow to more than 65,000 miles.

Julia Simon/NPR

A climate solution, or more of a climate problem?

Huffman notes that today most of the carbon dioxide transported in pipelines is used for something called "enhanced oil recovery." That's a process where oil companies inject CO2 into oil wells to boost the pressure and pump out more petroleum.

Currently over 70% of carbon capture projects involve "enhanced oil recovery," says Bruce Robertson, energy finance analyst at the Institute for Energy Economics and Financial Analysis, a nonprofit think tank. The CO2 in the pipeline that ruptured in Satartia was headed to an oil field where it would have been used to extract more oil.

While extracting fossil fuels can help make carbon capture projects more profitable, it can ultimately result in more planet-heating emissions. To help meet climate goals, many future projects for carbon capture won't involve extracting oil and will simply store the CO2 deep underground. But there are still questions about carbon capture's viability as a climate solution, says Robertson. He and his colleagues analyzed some of the world's largest carbon capture projects and found most of them underperformed on emission reduction targets, and many were over budget.

"Is this a good way to spend money to reduce emissions? The answer's no. The answer is definitely no," Robertson says.

Ultimately, Huffman worries that many CO2 pipelines and carbon capture projects will end up extending the life of fossil fuel operations. "This CO2 pipeline scheme is their lifeline," he says.

Back in Satartia, Burns walks by the spot on the road where the Cadillac stalled and he lost consciousness. The site of the pipeline rupture is just through the trees, less than

half a mile away.

These days, Burns avoids this patch of road. "I always stay on the highway. I try my best not to even come down." He now takes the long way to his mom's house. As for the communities across the country getting new carbon dioxide pipelines, Burns says he hopes they get more safety precautions. But mainly, he feels sorry for them.

Emergency director Willingham says in an ideal world, these CO2 pipelines wouldn't get built. If they are, he thinks everyone needs to learn about Satartia. He says: "And I think that the question that your decision-makers have to ask themselves is 'Do you want to live on that pipeline?'"

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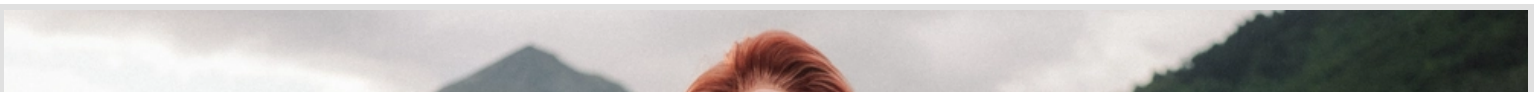
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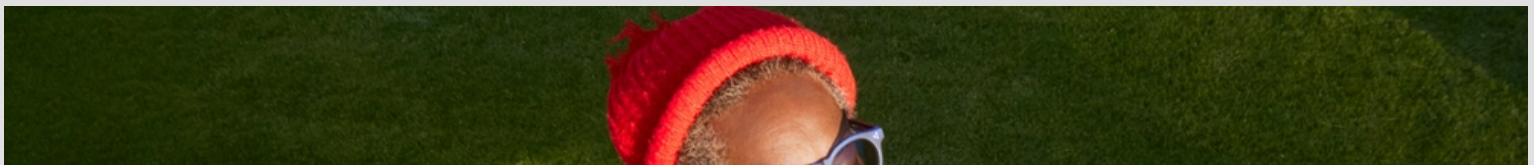
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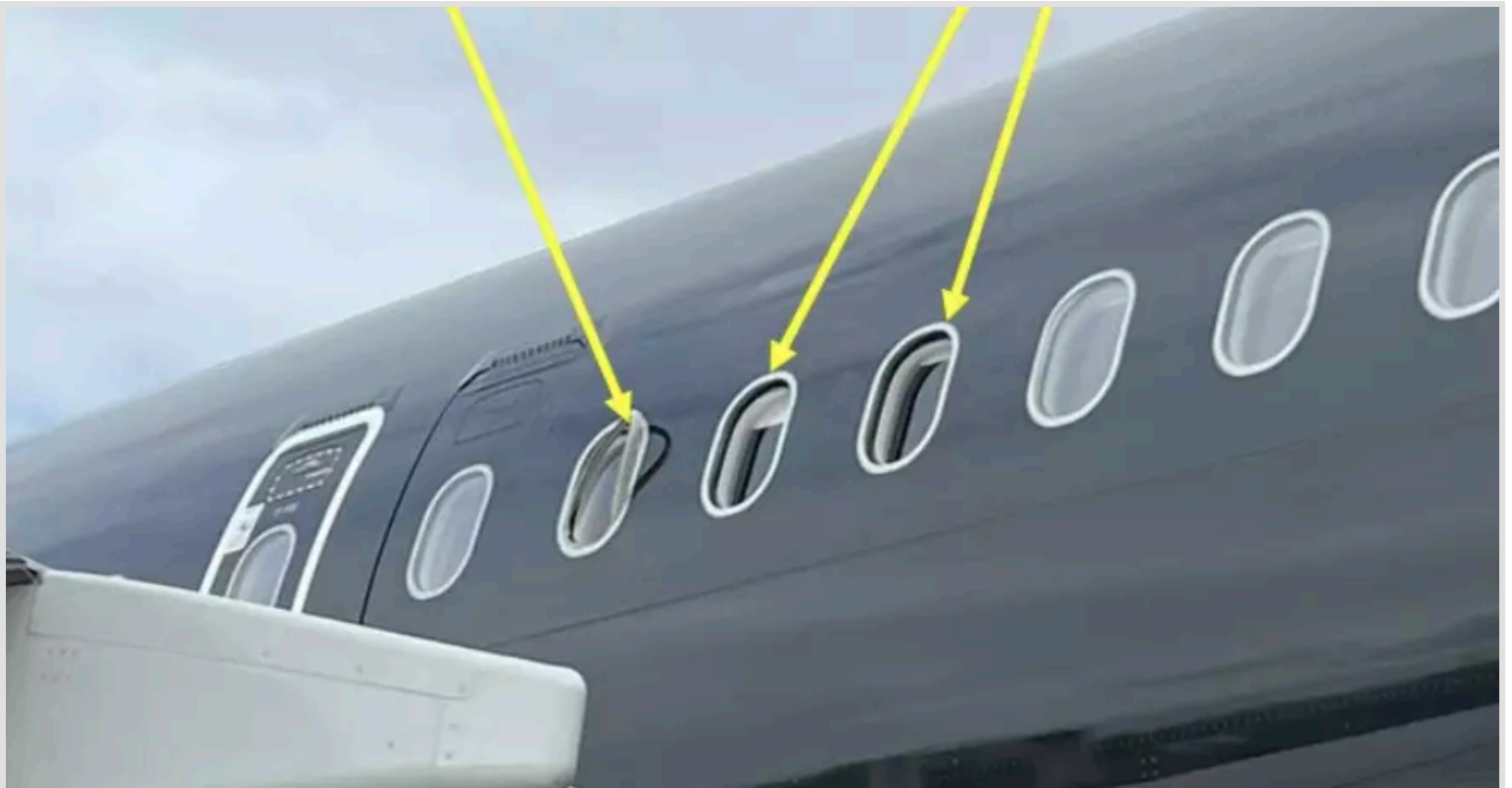
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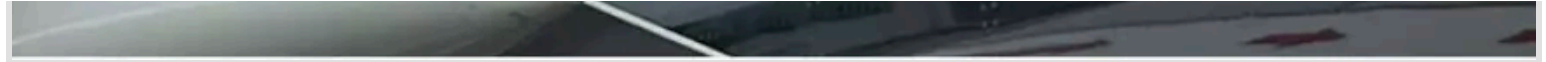
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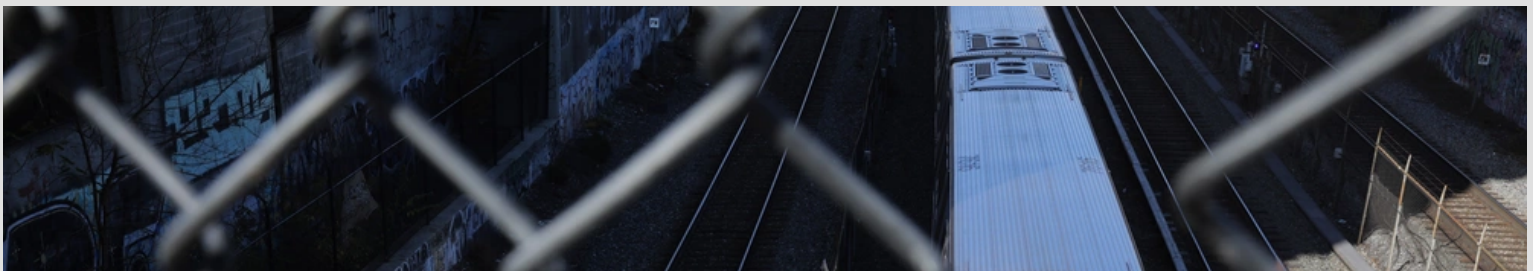
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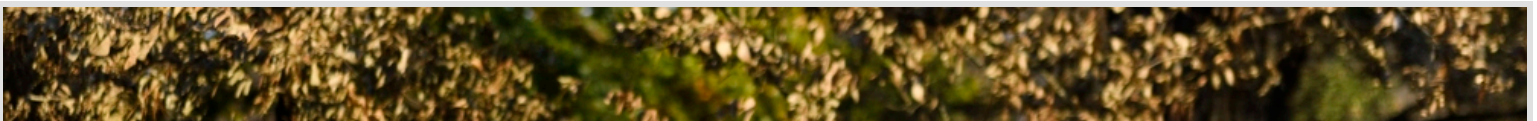
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